

The Light company

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October 31, 1985
ST-HL-AE-1511
File No.: G9.17

Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Responses to
Verbal NRC Questions on the FHAR

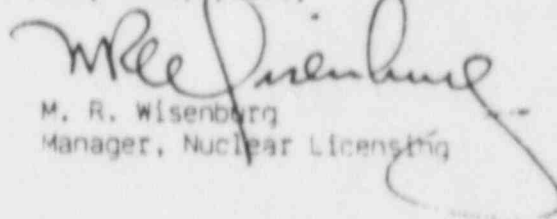
Dear Mr. Knighton:

The attachments enclosed provide STP's response to Fire Hazards Analysis Report (FHAR) questions and comments that were verbally given to HL&P in a meeting on October 25, 1985.

The attachments include mark-ups of FHAR pages (where appropriate) which will be incorporated in a future FHAR amendment.

If you should have any questions on this matter, please contact Mr. M. E. Powell at (713) 993-1328.

Very truly yours,


M. R. Wisenberg
Manager, Nuclear Licensing

MEP/yd

Attachments

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PDR ADDCK 05000498
F PDR

L1/NRC/H

Boo!
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Revised 9/25/85

*Full size drawings only, all other w/out full size drawings.

L1/NRC/H

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Responses to
Verbal NRC Questions on the FHAR

A. Comparison to Appendix A of APCSB 9.5-1

<u>Question</u>	<u>Section</u>	<u>Page</u>
1.	A.7	4.2-6

Amendment 2 stated that the portions of the Fire Protection Program (FPP) which is required to protect safe shutdown systems required for fuel load, low power testing and full power will be operable prior to initiating each stage. Appendix A states that the FPP for the entire reactor unit should be operational prior to initial fuel loading in that unit.

Resolution:

HL&P agreed to revert back to the wording in Amendment 1 of the FHAR which stated that the FPP for the entire reactor unit would be operational prior to initial fuel load.

See markup of Section A.7 on page 4.2-6 attached.

APPENDIX A OF APCSB 9.5-1

STP POSITION

A.6. Fuel Storage Areas

The fire protection program (plans, personnel and equipment) for buildings storing new reactor fuel and for adjacent fire zones which could affect the fuel storage zone should be fully operational before fuel is received at the site.

A.7. Fuel Loading

The fire protection program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.

A.6. Fuel Storage AreasNew Fuel Area

The fire protection program (plans, personnel and equipment) for buildings storing new reactor fuel and for adjacent fire zones which could affect the fuel storage zone will be fully operational before fuel is received.

2

A.7. Fuel Loading

The portions of the STP Fire Protection program required to protect safe shutdown systems required for fuel load, low power testing and full power will be operable prior to initiating each stage. The fire brigade will be established, trained and equipped prior to fuel load.

2

The fire protection program for an entire reactor unit will be fully operational prior to initial fuel loading in that reactor unit.

STP PHAR

Attachment
CCHL AE-1511
Page 2 of 102

<u>Question</u>	<u>Section</u>	<u>Page</u>
2.	0.1.a	4.2-20

Explain "This clarification for safe shutdown systems as opposed to safety-related systems..."

Resolution:

See markup of Section 0.1.a on page 4.2-20 attached.

APPENDIX A OF APCSB Q. 5-1

STEP POSITION

D.	General Guidelines for Plant Protection	D.	General Guidelines for Plant Protection
D.1.	Building Design	D.1.	Building Design
D.1.a.	Plant Layouts should be arranged to:	D.1.a.	Redundant safety-related systems and components are generally compartmentalized by heavy concrete walls, so that they are unlikely to be damaged from a single fire. Separate fire areas are developed for separate divisions of safe shutdown systems, except within containment. For further discussion refer to the FSAB Sections 1.0 and 2.0, and the comparison to Appendix B, III.C. This classification for safe shutdown systems as opposed to safety-related systems is consistent with IEC6150, Appendix B requirements.
(1)	Isolate safety-related systems from unacceptable fire hazards, and	(1)	In all cases, adequate fire detection and protection of the safe shutdown systems and components is provided to allow the fire brigade to manually extinguish the fire and bring the plant to cold shutdown. The protection provided for each of these areas is described in Section 3.0 of the Fire Hazard Analysis Report.
(2)	Separate redundant safety-related systems from each other so that both are not subject to damage from a single fire hazard.	(2)	Redundant safety-related systems that are subject to damage from a single fire hazard should be protected by a combination of fire retardant coatings and fire detection and suppression systems.
or		or	

[illegible]

<u>Question</u>	<u>Section</u>	<u>Page</u>
3.	D.1.h	4.2-23

Discuss the walls facing the ESF transformers and diking provisions, etc. to prevent exposure from burning fluid.

Resolution:

See markup on Section D.1.h on page 4.2-23 attached.

4.2 COMPARISON TO APPENDIX A OF APCS 9.5-1

APPENDIX A OF APCS 9.5-1

STP POSITION

- D.1.g. High Voltage - high amperage transformers installed inside buildings containing safety-related systems should be of the dry type or insulated and cooled with non-combustible liquid.
- D.1.h. Buildings containing safety-related systems should be protected from exposure or spill fires involving oil-filled transformers by:
- (1) Locating such transformers at least 50 feet distant, or
 - (2) Ensuring that such building walls within 50 feet of oil-filled transformers are without openings and have a fire resistance rating of at least three hours.
- D.1.i. Floor drains, sized to remove expected fire fighting water flow should be provided in those areas where fixed water fire suppression systems are installed. Drains should also be provided in other areas where hand hose lines may be used if such fire fighting water could cause unacceptable damage to equipment in the area. Equipment should be installed on pedestals, or curbs should be provided as required to contain water and direct it to floor drains. (See NFPA 92M, "Water-proofing and Draining of Floors.") Drains in areas containing combustible liquids should have provisions for preventing the spread of the fire throughout the drain system. Water drainage from areas which may contain radioactivity should be sampled and analyzed before discharge to the environment.

- D.1.g. Dry type transformers are installed inside fire areas containing safety-related systems.
- D.1.h. The only oil-filled transformers in the vicinity of safety-related buildings are two 4.16 kV transformers located 80 feet north of the Diesel-Generator Building, and three auxiliary Engineered Safety Features (ESF) transformers located 30 feet east of the Diesel-Generator Building and 30 feet north of the Electrical Auxiliary Building. Portions of the two walls facing and within 50' of the ESF transformers are 3-hour-rated fire barriers or as noted in the Fire Hazards Analysis Report.
- D.1.i. Floor drains are provided to remove expected firefighting water flow from fixed fire suppression systems or hand hose lines without flooding safety-related equipment. No drains are provided in areas protected by gas suppression systems. Firewater drainage in these areas is provided in adjacent hallways. The methodology and criteria associated with the plant flooding analysis is found in Sections 1.4, 1.6, and 9.3 of the STP FSAR.
- Floor drains in areas having combustible liquid are designed to prevent backflow to safety-related areas through interconnecting drain systems. Drainage from areas that may contain radioactivity are sampled and analyzed prior to discharging to the environment.

2

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STP FSAR

Each of the above oil-filled transformers is located in a separate diked pit sized to contain 100% capacity of the transformer oil plus water flow from the fixed fire suppression system for a 10 minute duration.

A fixed deluge water spray system is installed for protection of each transformer. The systems are automatically actuated by electrically operated thermal detectors and manually by electric fire alarm stations at each unit or a mechanical trip at each deluge valve.

<u>Question</u>	<u>Section</u>	<u>Page</u>
4.	D.1.d	4.2-22

Verify that the HL&P response to the FSAR question 280.12N on combustible interior finishes is correct and includes all such materials.

Resolution:

See markup of FSAR Question 280.12N attached.

Question 280.12N

Provide a list of all interior finish insulation, sound proofing, etc., that are other than noncombustible. Indicate the flame spread and smoke contributed ratings of each material where available. Indicate where their materials are used (by fire area) and in what quantities.

Response

The following finish materials are other than noncombustible:

Suspended acoustical ceiling tiles have a flame spread of 0-25 with a Underwriter Laboratories (UL) label of 25 or under when tested in accordance with ASTM E-84, and will meet the requirements of Federal Specification SS-S-118A. The smoke contributed rating is not available.

Drywall partitions have a flame spread rating of 15 or less and a smoke contributed rating of 0 in accordance with fire test number USG-17-FT-G&H and/or GA-WP-45-1HR, *and are therefore not considered combustible.*

Vinyl asbestos floor tiles have a flame spread rating of 75 or less when tested in accordance with ASTM E-84, a NBS Smoke Chamber 450 or less (Specific Optical Smoke Density), and an UL 992 Flame Propagation Index 4.0 or less.

Epoxy floor topping at 15 or 20 dry mil film thickness has been tested in accordance with ASTM E-84 and exhibits a flame spread of 10, smoke density of 40, and a fuel contribution of 0.

The floor of the Control Room and the Result's Engineer's office are covered with acrilan carpeting that has been tested in accordance with ASTM E-84 and exhibits a flame spread rating of 20, a fuel contribution of 10, and a smoke density of 10.

Thin-film paints on walls and ceiling in other Category I areas have been tested in accordance with ASTM E-84 and exhibit a flame spread rating of less than 25 with zero fuel contribution and smoke density and are therefore not considered combustible.

Wait The above materials are used in building areas normally occupied by the power plant operating personnel, and in non-occupied areas such as corridors, equipment rooms, etc. The approximate quantities are given in square feet and are listed by fire areas in Table Q280.12N-1.

QUESTION 280.12N

INSERT

P There are no combustible finishes in the Diesel Gen. Bldg. & the Isolation Valve Cubicles.

P Thin-film paints applied to non-combustible substrates are not considered combustible.

P The epoxy surfacer applied to concrete floors & walls in the Reactor Containment Building has a Flame spread rating of 10, a Smoke density factor of 15, & a Fuel contribution factor of 0, & is therefore not considered combustible.

TABLE Q280.12N-1

APPROXIMATE QUANTITIES OF NONCOMBUSTIBLES (in square feet)

Building	Fire Area	Epoxy	V-A Tile	Carpeting App-Bd	Ceiling
EAB	2	1940 900			
	1		1020 450	2630 1090	250 2250
	3	17440 620	6530 270	0 1490	5910 2780
	31		0 100		0 500
	4	520 520	820 520		820 1130
	67		4180 240	2240	4560 2090
MAR	21	550 ✓			
	27	20870 11220			
	24	11950 ✓			
	22	4190 ✓			
	2	1940 ✓			
	29	1940 ✓			
	23	24540 40560			
	28	570 ✓			
	32	23900 23,840			
	75	16020 19270			
	30	800 ✓			
	13	460 ✓			
	26	310 ✓			
	3	23270 17440	3540 6530	4010 0	4750 5910
FAE	34	20960			
RCB	All Areas	38160 *	0		

*(From FSAR Table 6.1-4)

<u>Question</u>	<u>Section</u>	<u>Page</u>
5.	D.1.j	4.2-24

Explain "In order for fire to propagate through a stairwell, it must pass through the equivalent 3 hour fire barrier".

Resolution:

See markup of Section D.1.j on page 4.2-24 attached.

Interior Boundary Walls Without Rated Penetration Seals

EL	FA/ZONE	COL LINE	DISCRPTION
10'	23/2103 - 24/2137	J - 30 to 32 J to H 30.5	Reactor makeup storage tank to LWPS Waste Monitor Tank
11'	27/2138 - 3/2130	B - 30 to 31.8 A to B - 30	HALLWAY to Recycle Holdup Tank
29'	23/2114 - 24/2137	E to C - 31 to 32	Radioactive Pipe Chase to LWPS Spent Resin Tank and waste Evap Room
29'	27/2114 - 3/2130	A to B - 30 to 31.8	Radioactive Pipe Chase to Recycle Holdup Tank
29'	23/2114 - 27/2138	B to D - 27 to 30	Radioactive Pipe Chase to Pipe and HVAC Chase
29'	3/2130 - 27/2138	A to B - 30	Boron Recycler Evap to Recycle Holdup Tank
29'	24/2137 - 3/2117	C to E - 32	LWPS Spent Resin Tank and waste Evap to Valve Room and Dry waste Compactor
41'	23/2131 - 3/2130	E to H - 28 to 3	Demineralizer Cubicles to Room 128 Boron Thermal Regen
41'	23/2131 - 3/2117	E - 29 to 32	Demineralizer Cubicles to Low/High Rad Storage
60'	23/2131 - 32/2146	H - 31 to 32	Demineralizer Cubicles to HVAC outside Ex Equi.
60'	23/2131 - 3/2117	E - 30 to 32	Demineralizer Cubicles to End Waste Handling
86'	4/2154 - 6/2085	A to B - 20 to 22	HVAC Equip Room to HVAC outside intake
86'	67/2028 - 6/2085	H to B - 22-24	operation Room/workarea to HVAC Return Plenum
29'	27/2127 - 23/2114	E - 29-30	Valve operating area to Radioactive Pipe Chase
29'	24/182 - 23/2114	E - 30-31	Valve Room to Radio active Pipe Chase
29'	24/157 - 23/2114	E - 31 to 31.8	Valve Operating Room to Radioactive Pipe Chase

Page - 2 of 3

Interior Boundary Walls Without Rated Penetration Seal

EL	FA/ZONE	COL LINE	DISCRPTION
41	24/2137 to 3/2111	E-315 to 32	Valve Room to Low Activity Storage Area
43'	23/2114 to 3/2117	F-30 to 31.5	Radioactive Pipe Chase to Solid Radwaste Handling
29'	24/2136 to 23/2114	H-31 to 32	Processing Area to Radioactive Pipe Chase
24'	24/2137 to 23/2114	H-28 to 31	Laundry Hot Sower Tank to Radioactive P. Chase
50'	23/2103 to 32/2146	11 tons - 32	Reactor Makeup Water Tank to FNB
10'	63/ to 2/2016	mtbS-21 to 24	Reactor Containment to Elect Penetration Area
10'	63/ to 22/2133	mtbS-24 to 27	Reactor Containment to Pipe Penetration Area
25'	63/ to 23/2135	mtbS-21 to 27	Reactor Containment to Pipe Penetration Area
111'	63/ to 3/2031	mtbS-21 to 24	Reactor Containment to Elect Penetration Area
41'	63/ to 3/2114	mtbS-24 to 27	Reactor Containment to Pipe Penetration Area
60'	63/ to 4/2046	mtbS-21 to 27	Reactor Containment to Elect Penetration Area
60'-74'	63/ to 32/2145	mtbS-24 to 27	Reactor Containment to Personnel Access Area
29'-68'	63/ to 35/	Nat.S-26	Reactor Containment to Fuel Handling Building
26'	11/2075 to 6/2014	A.S-20	HVAC DUCT TO OUTSIDE AIR INTAKE STRUCTURE
86'	10/2074 to 6/2014	A.S-20	HVAC DUCT TO OUTSIDE AIR INTAKE STRUCTURE
86'	12/2016 to 6/2014	A.S-20	HVAC DUCT TO OUTSIDE AIR INTAKE STRUCTURE
86'	16/2080 to 6/2085	A.S-22	HVAC DUCT TO HVAC Room
86'	14/2078 to 6/2014	A.S-22	HVAC DUCT TO OUTSIDE AIR INTAKE STRUCTURE
86'	17/2018 to 6/2014	A.S-22	HVAC DUCT TO HVAC Room
86'	22/2122 to 6/2085	A.S-22	HVAC DUCT TO HVAC Room

Interior Boundary Walls Without Rated Penetration Seals

EL	FA/ZONE	COL LINE	DISCRIPTION
60'	32/2146 to 351	M.B-28 to 32	HVAC OUTSIDE EXHAUST
60'	32/2145 to 351	M.B-26 to 28	PERSONNEL ACCESS AREA
41'	23/2103 to 351	M.B-28 to 32	REFUELING WATER
41'	3/2116 to 351	M.B 26.8 to 28	DIPING PENETRATION AREA
10 of 21'	23/2103 to 351	M.B-30.3 to 32	REACTOR MAKEUP TANK
10 of 21'	23/2104 to 351	M.B-30 to 30.5	REFUELING WATER STORAGE

<u>Question</u>	<u>Section</u>	<u>Page</u>
6	D.1.j	4.2-24
(also Section III.G. pg 4.1-12)		
	D.3.d	4.2-30

Identify and explain the deviations to the 3 Hour Fire Rated Barriers.

Resolution:

See markup of Section D.1.i on page 4.2-24 and of Section D.3.d on page 4.2-30. Also see the responses to Question 6.

APPENDIX A OF APCS 9.5-1

STP POSITION

D.1.i. (Cont'd)

If accumulation of water from the operation of new fire suppression systems does not create unacceptable consequences drains need not be installed.

D.1.i. (Cont'd)

D.1.j.

Floors, walls and ceilings enclosing separate fire areas should have minimum fire rating of three hours. Penetrations in these fire barriers, including conduits and piping, should be sealed or closed to provide a fire resistance rating at least equal to that of the fire barrier itself. Door openings should be protected with equivalent rated doors, frames and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be normally closed and locked or alarmed with alarm and annunciation in the control room. Penetrations for ventilation system should be protected by a standard "fire door damper" where required. (Refer to NFPA 80, "Fire Doors and Windows.")

D.1.j.

Floors, walls, and ceilings (including penetrations) which separate fire areas have either a fire resistance rating of 3 hours or ~~will be evaluated by a Registered fire protection Engineer to ensure that the boundaries are acceptable.~~ Door openings are protected by approved fire doors, frames, and hardware or special function doors which have been evaluated to provide an equivalent level of fire protection. This evaluation has been reviewed and approved by a registered Fire Protection Engineer. Refer to Section 4.1, Comparison to Appendix B, Section III.M for fire door surveillance methods. The penetrations for ventilation systems are protected by standard "fire door dampers," as indicated in the Fire Hazard Analysis Report.

meet the following criteria:

Rated penetration seals and HVAC dampers are not provided when the Fire Area boundaries communicate with an area of low in-situ combustible loading. It is unlikely a fire would propagate through the non-rated assemblies to other fire areas as there are no direct combustible pathways. NO penetration openings exceed 4'x4' in size and are located such as not to provide a direct path for flame spread beyond the bounding walls. In specific cases when 4'x4' horizontal openings exist combustibles are located only on one side and are approximately 5ft from the penetration opening. Detection is provided as a minimum on at least one side of the bounding for early warning of a fire with hose stations and portable extinguishers available for manual fire fighting.

STP FHAR

Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 17 of 107

4.2 COMPARISON TO APPENDIX A OF APCS 9.5-1

APPENDIX A OF APCS 9.5-1

STP POSITION

D.3.c (Cont'd)

D.3.c. (Cont'd)

Cables are designed to allow wetting with deluge water without electrical faulting. Manual hose stations and portable hand extinguishers are provided strategically around the plant. Concentrations of safety-related cable outside of containment are provided with area fire detection. Inside containment, concentrations of safety-related cables are equipped with thermal line-type detectors. Safety-related equipment in the vicinity of automatic water suppression systems are protected from the effects of system malfunction, if required. See response to Item A.5 above and FSAR Section 3.6 for further information.

1

2

1

2

D.3.d. Cable and cable tray penetration of fire barriers (vertical and horizontal) should be sealed to give protection at least equivalent to that fire barrier. The design of fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E-119, "Fire Test of Building Construction and Materials," including the hose stream test.

D.3.d. Openings through designated fire barriers for pipe, conduit, and cable trays which separate fire areas are sealed to provide a fire resistance rating at least equal to that of the barrier itself or have been evaluated by a Registered Fire Protection Engineer to ensure acceptability of the boundary.

1

Fire barrier penetration seals are qualified as stated in Appendix R, Section III.M.

1

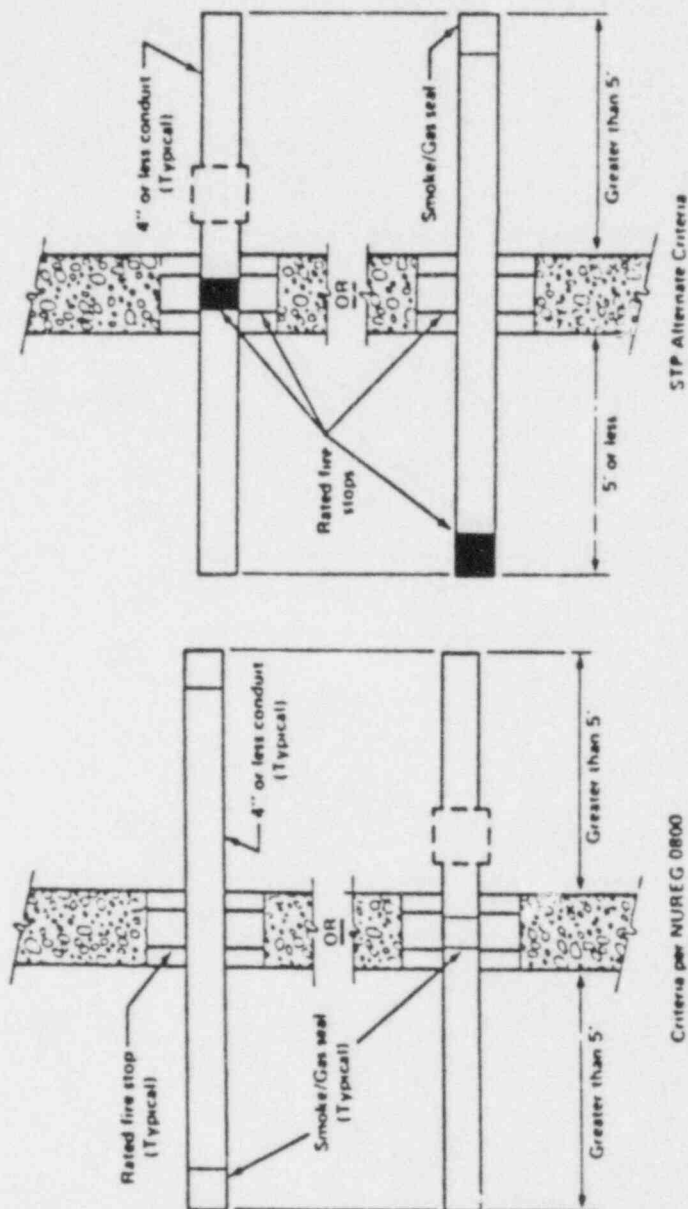
STP FHAR

4.2-30

Amendment 2

Openings inside conduits 4 inches or less in diameter will be sealed at the fire barrier with a rated fire stop if the conduit terminates within 5 feet of the barrier or if access (e.g. conduit) is available within 5 feet of the fire barrier. If the conduit extends greater than 5 feet on each side of the barrier it will be sealed at both ends with noncombustible smoke/gas seals. See Figure 4-1, Penetration Seal Detail.

Attachment 1
ST-HL-AE-1511
File No. G9
Page 18 of 102



SOUTH TEXAS PROJECT UNITS 1 & 2

PENETRATION SEAL DETAIL

Figure 4-1

<u>Question</u>	<u>Section</u>	<u>Page</u>
7.	D.3.c	4.2-28, 29

Revamp the HL&P response to having sprinklers in concentrated cabling areas.

Resolution:

See the new writeup of Section 1.3.2 "Fixed Suppression" and Figures 1-1, 1-2, and 1-3 attached.

STP FHAR

1.3.2 Fixed Suppression

The STP fire protection program provides for manual and automatic fire suppression capabilities to prevent the spread of fire between fire zones or fire areas. The FHA evaluated those areas within STP where safe shutdown systems are located and where combustible materials such as concentrations of cables in trays exist outside of the cable spreading rooms/power cable vault.

As a result of the FHA, fixed fire suppression systems will be provided for substantial fire hazards such as diesel fuel, charcoal filters, oil filled transformers and laundry/change areas. Automatic wet pipe sprinkler protection, at the ceiling level, will be provided throughout the cable spreading rooms and power cable vault.

The STP fire protection program provides for manual suppression to prevent the spread of fire between fire zones or fire areas in plant areas with moderate or limited fire hazards, except for certain concentrations of cable in trays outside of the cable spreading rooms/power cable vault. An evaluation has been performed to determine which cable tray configurations are to be classified as "concentrated" or "not concentrated".

The evaluation consisted of a walkdown of the entire plant to review cable tray configurations against developed criteria (see Figures 1-1 and 1-2). If a cable tray grouping was determined to be "concentrated", the fire area was analyzed to determine if manual suppression was adequate.

With regard to adequacy of manual suppression the evaluation looked at whether or not early warning automatic fire detection was in the area, availability of hose stations, the accessibility to all parts of the room, the effective reach of a hose stream to all areas, and the extent of combustible loading within the fire area/zone. With regard to the latter item an analysis was made as to the amount of combustibles in the area and the specific configuration

(i.e. number of cable trays, how they are grouped, height of tray stacks, and separation distance between trays). Figure 1-3 illustrates the logic flowpath used in this evaluation.

Numerous areas were identified within the plant that are classified as containing "concentrated" cable tray configurations. It was further determined that all "concentrated" areas can be adequately controlled by manual fire suppression. However, some rooms contain cable tray configurations which form physical barriers such as to make the manual fire suppression efforts more difficult; all areas are reachable by at least one effective hose stream, but the response time would be lengthened due to the presence of the barriers. Therefore, in these areas automatic wet pipe sprinkler protection will be provided at the ceiling level. The manual and automatic suppression provided will control the fire within the area.

As a result of the evaluation it was determined that no area of the plant contains a concentration of combustibles that could develop a fire growth scenario such that the fire could not be approached and/or controlled within a given fire area by manual suppression efforts.

Figure 1-2

Examples of Concentrated Cable Trays -

Attachment 1

ST-HL-AE-1511

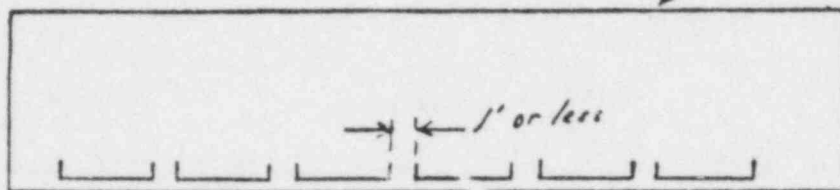
File No. 89.17

Page 53 of 108

Configuration

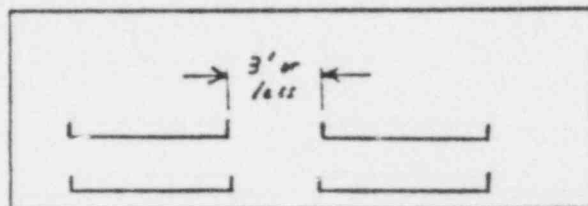
1.

Cable close/shaft →



Six (6) trays adjacent
with separation one (1)
foot or less

2.

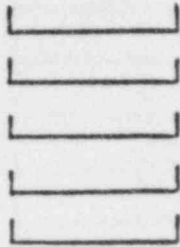


Two (2) adjacent stacks
with separation three (3)
feet or less, each stack
with two (2) or more trays
back to back

Figure 1-1

Examples of Concentrated Cable Trays - Horizontal Configuration

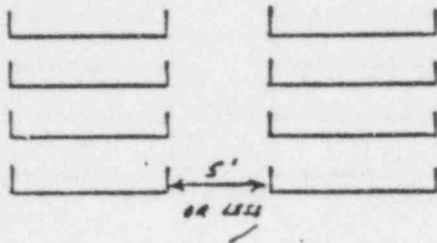
1.



MORE THAN 4 TRAYS

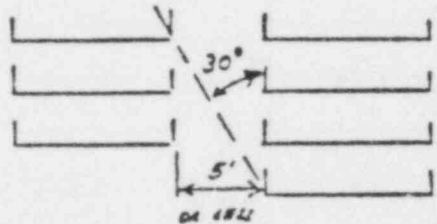
A single stack of cable trays more than four (4) trays high

2.



Adjacent horizontal runs located five (5) feet or less separation, with more than three (3) trays in each vertical stack

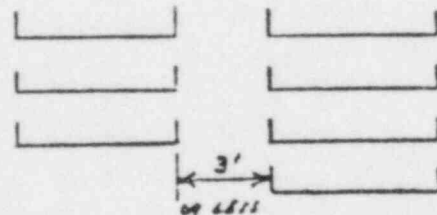
3.



WITHIN 5' HORIZONTALLY AND 30°

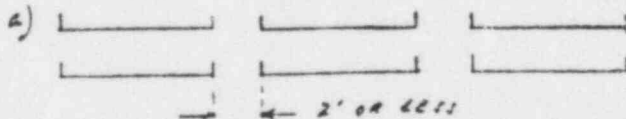
A stack that is more than three (3) trays high that is less than five (5) feet apart horizontally from a stack of three (3) or more trays which fall within a 30 degree angle from the vertical, starting at the closest edge of the bottom tray

4.



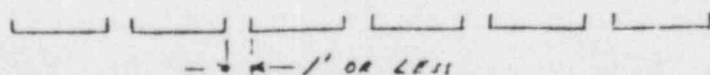
A stack that is more than three (3) trays high that is three (3) feet or less horizontally from an adjacent stack of three (3) trays.

5.



Two (2) trays high with horizontal separation two (2) feet or less

b)

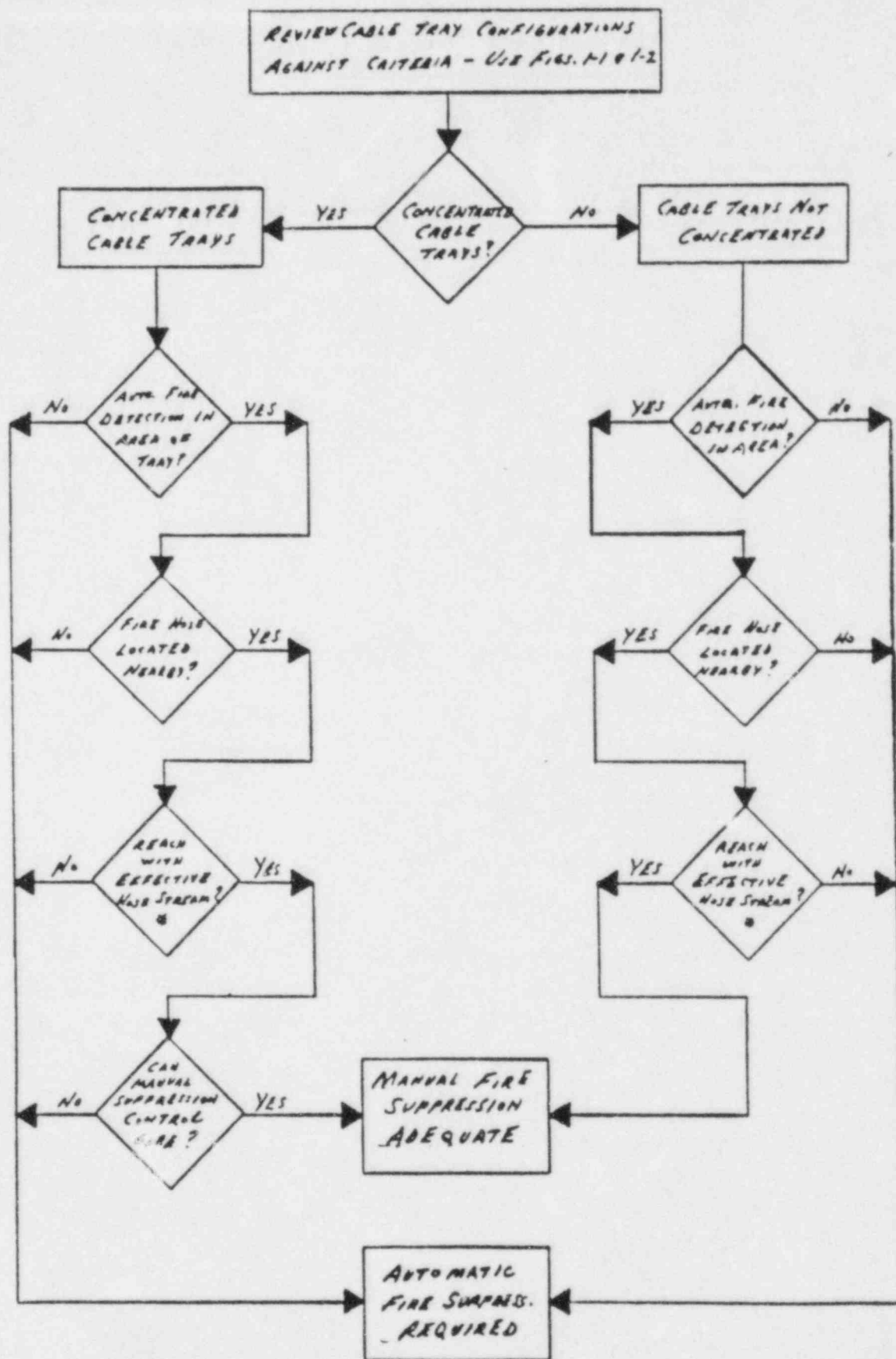


Six (6) trays adjacent with separation one (1) foot or less

LOGIC FOR DETERMINING THE TYPE OF FIRE SUPPRESSION SYSTEM, MANUAL OR AUTOMATIC, FOR ALL CABLE TRAYS OUTSIDE CABLE SPANNING ROOMS, POWER CABLE VAULT

Attachment 1

File No. 69-17
Page 25 of 108



* TO ACHIEVE, CREDIT MAY BE TAKEN FOR USE OF PORTABLE LADDERS AND ADEQUATE CLEARANCE IN ACCESS PATHS

<u>Question</u>	<u>Section</u>	<u>Page</u>
8.	D.4	4.2-33

Clarify smoke purge modes of the EAB and MAB and ensure the response to FSAR Question 280.09N is consistent.

Resolution:

See markup of FSAR Question 280.09N and the associated HL&P response attached.

Question 280.09N

You indicate that the normal ventilation systems will be used to provide venting of smoke and other combustion products. Verify that the ventilation systems are designed to handle the high temperature gases which may be expected. Also provide a description of the operating mode of all such equipment serving each area in the event a fire were to occur in that area. Indicate the operating modes of the ventilation systems in areas adjacent to the fire areas.

ResponseResponse

The normal ventilation systems will provide ^{Venting} ~~purging~~ of combustion products and gases from the affected fire area until the fusible thermal links melt and release the fire dampers which will isolate the area from adjacent areas and also from the normal ventilation system supply and exhaust ductwork. ⁴⁷ The combustion products from the isolated area will be removed by portable vent fans and will not be transferred into any areas containing safe shutdown equipment or stairwells within the building. ³³

For those areas where normal ventilation air is staged from one cubicle to another, the fire dampers will isolate the affected cubicle from adjacent cubicles. The safety-related equipment that may be located in the adjacent cubicles will not be affected since the primary means of cooling is achieved by dedicated essential chilled water fan-coil units that are completely independent of the normal ventilation systems. ⁴⁷ ³³

Smoke and heat removal is addressed in the STP Fire Hazard Analysis Report. ⁴⁷

LATER OPERATOR ACTION TO SHUT DOWN THE SYSTEM IN THE FIRE AFFECTED AREA OR DAMPER CLOSURE DUE TO FUSIBLE LINK MELT AND SUBSEQUENT DAMPER RELEASE, WILL PREVENT THE RECIRCULATION OF SMOKE IN ANY SAFETY-RELATED BUILDING. IN THE CASE OF THE LAD, THE OPERATOR CAN ALSO MANUALLY ACTUATE CERTAIN DAMPERS TO PROVIDE 100% MAKEUP WITH NO RECIRCULATION. IN THE CASE OF THE EPB THIS WOULD PROVIDE MINIMAL SMOKE REMOVAL IN THOSE AREAS CONTAINING SMOKE, PREVENTING DAMPER CLOSURE.

<u>Question</u>	<u>Section</u>	<u>Page</u>
9.	E.1	4.2-38
	(III.F	4.1-10)

Identify any safety related areas which do not have detection and explain.

Resolution:

See the markup of Section E.1 on page 4.2-38 attached.

<u>Question</u>	<u>Section</u>	<u>Page</u>
10.	E.1	4.2-38

Identify the deviations from NFPA 72D by enveloping the distance and providing justification.

Resolution:

See markup of Sectionn E.1 on page 4.2-38 attached.

4.2 COMPARISON TO APPENDIX A OF APCSB 9.5-1

APPENDIX A OF APCSB 9.5-1

STP POSITION

E. Fire Detection and Suppression

E.1. Fire Detection

E.1.a. Fire detection systems should as a minimum comply with NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems."

E.1.b. Fire detection systems should give audible and visual alarm and annunciation in the control room. Local audible alarms should also sound at the location of the fire.

E.1.c. Fire alarms should be distinctive and unique. They should not be capable of being confused with any other plant system alarms.

E. Fire Detection and Suppression

E.1. Fire Detection

E.1.a. Detection systems are provided for areas that contain or present a fire exposure to safe shutdown systems, ~~and all but a few safety-related equipment areas due to radiation levels~~ and plant configuration (e.g., no combustibles present). These detection systems comply with the requirements as defined in NFPA 72D-1975 except for the interconnection wiring between the local fire panel and the transmitter which transmits the signals to the control room panel. This is not considered significant since the fire panel and transmitter are NORMALLY located ~~near~~ each other, interconnection wiring is run in steel conduit, and the circuits are supervised. The fire detectors are being selected and will be located in accordance with NFPA 72-E, 1978.

E.1.b. Fire alarm bells and system trouble alarm horns provide audible alarms at the local control panels that provide the fire protection system control for each fire hazard. These local control panels are normally located in the vicinity of the fire hazards that they protect. Fire protection alarms are annunciated in the control room, displayed visually by cathode ray tube, and recorded automatically by printer to provide a permanent record.

E.1.c. Fire Alarms are distinctive and unique from other alarms.

IN SOME AREAS OF THE PLANT, DETECTORS WERE NOT INSTALLED DUE TO THE PRESENCE OF HIGH RADIATION LEVELS, LOW COMBUSTIBLE LOADINGS, ETC. THESE AREAS CAN BE ORGANIZED INTO SEVERAL GROUPS. THE GROUPS AND THE BASIS FOR DETERMINING THAT PLANT SAFETY IS NOT ENDANGERED BY THEIR DETECTION ARE:

2

2

WITHIN 4' TO 6' OF STP PHAR BUT NOT GREATER THAN 20'

Attachment 1
ST-HL-AE-151110
File No.: G9417
Page 30 of K12

GROUP	PLANT AREA	BASIS
1	REACTOR CONTAINMENT	LOW COMBUSTIBLE LOADING IN UNHABITED AREAS. (FINE TYPE THERMAL DETECTION IN CABLE TRAYS)
2	FUEL HANDLING BLDG - CASK DECON AREA TANK AREA	HIGH RADIATION LEVELS LOW COMBUSTIBLE LOADING, NO SAFE SHUTDOWN EQUIPMENT
3	MECHANICAL AUXILIARY BLDG - VALVE ROOMS, TANK ROOMS, etc. (NOT INCLUDING SYSTEM CONTROL ROOM (SCRS))	HIGH RADIATION LEVELS LOW COMBUSTIBLE LOADINGS
4	MECHANICAL AUXILIARY BLDG - PIPE CHASES, VENTILATION PLENUMS	LOW COMBUSTIBLE LOADINGS LIMITED SOURCE FOR IGNITION
5	TENDON GALLERIES	LIMITED SOURCE FOR IGNITION
6	PERSONNEL AIRLOCKS	DETECTION FROM ADJACENT AREAS AVAILABLE LOW COMBUSTIBLE LOADING
7	STAIRWELLS	NO SAFE SHUTDOWN EQUIP LOW COMBUSTIBLE LOADING

THE COMBUSTIBLE LOADING IN THESE AREAS CORRESPOND TO
A FIRE DURATION OF LESS THAN ONE-HALF HOUR.

<u>Question</u>	<u>Section</u>	<u>Page</u>
11.	E.2.e	4.2-41

Explain the largest flow demand which was used in verifying the 2 Hour Fire Water Tank Capacity.

Resolution:

See markup of Section III.A on page 4.1-7 attached.

4.1 COMPARISON OF STP UNITS WITH REQUIREMENTS OF APPENDIX R

APPENDIX R REQUIREMENTS

III. SPECIFIC REQUIREMENTS

- III.A. Water supplies for fire suppression systems. Two separate water supplies shall be provided to furnish necessary water volume and pressure to the fire main loop.

Each supply shall consist of a storage tank, pump, piping, and appropriate isolation and control valves. Two separate redundant suctions in one or more intake structures from a large body of water (river, lake, etc.) will satisfy the requirement for two separated water storage tanks. These supplies shall be separated so that a failure of one supply will not result in a failure of the other supply.

Each supply of the fire water distribution system shall be capable of providing for a period of 2 hours the maximum expected water demands as determined by the fire hazards analysis for safety-related areas or other areas that present a fire exposure hazard to safety-related areas.

When storage tanks are used for combined service-water/fire-water uses the minimum volume for fire uses shall be ensured by means of dedicated tanks or by some physical means such as a vertical standpipe for other water service. Administrative controls, including locks for tank outlet valves, are unacceptable as the only means to ensure minimum water volume.

STP POSITION

III. SPECIFIC REQUIREMENTS

- III.A. Two separate dedicated water supplies consisting of two tanks of approximately 270,000 gallons each for fire protection water are installed. The tanks are interconnected so that the fire pumps can take suction from either or both tanks. A failure of one supply will not result in a failure of the other supply.

The fire water supply is calculated on the basis of the largest expected flow rate of a period of two hours for safety-related areas or other areas that present a fire exposure hazard to safety-related areas. The fire water supply is capable of delivering this design demand over the longest route of the water supply system. The fire water supply system includes an underground yard fire main loop of cement-lined ductile iron pipe. The water supply (Fresh Water System) is capable of refilling either tank in less than 8 hours.

The largest expected flow rate has been calculated as follows: largest design demand of any suppression system plus 500 gpm for manual hose streams for a minimum duration of two hours equals 241,788 gallons minimum water supply required.

STP FHAR

Attachment 1
ST-HL-A-311
File No: CG 17
Page 30 of 42

<u>Question</u>	<u>Section</u>	<u>Page</u>
12.	E.3.b	4.2-43

Identify the unsupervised valves and the provisions for ensuring water flow.

Resolution:

See the markup of Section E.3.b on page 4.2-43 attached.

4.2 COMPARISON TO APPENDIX A OF AP-108 9.5-1

APPENDIX A OF APCS 9.5-1

STP POSITION

E.3. Water Sprinklers and Hose Standpipe Systems

- E.3.a. Each automatic sprinkler system and manual hose station standpipe should have an independent connection to the plant underground water main. Headers fed from each end are permitted inside buildings to supply multiple sprinkler and standpipe systems. When provided, such headers are considered an extension of the yard main system. The header arrangement should be such that no single failure can impair both the primary and backup fire protection systems.

Each sprinkler and standpipe system should be equipped with OS&Y (outside screw and yoke) gate valve, or other approved shutoff valve, and water flow alarm. Safety-related equipment that does not itself require sprinkler water fire protection, but is subject to unacceptable damage if wetted by sprinkler water discharge, should be protected by water shields or baffles.

- E.3.b. All valves in the fire water systems should be electrically supervised. The electrical supervision signal should indicate in the control room and other appropriate command locations in the plant (See NFPA 26, "Supervision of Valves.").

E.3. Water Sprinklers and Hose Standpipe Systems

- E.3.a. STP complies. Each automatic sprinkler system and hose station standpipe system in safety-related buildings is either connected independently to the plant underground water main or connected to a header within the building. If such a header is used, two widely separated connections will be provided between the header and the underground main. Adequate isolating valves are provided in the main, the header, and in each system to ensure that no single failure could impair both the primary and backup fire protection systems. Isolating valves installed underground are of the post indicator type; isolating valves installed above ground are of the OS&Y type. Automatic sprinkler systems are equipped with water flow alarms. The effect of sprinkler water discharge is evaluated as part of the systems interaction evaluation. Protection requirements, if any, are noted in STP PSAR Section 3.6.

- E.3.b. ~~Valves in the fire protection system whose improper positioning could affect the performance of the system are supervised. This supervision is accomplished either by tamper switches which are installed on the valves and which provide alarms in the control room if the valve position is changed, or by locking the valves in the required position and providing strict administrative controls.~~

SEE ATTACHED SHEET

STP PSAR

Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 25 of 102

4.2-43

Amendment 1

E.3.6

THE VALVES IN THE FIRE PROTECTION SYSTEM WHOSE IMPROPER POSITIONING COULD AFFECT THE PERFORMANCE OF THE SYSTEM ARE EITHER SUPERVISED OR HAVE THEIR POSITION VERIFIED BY PROCEDURE IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS. THE VALVES IN THE FIRE PROTECTION SYSTEM WHICH ENSURE THE AVAILABILITY OF WATER FROM THE FIRE WATER STORAGE TANKS TO THE UNIT 1/UNIT 2 FIRE LOOPS AND FROM THE LOOPS TO THE HEADERS INSIDE THE SITE STRUCTURES ARE SUPERVISED, I.E. THEY PROVIDE ALARMS AT LOCAL PANELS AND ON A CONTROL ROOM CRT WHEN NOT IN THEIR NORMAL ALIGNMENT. SOME EXAMPLES OF SUPERVISED VALVES INCLUDE TANK ISOLATION VALVES, FIRE PUMP SUCTION AND DISCHARGE VALVES, BUILDING HEADER ISOLATION VALVES, AND SPRINKLER OR DELUGE SUPPLY VALVES. NON SUPERVISED VALVES CONSIST OF VALVES WITH LOCAL INDICATION, I.E. POST INDICATING, AND THOSE WITHOUT ANY DIRECT MEANS OF POSITION INDICATION. THE LATTER GROUP OF VALVES CONSISTS OF VALVES SUCH AS CHECK VALVES AND RELIEF VALVES WHICH ARE CONTROLLED BY THE CONDITION OF THE FIRE PROTECTION SYSTEM, ^{AND} VENT AND DRAIN VALVES OR INSTRUMENT ROOT VALVES WHOSE POSITIONS ARE CONTROLLED BY THE FIRE PROTECTION SYSTEM OPERATING PROCEDURE. THE POSITION OF VALVES WITH LOCAL INDICATION, SUCH AS THE MAIN FIRE LOOP SECTOR ISOLATION VALVES, AND SUPERVISED VALVES IS VERIFIED BY PROCEDURE IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS. THE NON INDICATING VALVES WHICH ARE NOT LOCKED IN PLACE HAVE BEEN EVALUATED AND THEIR REPOSITIONING WILL NOT AFFECT THE PROPER OPERATION OF THE FIRE PROTECTION SYSTEM.

VALVES WHICH ARE ELECTRICALLY SUPERVISED ARE SHOWN ON THE FIRE PROTECTION P&ID'S IN SECTION 9.5 OF THE FSAR.

Question
13.

Section
E.3.c

Page
4.2-44, 44a

Explain variances from NFPA 13.

Resolution:

See markup of Section E.3.c on page 4.2-44a attached.

E.3.c. (Cont'd)

THE QUANTITY OF SPRINKLERS PROVIDED WILL BE AT LEAST EQUAL TO NFPA 13 QUANTITIES BASED ON 100 SQ FT / SPRINKLER. ADDITIONAL SPRINKLERS WILL BE INSTALLED UNDER OBSTRUCTIONS WHICH EXCEED 4 FEET IN WIDTH. CABLE TRAYS ARE NOT CONSIDERED OBSTRUCTIONS, SINCE THERE IS TYPICALLY 3 TO 4 FT. OF CLEARANCE ON AT LEAST ONE SIDE OF A TRAY OBSTRUCTING.

E.3.c. (Cont'd)

Although the design for special hazard sprinkler systems has not yet been completed, the anticipated variances from NFPA 13 will be:

- o Coverage - These systems will be provided at the ceiling level to aid in cooling and controlling a fire until manual suppression is achieved.
- o Spacing and Location - Heads will be spaced and oriented to achieve the maximum wetting of tray stacks from the ceiling level.
- o Design Density - These systems will be designed to provide an average density of 0.3 gpm/sq. ft. over any 3,000 sq. ft. of floor area.

A SPECIAL HAZARD SPRINKLER SYSTEMS FOR CABLE TRAYS ARE DESIGNED TO PROVIDE AN AVERAGE DENSITY OF 0.3 gpm/sq. ft. OVER ANY 3,000 SQ. FT. OF FLOOR AREA.

SOME SPRINKLER HEAD LOCATIONS MAY EXCEED NFPA 13 GUIDELINES REGARDING AREA OF COVERAGE PER SPRINKLER, BUT MAXIMUM PROTECTED AREA PER SPRINKLER WILL NOT EXCEED 200 SQ. FT.

<u>Question</u>	<u>Section</u>	<u>Page</u>
14.	E.3.d.	4.2.-45

Explain whether or not the noncollapsible hoses are rated.

Resolution:

See the markup of Section E.3.d on page 4.2-45 attached.

4.2 COMPARISON TO APPENDIX A OF APCSB 9.5-1

APPENDIX A OF APCSB 9.5-1

STP POSITION

E.3.d. Interior manual hose installation should be able to reach any location with at least one effective hose stream. To accomplish this, standpipes with hose connections, equipped with a maximum of 75 feet of 1-1/2-inch woven jacket-lined fire hose and suitable nozzles should be provided in all buildings, including containment, on all floors and should be spaced at not more than 100-foot intervals. Individual standpipes should be of at least 4-inch diameter for multiple hose connections and 2-1/2-inch diameter for single hose connections. These systems should follow the requirements of NFPA 14, "Standpipe and Hose Systems" for sizing, spacing and pipe support requirements.

Hose stations should be located outside entrances to normally unoccupied areas and inside normally occupied areas. Standpipes serving hose stations in areas housing safety-related equipment should have shut off valves and pressure reducing devices (if applicable) outside the area.

E.3.d. The standpipe systems are described in the FHAR comparison to Appendix W, Section III.D.

Hose lengths are 75 feet where feasible, but hose lengths of 100 feet are utilized as required and as permitted by NFPA 14, 1976 Edition. 1-1/2 in. woven jacket-lined fire hoses and suitable nozzles installed on semiautomatic racks in hose cabinets are used where feasible. Braided, noncollapsible hoses installed on hose reels are used wherever the ability to have a hose stream immediately available, without having to unrack a complete length of hose, would be advantageous. Individual standpipes are minimum 4 in. in diameter for multiple fire hose connections and 2-1/2 in. in diameter for single fire hose connection.

Each standpipe is provided with a shut-off valve. Each fire hose reel or cabinet is provided with a dual function shut-off-pressure reducing devices, as required.

ALL ARE
UL LISTED AND/OR F.M. RATED

2

2

STP FHAR

Attachment 1
ST-HAR-1511
Page 40 of 102

<u>Question</u>	<u>Section</u>	<u>Page</u>
15.	F.2	4.2-55

Provide more information on the cable trays above suspended ceiling in control room.

Resolution:

See the markup of Section F.2 on page 4.2-55 attached.

4.2 COMPARISON TO APPENDIX A OF APCSB 9.5-1

APPENDIX A OF APCSB 9.5-1

STP POSITION

F.2. Control Room (Cont'd)

The control room ventilation intake should be provided with smoke detection capability to automatically alarm locally and isolate the control room ventilation system to protect operators by preventing smoke from entering the control room. Manually operated venting of the control room should be available so that operators have the option of venting for visibility.

Cables should not be located in concealed floor and ceiling spaces. All cables that enter the control room should terminate in the control room. That is, no cabling should be simply routed through the control room from one area to another.

If such concealed spaces are used, however, they should have fixed automatic total flooding Halon protection.

F.2. Control Room (Cont'd)

The HVAC system return ducts from the control room contain smoke detectors which actuate an alarm in the control room. Upon receiving this alarm the operator can remote-manually close the return dampers from the control room and divert the smoke to the outdoors. This allows the HVAC System to be put into the smoke purge mode.

The STP control room has a partial suspended ceiling with cabling above it. Cabling which enters the control room terminates there. ~~Small amounts of lighting and communication cabling are routed through the room and suspended ceiling.~~

A fixed automatic total flooding Halon protection is not provided for cables in this area.

THE IN SITU COMBUSTIBLE LOADING IN THE AREA ABOVE THE SUSPENDED CEILING CONSISTS ENTIRELY OF IEEE 323 CABLES. THE CABLES ARE ROUTED IN TRAYS OR CONDUIT WHICH RISE VERTICALLY OUT OF THE CABINETS LOCATED BELOW THE CEILING. THE TRAYS EITHER CONTINUE TO RISE VERTICALLY THROUGH THE AREA OR ROTATE AND EXIT THROUGH THE SIDE WALLS. IN NO CASE ARE TRAYS STACKED ABOVE EACH OTHER. IONIZATION DETECTORS ARE PROVIDED IN THE SPACE ABOVE THE CEILING TO PROVIDE EARLY WARNING OF A FIRE. A SEISMIC CATWALK HAS BEEN PROVIDED ABOVE THE CEILING TO ENSURE HOSE STREAM ACCESSIBILITY FOR MANUAL SUPPRESSION. FIRE HOSE STATIONS ARE LOCATED IN THE ADJACENT FIRE BOWE AND PROVIDE COVERAGE WITH AT LEAST ONE EFFECTIVE HOSE STREAM. PORTABLE WATER AND CO₂ FIRE EXTINGUISHERS ARE STRATEGICALLY LOCATED THROUGHOUT THE CONTROL ROOM FOR IMMEDIATE FIRE FIGHTING. SINCE THE CONTROL ROOM IS CONTINUOUSLY MANNEED, THE PRESENCE OF THE OPERATORS PROVIDES ADDITIONAL EARLY DETECTION AND SUPPRESSION.

STP FHAR

Attachment
ST-HL-AE-1
FILE NO. 1-15-1
8-1-77

<u>Question</u>	<u>Section</u>	<u>Page</u>
16.	F.3(b)	4.2-57

Explain that cable trays are accessible by hose stream and describe deviations from guidelines that could hamper fire brigade access to cable spreading rooms.

Resolution:

See the markup of Section F.3(b) on page 4.2-57 attached.

4.2 COMPARISON TO APPENDIX A OF APCSB 9.5-1

APPENDIX A OF APCSB 9.5-1

STP POSITION

F.3. Cable Spreading Room (Cont'd)

- (a) At least two remote and separate entrances are provided to the room for access by fire brigade personnel; and
- (b) Aisle separation provided between tray stacks should be at least three feet wide and eight feet high.

F.3. Cable Spreading Room (Cont'd)

It must be noted that STP has a unique design, in that there are three separate independent trains or pathways to achieve and maintain shutdown. A loss of any one of the three safe shutdown pathways still leaves the STP operators two pathways to achieve and maintain shutdown. Also, the cable spreading room/power cable vault for each train is physically separated from the other trains by a fire barrier with a 3-hour fire resistive rating.

Each cable spreading room and power cable vault is segregated by safe-shutdown train (A, B or C) and is separated from the redundant rooms by 3-hour rated fire barriers. Each cable spreading room is separated from the adjacent fire areas by 3-hour rated fire barriers. Smoke and hot gas removal will be accomplished primarily by temporary flexible ducts and portable fans. (See D.4.g.).

- (a) Two remote and separate entrances are provided to the cable spreading rooms and power cable vault.

- (b) ~~Variances from this guidance exist in some areas of the cable spreading rooms making fire brigade access difficult during a fire. However, full area automatic wet pipe sprinkler protection is provided at the ceiling level to control a fire and 3 hour fire barriers of each cable spreading room will contain a fire.~~

b) All parts of the room are accessible for manual fire suppression and can be reached by at least one effective hose stream. However, cable tray configurations in parts of the room form physical barriers to make manual fire suppression efforts somewhat more difficult. Therefore, in these specific areas ...

<u>Question</u>	<u>Section</u>	<u>Page</u>
17.	F.5	4.2-60

Justify lack of 3 hour separation for switchgear rooms.

Resolution:

See markup of Section F.5 on page 4.2-60 attached.

APPENDIX A OF APCSB 9.5-1

STP POSITION

F.5. Switchgear Rooms

Redundant safe shutdown paths will be free from fire damage to achieve and maintain shutdown.

A fire area or zone boundary will contain a postulated fire and allow time for the control or extinguishment of this fire before it can reasonably be expected to propagate out of the zone or area.

Switchgear rooms should be separated from the remainder of the plant by minimum 3-hour rated fire barriers to the extent practicable. Automatic fire detection should alarm and annunciate in the control room and alarm locally. Fire hose stations and portable extinguishers should be readily available.

Acceptable protection for cables that pass through the switchgear room is automatic water or gas agent suppression. Such automatic suppression must consider preventing unacceptable damage to electrical equipment and possible necessary containment of agent following discharge.

F.5. Switchgear Room

The ESF switchgear rooms each contain one train of safety-related equipment and are separated from each other by floors and ceilings which are 3-hour-rated fire barriers. This provides two redundant safe shutdown trains to achieve and maintain shutdown in the event of a fire in the switchgear room which disables one train of safety-related equipment.

Heavy concrete walls with 3-hour rated fire doors and unprotected cable and HVAC penetrations, separate these fire zones from other fire zones within the same fire area. These fire zone boundaries provide substantial obstructions which will inhibit zone-to-zone fire propagation. This facilitates containing and suppressing fires within each switchgear room using manual firefighting capabilities and significantly reduces the probability of a fire spreading throughout the entire fire area.

Ionization detectors are provided which alarm at the local panel and in the control room. Manual hose stations and portable fire extinguishers are available outside the room. The equipment is on 4-inch pads and drains are located in the corridors directly outside the room.

INSERT
→

STP FHAR

F.5 SWITCHGEAR ROOM

INSERT

HEAVY CONCRETE WALLS WITH 3 HOUR RATED FIRE DOORS AND UNPROTECTED CABLE AND HVAC PENETRATIONS, SEPARATE THESE FIRE ZONES FROM OTHER FIRE ZONES WITHIN THE SAME FIRE AREA. ALL UNPROTECTED OPENINGS ARE HORIZONTAL, DO NOT EXCEED 4'X2' IN SIZE FOR HVAC DUCT AND 6'X5' IN SIZE FOR ELECTRICAL TRAY, AND ARE READILY ACCESSIBLE TO AN EFFECTIVE HOSE STREAM. COMBUSTIBLES LOCATED NEAR THESE OPENINGS ARE LIMITED TO IEEE-383 CABLING IN TRAYS WHICH ARE NOT CONSIDERED CONCENTRATED (SEE SECTION 1.3.2) AND ARE ALSO ACCESSIBLE TO EFFECTIVE MANUAL HOSE STREAMS.

<u>Question</u>	<u>Section</u>	<u>Page</u>
18.	F.7	4.2-62

Justify lack of 3 hour separation for station battery rooms.

Resolution:

See the markup of Section F.7 on page 4.2-62 attached.

APPENDIX A OF APCSB 9.5-1

STP POSITION

F.7. Station Battery Rooms

Battery rooms should be protected against fire explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of 3-hours inclusive of all penetrations and openings. (See NFPA 69, "Standard on Explosion Prevention Systems.") Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2 vol. % hydrogen concentration. Standpipe and hose and portable extinguishers should be provided.

Alternatives:

- (a) Provide a total fire rated barrier enclosure of the battery room complex that exceeds the fire load contained in the room.
- (b) Reduce the fire load to be within the fire barrier capability of 1-1/2 hours.

OR

- (c) Provide a remote manual actuated sprinkler system in each room and provide the 1-1/2-hour fire barrier separation.

F.7. Station Battery Rooms

The battery rooms each containing one train of safety-related equipment are separated from each other by floors and ceilings which are 3-hour-rated fire barriers. This provides two redundant safe shutdown trains to achieve and maintain shutdown in the event of a fire in the battery room which disables one train of safety-related equipment.

Heavy concrete walls with 3 hour rated fire doors and unprotected cable and HVAC penetrations, separate these fire zones from other fire zones within the same fire area. These fire zone boundaries provide substantial obstructions which will inhibit zone-to-zone fire propagation. This facilitates containing and suppressing fires within each battery room using manual firefighting capabilities and significantly reduces the probability of a fire spreading throughout the entire fire area.

DC switchgear, battery chargers, and inverters are not located in these rooms. Fire detection systems which alarm and annunciate in the control room and locally are provided. Ventilation systems will limit the H₂ concentration well below 2% by volume. Loss of ventilation will alarm in the control room. Standpipes and portable extinguishers are provided outside the room.

INSERT

4.2-62

Amendment 2

Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 49 of 108

STP FHAR

F.7 STATION BATTERY ROOMS

INSERT

HEAVY CONCRETE WALLS WITH 3 HOUR RATED FIRE DOORS AND UNPROTECTED CABLE AND HVAC PENETRATIONS SEPARATE THESE FIRE ZONES FROM OTHER FIRE ZONES WITHIN THE SAME FIRE AREA. ALL UNPROTECTED OPENINGS ARE HORIZONTAL, DO NOT EXCEED 3' X 2' IN SIZE FOR HVAC DUCT AND 6' X 4' IN SIZE FOR ELECTRICAL CONDUIT, AND ARE READILY ACCESSIBLE TO AN EFFECTIVE HOSE STREAM. ALL PENETRATIONS ARE PROVIDED WITH AIR-TIGHT SEALS WHICH PROHIBIT HYDROGEN MIGRATION OUT OF THE ROOMS. COMBUSTIBLES LOCATED NEAR THESE OPENINGS ARE LIMITED TO IEEE-383 CABLE IN TRAYS WHICH ARE NOT CONSIDERED CONCENTRATED (SEE SECTION 1.3.2) AND ARE ALSO ACCESSIBLE TO EFFECTIVE MANUAL HOSE STREAMS.

<u>Question</u>	<u>Section</u>	<u>Page</u>
19.	F.9	4.2-63/64

Verify hose station and portable extinguisher coverage meets the guidelines.

Resolution:

See markup of Section F.9 on page 4.2-63 attached.

4.2 COMPARISON TO APPENDIX A OF APCSB 9.5-1

APPENDIX A OF APCSB 9.5-1

STP POSITION

F.7. Station Battery Rooms (Cont'd)

F.7. Station Battery Rooms (Cont'd)

A detection-activated fixed Halon suppression system which may also be manually activated covers the control room computer battery room.

F.8. Turbine Lubrication and Control Oil Storage and Use Areas

F.8. Turbine Lubrication and Control Oil Storage and Use Areas

A blank fire wall having a minimum resistance rating of three hours should separate all areas containing safety related systems and equipment from the turbine oil system.

Turbine lubrication and control oil is stored and handled in separate areas and buildings remote from safety-related systems and equipment. The turbine generator building and the IVC which are adjacent to each other are separated by a 3-hour rated barrier.

F.9. Diesel Generator Areas

F.9. Diesel Generator Areas

Diesel generators should be separated from each other and other areas of the plant by fire barriers having a minimum fire resistance rating of three hours.

STP has three diesel generators installed in the diesel-generator building of each unit. Each diesel generator is located in an individual room and is separated from any adjacent diesel by a reinforced concrete wall, 24 inches thick, which has more than a 3-hour fire rating. There are no openings or penetrations through these separating walls. Each diesel generator room is provided with a complete automatic preaction sprinkler system that is initiated by a fire detection system within each room. This detection system will provide a local alarm and will alarm and annunciate in the control room. Adequate drainage for fire-fighting water is provided. Smoke ventilation is provided by portable fans and flexible ducts. Hose stations and portable extinguishers are readily available outside the fire area.

Automatic fire suppression such as AFFF foam, or sprinklers should be installed to combat any diesel generator or lubricating oil fires. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Drainage for fire fighting water and means for local manual venting of smoke should be provided.

ALL PARTS OF THE ROOMS ARE ACCESSABLE FOR MANUAL FIRE SUPPRESSION AND CAN BE REACHED BY AT LEAST ONE EFFECTIVE HOSE STREAM.

STP FHAR

Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 52 of 108

4.2-63

Amendment 2

<u>Question</u>	<u>Section</u>	<u>Page</u>
20.	F.11	4.2-67

Fire protection for safety-related pumps. Verify that detection and manual fire fighting equipment are provided.

Resolution:

See markup of Section F.11 on page 4.2-67.

4.2 COMPARISON TO APPENDIX A OF APCSB 9.3-1

APPENDIX A OF APCSB 9.3-1

STP POSITION

F.11.	<u>Safety Related Pumps</u>	F.11.	<u>Safety Related Pumps</u>
	<p>Pump houses and rooms housing safety-related pumps should be protected by automatic sprinkler protection unless a fire hazards analysis can demonstrate that a fire will not endanger other safety-related equipment required for safe plant shutdown. Early warning fire detection should be installed with alarm and annunciation locally and in the control room. Local hose stations and portable extinguishers should also be provided.</p>		<p>Safety-related pumps are not provided with automatic sprinkler protection since this FNA demonstrates that a postulated fire in these areas will not endanger other safety related equipment required for safe shutdown.</p> <p><i>These areas are provided with automatic fire detectors that alarm locally as well as provide remote annunciation in the control room.</i></p>
			<p><i>Portable extinguishers and manual hose stations are provided near each area. At least one effective hose stream will reach all parts of the pump house/pump rooms.</i></p>

STP FIAR

Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 24 of 102

<u>Question</u>	<u>Section</u>	<u>Page</u>
21.	F.14	4.2-69

Provide information on the separation, ventilation, etc of Radwaste handling area from the balance of the plant.

Resolution:

See markup of Section F.14 on page 4.2-69 attached.

4.2 COMPARISON TO APPENDIX A OF APCS 9.5-1

APPENDIX A OF APCS 9.5-1

STP POSITION

F.14. Radwaste Building

The radwaste building should be separated from other areas of the plant by fire barriers having at least 3-hour ratings. Automatic sprinklers should be used in all areas where combustible materials are located. Automatic fire detection should be provided to annunciate and alarm in the control room and alarm locally. During a fire, the ventilation systems in these areas should be capable of being isolated. Water should drain to liquid radwaste building sumps.

Acceptable alternative fire protection is automatic fire detection to alarm and annunciate in the control room, in addition to manual hose stations and portable extinguishers consisting of hand-held and large-wheeled units.

F.15. Decontamination Areas

The decontamination areas should be protected by automatic sprinklers if flammable liquids are stored. Automatic fire detection should be provided to annunciate and alarm in the control room and alarm locally. The ventilation system should be capable of being isolated. Local hose stations and hand portable extinguishers should be provided as backup to the sprinkler system.

F.14. Radwaste Building

The radwaste handling area is incorporated into the mechanical auxiliary building, and is separated from other areas by concrete walls, floors, and ceilings.

In addition, automatic fire detection which alarms in the control room is provided. Manual hose stations and portable extinguishers (hand-held and large-wheeled) are provided.

SPECIAL WATER SPRINKLER SYSTEM, ALSO PROVIDED FOR THE TRUCK BAY AND DRY WASTE COMPACTOR FOR THE PURPOSE OF PROPERTY PROTECTION. NO SMOKE SMOKE DOWN SYSTEMS ARE LOCATED IN THE RADWASTE HANDLING AREA.

F.15. Decontamination Areas

The decontamination area at STP, located in the mechanical auxiliary building, is not used for the storage of flammable liquids. The decontamination fluids which are stored and used in appreciable quantities (50 gallons) are of the water-based type and will not present a fire hazard. Portable fire extinguishers are provided within the area, and hose stations are provided adjacent to the area.

4.2-69

Attachment 1

STP FIAR

Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 102 of 102

/INSERT

Although the penetrations and HVAC ducts are not sealed with 3-hour rated seals and dampers, fire propagation from the radwaste handling area to other areas will be inhibited because of the following reasons:

The radwaste handling area is enclosed by 3-hour equivalent concrete walls and roof with doors procured as 3-hour rated fire doors. The penetrations are for piping, ducts and conduits. There are no electrical tray penetrations. No penetration openings exceed $3' \times 1\frac{1}{2}'$ (duct) in size and are located so as not to provide a direct path for flame spread beyond the radwaste handling area. In ^aspecific case where a $3' \times 1\frac{1}{2}'$ duct penetration exists combustibles are located only on one side and are approximately 10 ft from the penetration opening.

INSERT

The solid radwaste system uses cement as a solidification agent, which presents a low fire load. Except for dry waste, most combustibles in this area are not radioactive. In the event of a fire, the offsite releases would be a small fraction of the limits established by 10 CFR 100. Also, HVAC exhaust from this general area is monitored for radiation.

<u>Question</u>	<u>Section</u>	<u>Page</u>
22.	Fig 4.1	

Specify where is this figure discussed.

Resolution:

See the markup of Section D.3.d on page 4.2-30 which is attached to Question 6 of Part A.

B. Comparison with Appendix R.

<u>Question</u>	<u>Section</u>	<u>Page</u>
1.	III.C	4.1-8

Describe hydrant isolation valving arrangement.

Resolution:

See markup of Section III.C on page 4.1-8 attached.

4.1 COMPARISON OF STP UNITS WITH REQUIREMENTS OF APPENDIX R

APPENDIX R REQUIREMENTS

STP POSITION

III.A. (Cont'd)

Other water systems used as one of the two fire water supplies shall be permanently connected to the fire main system and shall be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems shall satisfy the requirements for the main fire pumps. The use of other water systems for fire protection shall not be incompatible with their functions required for safe plant shutdown. Failure of the other system shall not degrade the fire main system.

III.B. Sectional isolation valves. Sectional isolation valves such as post indicator valves or key operated valves shall be installed in the fire main loop to permit isolation of portions of the fire main loop for maintenance or repair without interrupting the entire water supply.

III.C. Hydrant isolation valves. Valves shall be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.

III.A. (Cont'd)

Three 100-percent capacity, diesel-driven automatic fire pumps, each rated at 2,500 GPM at 125 PSIG, are provided. Each pump is independent of the others and is complete with a diesel engine driver, a fuel oil storage tank, a fire pump controller, and two sets of starter batteries. A failure of one pump or associated auxiliary equipment will not prevent the other two pumps from starting and providing 100 percent of the required water capacity. The fire pump installation complies with NFPA 20-1976 Edition.

III.B. Indicating sectional control valves have been provided to isolate portions of the fire main loop for maintenance or repair without shutting off the entire water supply to primary and secondary fire suppression system serving areas that contain or expose safety-related equipment. See Figure 4.1-1.

III.C. ~~Valves are provided to isolate hydrant groups without interrupting supply to areas that contain or expose safety-related equipment. See Figure 4.1-1.~~

Sectional control valves are provided at appropriate points in the underground main fire loop which allow isolation of outside hydrant groups without interrupting water supply to any primary backup fire suppression systems in areas that contain or expose safety-related equipment. See Figure 4.1-1.

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STP FHAR

Attachment 1
ST-HL-AE-1511
File No.: C9.17
Page 61 of 108

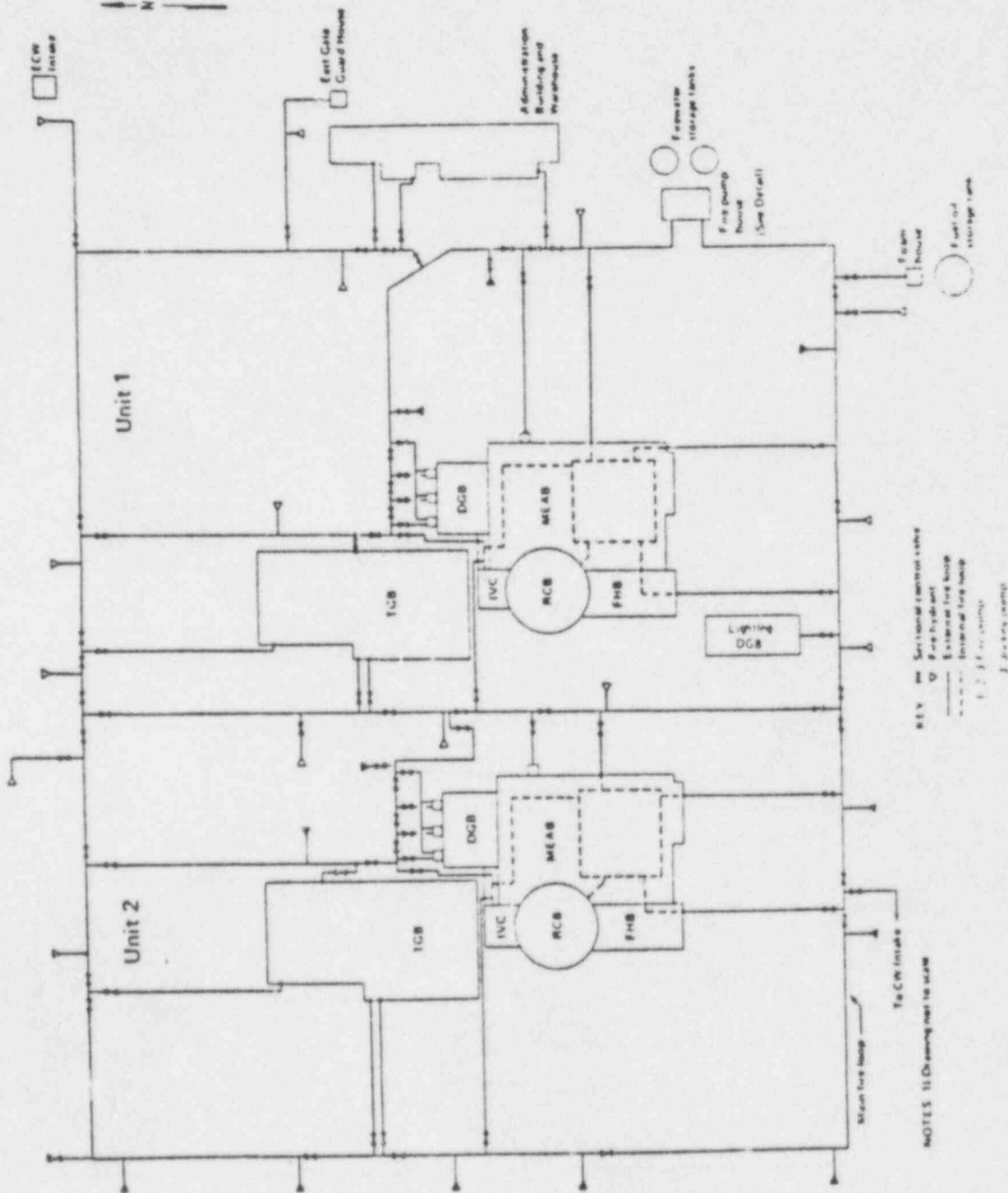
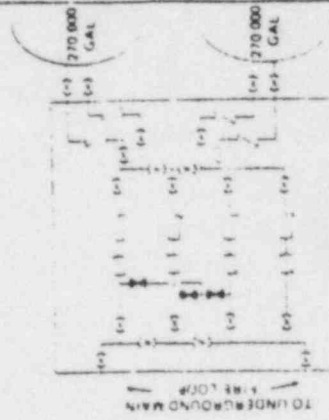
SOUTH TEXAS PROJECT
UNITS 1 & 2

PLANT MAINTENANCE
LOOP LAYOUT

Figure 4.11

AME NISSA

FIRE PUMP HOUSE
FIRE PUMP HOUSE DETAIL



- KEY
- Sectional control valve
 - Fire hydrant
 - Internal fire loop
 - External fire loop
 - Fire loop
 - Fire loop

NOTES: 1) Drawing not to scale

<u>Question</u>	<u>Section</u>	<u>Page</u>
2.	III.D	4.1-9

Explain "Where a power block area can not be reached with an effective hose stream...additional special hazard automatic suppression has been provided."

Resolution:

See markup of Section, III.D on page 4.1-9 attached.

4.1 COMPARISON OF STP UNITS WITH REQUIREMENTS OF APPENDIX R

APPENDIX R REQUIREMENTS

III.D. Manual fire suppression. Standpipe and hose systems shall be installed so that at least one effective hose stream will be able to reach any location that contains or presents an exposure fire hazard to structures, systems, or components important to safety.

Access to permit effective functioning of the fire brigade shall be provided to all areas that contain or present an exposure fire hazard to structures, systems, or components important to safety.

Standpipe and hose stations shall be inside PWR containments and BWR containments that are not inserted. Standpipe and hose stations inside containment may be connected to a high quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment. For BWR drywells, standpipe and hose stations shall be placed outside the dry well with adequate lengths of hose to reach any location inside the dry well with an effective hose stream.

STP POSITION

III.D. STP is provided with adequate standpipe systems that will permit parts of the power block containing safe shutdown components to be reached by at least one effective hose stream. ~~A Where a power block area can not be reached with an effective hose stream during a fire scenario, additional special hazard automatic suppression has been provided.~~

All standpipe systems installed at STP conform to NFPA 14, 1976 Edition for sizing, spacing, and pipe support requirements. More restrictive seismic Category II/I supports are provided where required. The locations of the hose stations are selected to provide optimum accessibility and fire-fighting capability.

The containment is provided with a single water supply line for the hose stations and fixed suppression systems extended from the fire main loop. The containment standpipe is normally dry.

However, in those areas where cable tray configurations, ducting, or equipment form physical barriers to make fire suppression efforts somewhat more difficult, automatic wet pipe sprinkler protection is provided.

2
2
2
2
2

STP FHAR

Attachment 1
ST-HL-AE-1511
File No.: 09.17
Page 24 of 108

<u>Question</u>	<u>Section</u>	<u>Page</u>
3.	III.G.	4.1-11

Identify when the associated circuits analysis will be completed?

Resolution:

The associated circuits analysis is scheduled to be completed prior to March of 1986.

<u>Question</u>	<u>Section</u>	<u>Page</u>
4.	III.G.	4.1-12

Explain the term "active equipment"

Resolution:

Active Component	Mechanical equipment that is capable of powered physical movement and electrical/electronic/pneumatic equipment that controls and powers active mechanical components. Pumps, remote-operated valves, MCCs, and process instruments are examples of active components.
Passive Component	Mechanical equipment that is not subject to spurious failure due to a fire. Piping, tanks, check valves and manual valves are examples of passive components.

<u>Question</u>	<u>Section</u>	<u>Page</u>
5.	III.G.	4.1-12

Identify when will evaluation of fire protection means in containment be complete?

Resolution:

The method of meeting Appendix R Section III.G.2 for cabling in containment involves some areas which will use greater than 20 foot horizontal separation and other areas which will use either a water suppression curtain system or radiant energy shields. The detailed design will be completed prior to May of 1986. As stated in the FHAR, line type heat detectors are provided in the cable trays inside containment.

C. Other FHAR Issues

<u>Question</u>	<u>Section</u>	<u>Page</u>
1.	1.	Figure 1.1

Provide a copy of the ANI document providing the definition of concentrated cable trays.

Resolution:

A copy of the May 27, 1981 letter from ANI to Mr. Rod LaReau of HL&P is attached which provides the requested information.

AN AMERICAN NUCLEAR INSURERS

MURT C. PROOM, CPCU
President

Attachment o SEARCHED 4/14
ST-RL-AE-1511
File No. : G9-17
Page 69 of 108
PROP. Y ENGINEERING DEPARTMENT
7-1-1981 11:15 AM

May 27, 1981

Mr. Rod LaResu
Director of Insurance
Houston Lighting & Power Co.
P.O. Box 1700
Houston, TX 77001

Dear Rod:

HOUSTON LIGHTING & POWER CO.
SOUTH TEXAS PROJECT
AIR PROPERTY FILE NO. H 201

FIRE LOSS PREVENTION MANAGER
CABLE TRAY CONCENTRATIONS

In our meeting of May 14, you requested an expansion upon what American Nuclear Insurers felt the responsibilities of a site Fire Loss Prevention Manager should encompass.

The Fire Loss Prevention Manager should have the authority and responsibility for property conservation for the entire construction site. The property conservation program should include but not necessarily be limited to the attached "Fire Protection & Prevention Program" as well as the location and design of proposed temporary facilities, the proper scheduling of Permanent Fire Protection Systems and communications with American Nuclear Insurers.

Also included for your information ANI's definition of concentrated cable trays. This item was discussed briefly during our meeting at Brown & Root on May 14.

If you have any questions, please call.

Sincerely,

J. Stephen Darrah
Regional Field Engineer

JSD/kcm 5/27/81

cc: Mr. K. Kelly, J&H, Houston, Enc.
Mr. T. Germani, J&H, NY

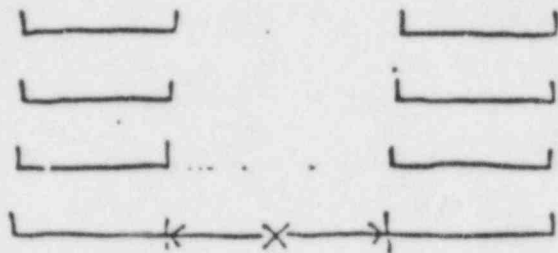
Definition of Concentrated Cable

Attachment 1
SHE-AE-1507

File No. 69.17

Page 70 of 108

Adjacent horizontal runs with more than 3 trays in each stack



Section view.

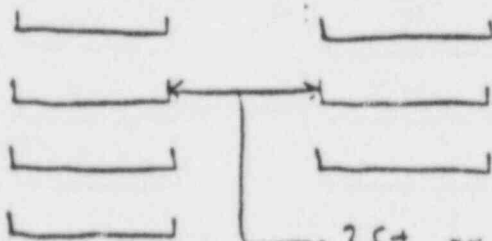
If distance "X" is 5 ft. or greater, the trays will not be considered ~~concentrated~~ adjacent.

Trays that are less than 5 ft. apart horizontally, and fall within a 30° angle from vertical plane of stack, are considered adjacent.



Section view

Stacks that are more than three trays high, adjacent to a stack of three trays, within three feet horizontally or within 30° of bottom are concentrated.

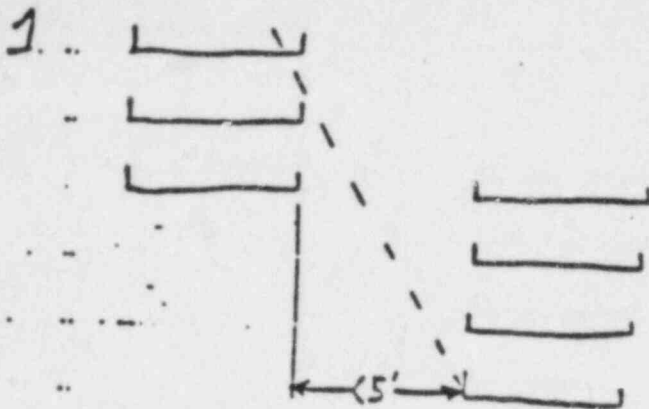


Section view

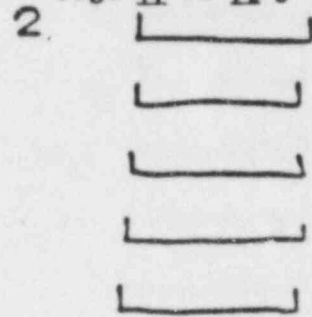
3 ft. or less - consider adjacent and concentrated

Attachment to SI-HL-17844
Examples of Configurations That are Concentrated

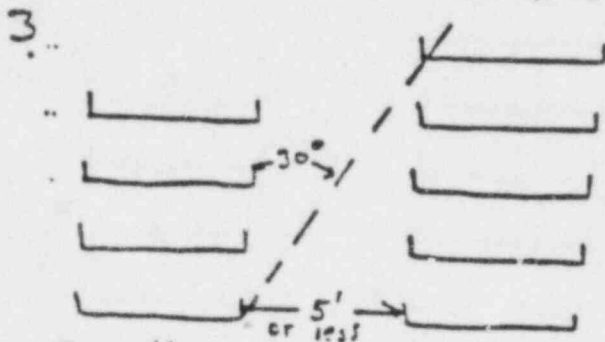
ST-HL-AE-1311
 File No.: G9.17
 Page 11 of 108



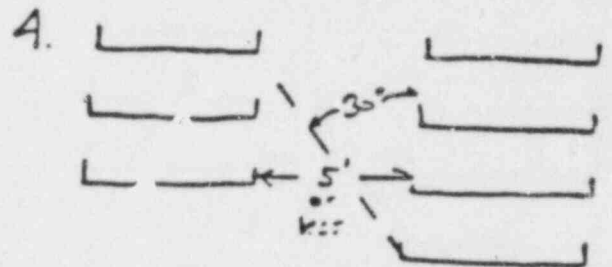
Within 5' horiz. and within 30°



More than 4 Trays

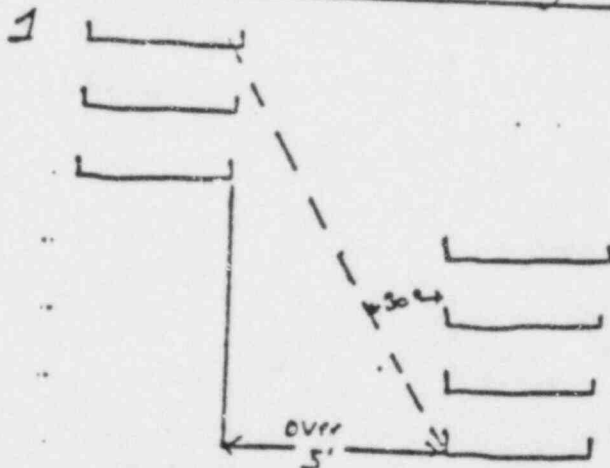


More than 3 Tray stack, adjacent




More than 3 Trays Adjacent

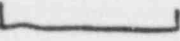
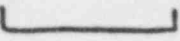
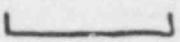
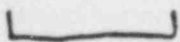
Examples of Configurations That are not Concentrated



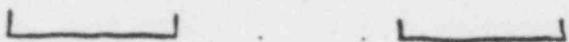
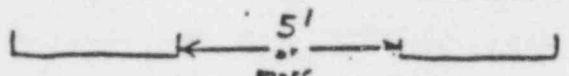
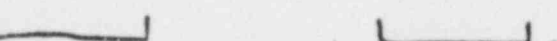
Within 30° but 5' or more horiz. distance

2. 

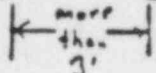
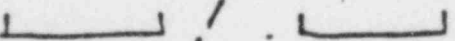
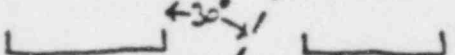
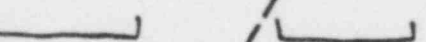
Not over 3 trays in stack adjacent.

3. 

Not over 4 trays in single stack rule

4. 

Greater than 5' - Don't consider adjacent.

5. 

Greater than 3' and not in 30° arc (Also not greater than 4 Trays in each stack)

<u>Question</u>	<u>Section</u>	<u>Page</u>
2.	1.	Figure 1-2

Change the logic diagram as follows:

- a) Indicate that this review is done for all cable regardless of whether or not it is concerned.
- b) Change the last diamond to explain that this is to provide an effective hose stream to the fire.

Resolution:

A revised copy of Figure 1-2 is provided as Figure 1-3 which is attached to Question 7 of Part A.

<u>Question</u>	<u>Section</u>	<u>Page</u>
3.		

Clear up Item 9 Attachment 3 to ST-HL-AE-1194.

Resolution:

HL&P's review of the areas of the plant having concentrated cable is provided as an attachment to Question 7 of Part A.

<u>Question</u>	<u>Section</u>	<u>Page</u>
4.		

Non-rated special function fire doors. Provide the same information as River Bend provided.

Resolution:

The additional information requested is attached.

With the exception of special function doors (i.e., tornado resistant and fire resistant, watertight and fire resistant, and missile proof and fire resistant doors) the door openings provided in fire resistant barriers are protected by 3 hour fire rated UL-labeled fire door assemblies. Although the special function doors are not 3 hour fire rated doors, these doors will provide an adequate level of protection for the areas where they are installed since

1. the fire landing on either side of the door is low, and/or
2. there are no safe shutdown components on one side of the door and there are negligible combustibles on that side of the door and/or
3. there is an automatic fire suppression system installed.

Attachment A provides a summary of the key data for the 10 special function doors, including the fire area and zone which abut the door, the combustible load on each side, suppression, detection and other data such as the door type and drawing references.

Attachment B provides a summary by the type of special function door and the basis for acceptability.

Attachment C is a comparison of the six unlabeled watertight and fire resistant doors to fire doors tested or listed as 3-hour fire doors. This comparison indicates that these doors are (1) similar to labeled fire doors in construction, and (2) that adequate gaps are provided between the doors and frames to allow for expansion and distortion during a fire. Similar comparisons have been requested and are being prepared by the manufacturers of the tornado resistant and fire resistant and missile proof and fire resistant doors. Since these doors have only been purchased recently, these two comparisons will be submitted for NRC review as soon as available. It should be noted that the Mosler Safe Company has been awarded the contract for the missile proof and fire resistant doors and as such this comparison is expected to be similar to the Mosler comparison in Attachment C for watertight and fire resistant doors.

These ten special function doors for Unit 1 (Unit 2 is identical) are similar both in type, construction details and fire loading to doors previously approved by the NRC for River Bend Station.

Attachment A
Special Function/Fire Resistant Door Data
South Texas Project - Unit 1

Door No.		Fire Area/Zone	COMB. Load (BTU/SF)	Detection	Suppression	SSD Equipment	Door Type	Drawing Ref Elev/Col/ FHAR Fig. No.
FHB-338	35	310	3,000	Smoke	None	None	Tornado	60'-0"/M.8-27&28/
	32	145	10,100	Ionization	None	None	Resistant/ Fire Resistant	3-10 & 3-17
DGB-104	39	503	10,300,000	Heat	Foam-Water	Yes*	Watertight/	64'0"
	45	509	Negligible	Ionization	None	Yes	Fire Resistant	F.5 & H-16.9 3-32
DGB-105	40	504	10,300,000	Heat	Foam-Water	Yes*	Watertight/	64'-0"
	46	510	Negligible	Ionization	None	Yes	Fire Resistant	D.9 & F.5-15 3-32
DGB-106	41	505	10,300,000	Heat	Foam-Water	Yes*	Watertight/	64'-0
	47	511	Negligible	Ionization	None	Yes	Fire Resistant	C.8 & D.9-16 3-32
DGB-201	45	509	None	Ionization	None	Yes	Missile proof	82'-0"
	DGB	roof	None	None	None	No	Fire Resistant	F.5&H-19.4 3-33
DGB-202	46	510	None	Ionization	None	Yes	Missile proof	82'-0"
	DGB	roof	None	None	None	No	Fire Resistant	D.9&F.5-19.4 3-33
DGB-203	47	511	None	Ionization	None	Yes	Missile proof	82'-0"
	DGB	roof	None	None	None	No	Fire Resistant	C.8&D.9-19.4 3-33

*These doors separate equipment of the same train, i.e., the same diesel generator.

Door No.	Fire Area/Zone		COMB. Load (BTU/SF)	Detection	Suppression	SSD Equipment	Door Type	Drawing Ref
								Elev/Col/ FHAR Fig. No.
IVC-002	48	403	45,000 Negligible	Ionization Ionization	None None	Yes No	Watertight/ Fire Resistant	10'-0"/ N.5&P.4-20 3-35
	51	405						
IVC-003	49	402	80,000 Negligible	Ionization Ionization	None None	Yes No	Watertight/ Fire Resistant	10'-0" P.4&R-20 3-35
	51	405						
IVC-004	50	401	134,000 Negligible	Ionization Ionization	None None	Yes No	Watertight/ Fire Resistant	10'-0" R&R9-20 3-35
	51	405						

*These doors separate equipment of the same train i.e., the same diesel generator.

Attachment B

Door type: Watertight-fire resistant
Door Manufacturer: The Mosler Safe Co.
Comparison to labeled 3 hour fire door: Included in Attachment C

<u>Door No.</u>	<u>Worst Fire Severity</u>	<u>Basis for Acceptability</u>
DGB-104 DGB-105 DGB-106	128 hours - 45 minutes	1. Automatic foam-water suppression on fire side of dppr/ 2. Door separated diesel fuel oil supply from the same train of diesel components. 3. Not required to meet Appendix R Section III.G
IVC-002	34 minutes	1. Low fire severity 2. No SSD components on other side
IVC-003	60 minutes	1. Low fire severity 2. No SSD components on other side
IVC-004	1 hour - 41 minutes	1. No SSD components on other side 2. Negligible combustibles on other side 3. Nearest SSD components protected by door IVC-003 which means that we have two water tight doors and a considerable distance separating the respective pumps.

Attachment B

Door type: Missile Proof-Fire Resistant
Door Manufacturer: The Mosler Safe Co.
Comparison to labled 3 hour fire door: Being prepared

<u>Door No.</u>	<u>Worst Fire Severity</u>	<u>Basis for Acceptability</u>
DGB-202 DGB-203 DGB-204	None	1. No anticipated fire severity- either side 2. Administrative procedues will effectively minimize transient combustibles

Door type: Tornado Resistant-Fire Restraint
Door Manufacturer: Richardson-Wilcox
Comparison to labled 3 hour fire door:

<u>Door No.</u>	<u>Worst Fire Severity</u>	<u>Basis for Acceptability</u>
FHB-338	Less than 8 minutes	1. Low fire severity 2. No SSD component on either side of door

HOUSTON LIGHTING & POWER COMPANY
WATERTIGHT DOOR COMPARISON
WITH EXISTING FIRE DOOR

The following analysis is to compare the Watertight Doors in Specification No. 3A519SS0036 with an existing Fire Labeled Door which was tested in accordance with the Standard for Safety for Fire Test of Door Assembly - UL 10B for 3 Hour fire rating (Reference: File No. R8440 Attached).

The clearance between the door/frame assembly and the area of the labyrinth at the seal for door expansion in case of fire is a nominal 11/16" all around.

The calculations will evaluate the largest doors with nominal door dimensions of 46-1/8" Wide x 80-1/8" High and fire test temperature of approximately 1930°F. (Doors IVC 002, 003, 004, and 005, DGB 104, 105 and 106)

$$\frac{\text{Expansion in Height}}{80-1/8 \times 1930^\circ \times 6.33^{-6}} = \frac{.979}{2} = .489$$

$$\frac{\text{Expansion in Width}}{46-1/8 \times 1930^\circ \times 6.33^{-6}} = \frac{.563}{2} = .282$$

$$\frac{\text{Expansion Across Corners}}{92.45 \times 1930^\circ \times 6.33^{-6}} = \frac{1.129}{2} = .569$$

Based on the above calculations there would be approximately 1/8" clearance at top and bottom, 11/32" clearance at sides, and 9/64" clearance diagonally across corners at the time of the largest expansion.

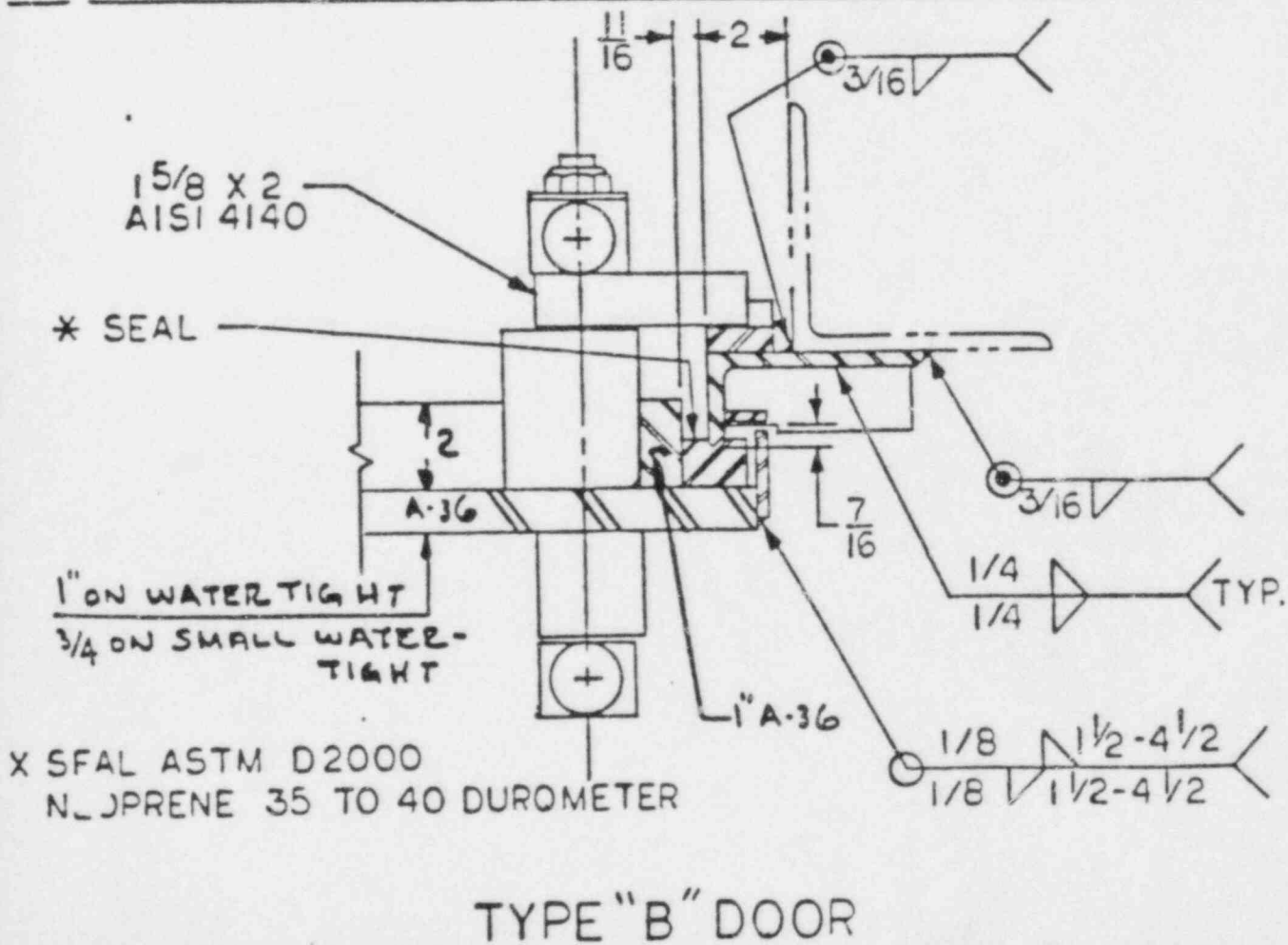
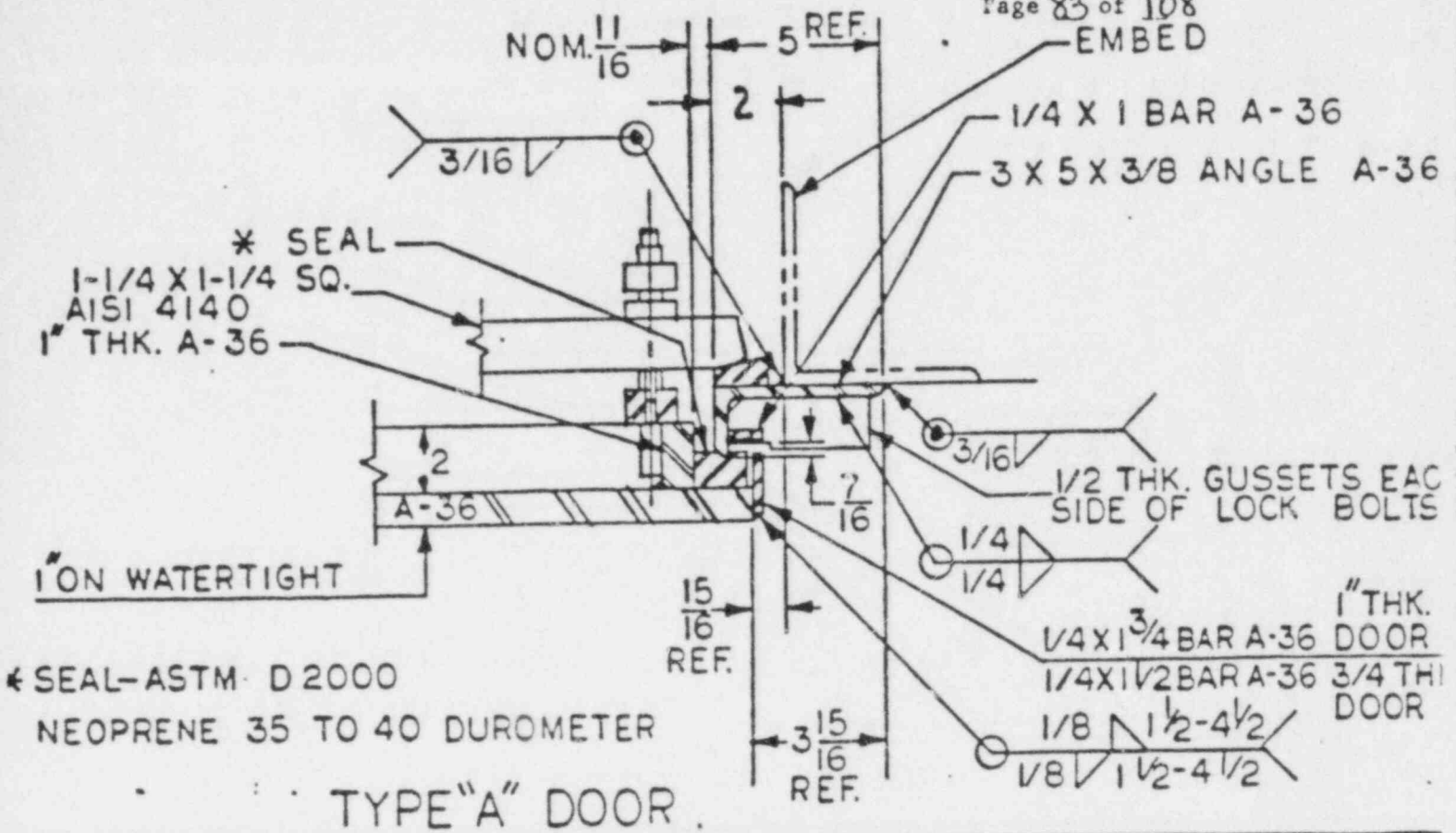
Door and frame construction description as outlined on the Comparison Chart show the Watertight Doors reinforced at all edges and incorporate a minimum of six (6) locking bolts to secure the edges against warpage. The frame is also shown to be much stronger due to unit welded construction, reinforcing and being continuously welded all around to precast steel embeds for strength. See sketches on Type "A" and Type "B" Doors.

July 9, 1985

COMPARISON CHART

ITEM	U.L. LABELED SPECIAL PURPOSE 3 HOUR FIRE DOOR - REFERENCE FILE NO. R8440 ATTACHED.	HOUSTON LIGHTING & POWER SPECIAL PURPOSE WATERTIGHT DOORS - REFERENCE DRAWING D-K18551, TYPE A AND DRAWING D-K18479, TYPE B ATTACHED
Door Construc- tion	Laminated construction of 11 Ga. cover panels with 1-1/4 thick polystyrene foam filler bonded to each panel.	Solid plate 3/4" or 1" thick A-36 steel reinforced around periphery with 1" thick x 2" high A-36 bars. Seal housing around periphery adds additional strength and stiffness.
Lock Bolts	Mortise type keylock.	Six (6) Lock Dogs 1-5/8 x 2 or six (6) Lock Bolts 1-1/4 Sq. AISI 4140 on door boltwork seating on locking plates of ASTM B148 9C aluminum bronze heat treated 90 ksi minimum tensile and mounted to frame.
Hinge	Continuous .090 piano type hinge with 5/16 diameter hinge pin mounted to door and frame with #10-32 x 3/8 lg. sheet metal screws on 7-3/4 centers.	Two (2) hinge assemblies, one at top and one at bottom. Hinge yokes (A-36) mounted to door and frame with two (2) 5/8-11 x 3 lg. screws each yoke. Hinge leaf (1-1/4 thick A-36) mounted between door yoke and frame yoke with 5/8 dia- meter ASTM A-434 CL BC CF 41L42 hinge pins.
Frame	11 Ga. pressed steel.	Unit welded construction of 3 x 5 x 3/8 thick angle (A-36) reinforced with 1/4 thick x 1" lg. bar of (A-36) around periphery. 3/8 thick gussets are welded in lock bolt areas (one side of lock bolt) for additional strength stiffness.
Field Installation	Pressed steel frame anchored to wall with 24 Ga. steel masonry anchors - three (3) on each side and two (2) on top.	Frame assembly continuously field welded all around inside and outside with 3/16" fillet weld to previously installed embed angles and/or plates

Attachment 1
HL-AE-1511
Rev. 10-78
Page 1 of 1





UNDERWRITERS LABORATORIES INC.

CHICAGO · NORTH BROOK, ILL. · MELVILLE, N.Y. · SANTA CLARA, CALIF.

Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 84 of 108

an independent, not-for-profit organization testing for public safety

File R8440-1
Project 77NK8109

June 6, 1978

REPORT

on

SINGLE SWING SPECIAL PURPOSE TYPE FIRE DOOR AND FRAME ASSEMBLY

Under The

CLASSIFICATION PROGRAM

The Mosler Safe Co.
Hamilton, OH

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above named company to reproduce this Report
provided it is reproduced in its entirety.

D E S C R I P T I O N

PRODUCT COVERED:

The product covered by this Report is a special purpose type fire door, single swing installed in a pressed steel fire door frame of the single unit type.

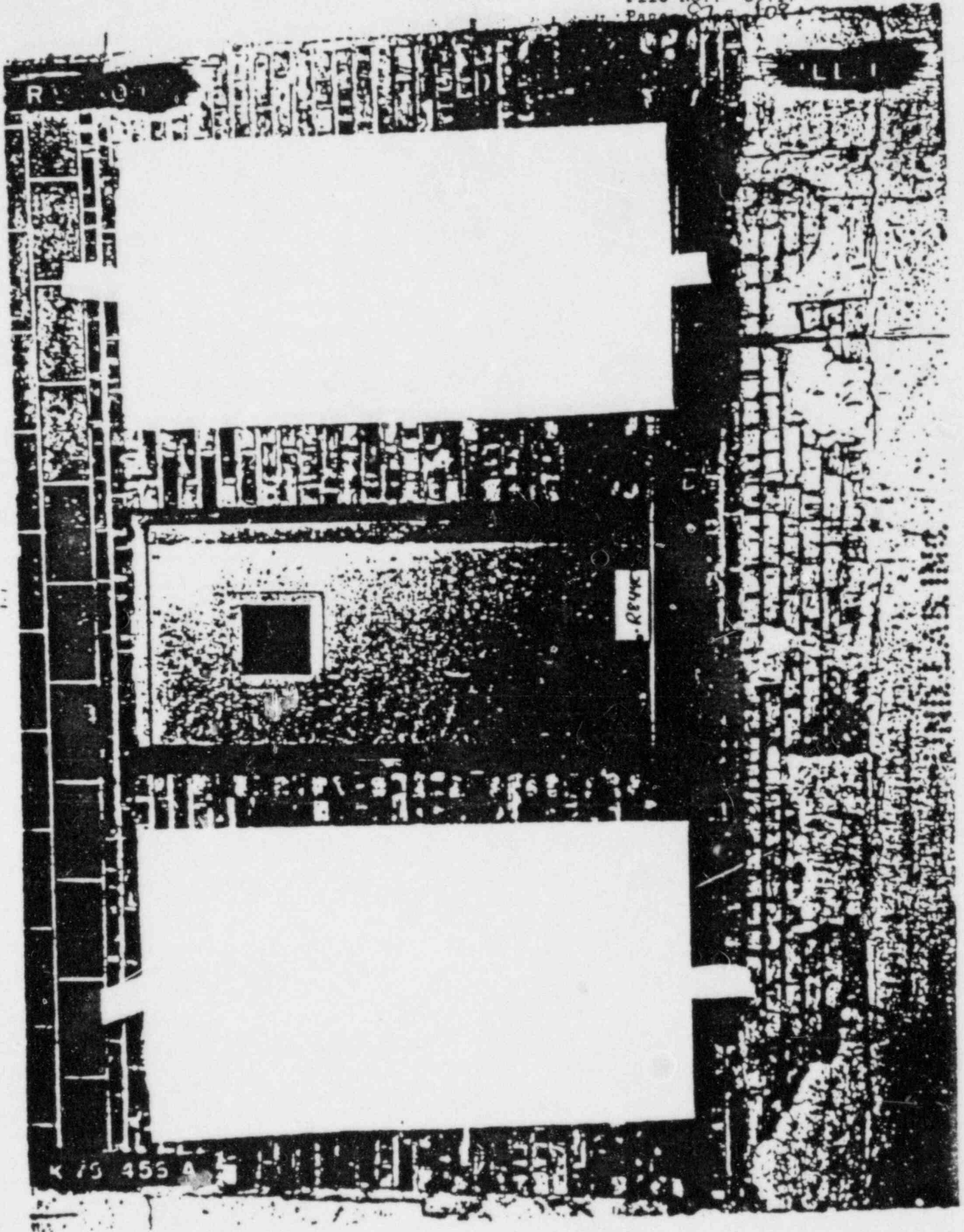
USE:

The assembly is designed for the protection of openings in walls for 3 hr locations. The door and frame assembly is Classified with respect to fire hazard only.

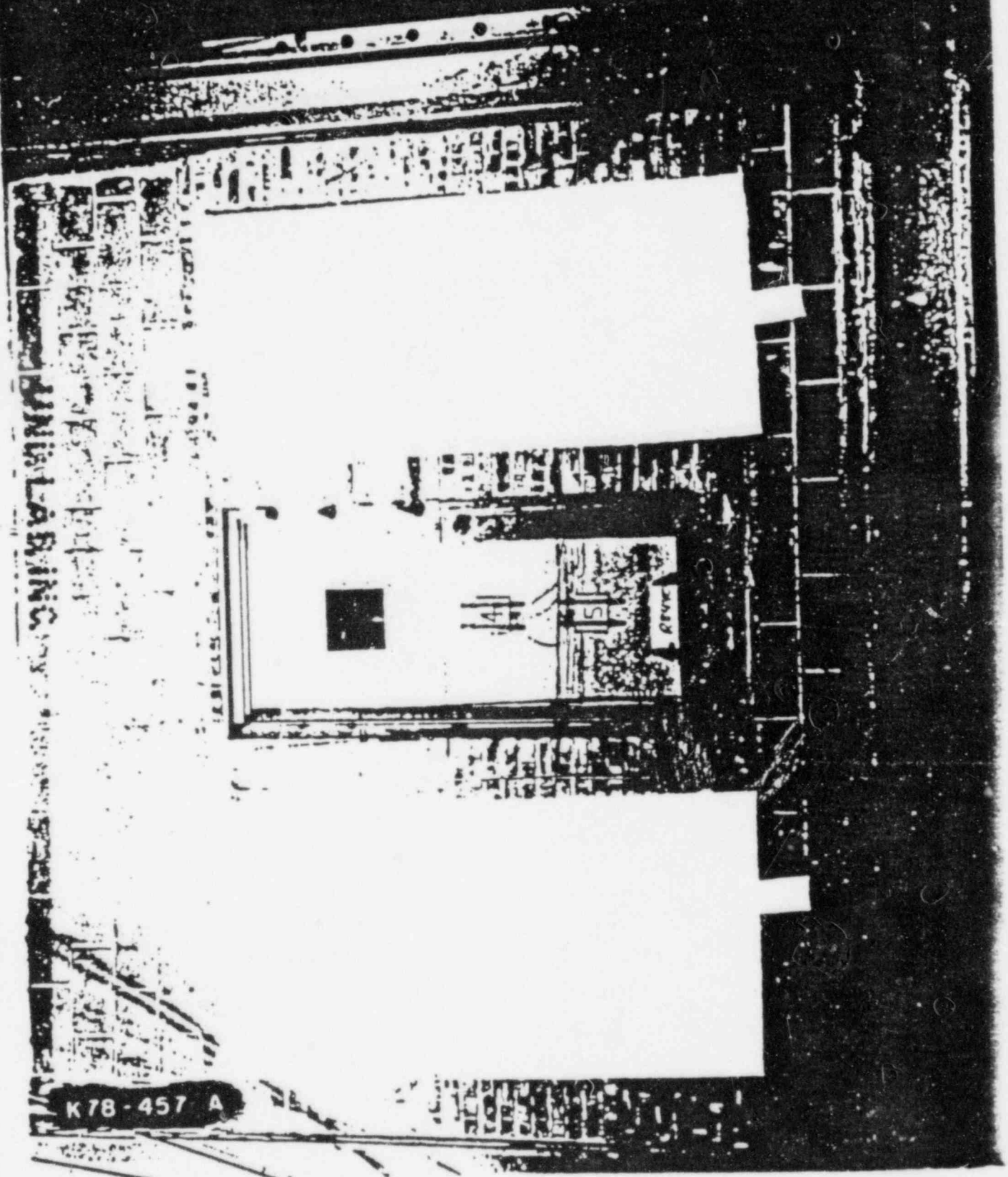
D E S C R I P T I O N O F
I L L U S T R A T I O N S

<u>ILL.</u>	<u>Description</u>
1	Appearance of exposed side of test assembly before fire test.
2	Appearance of unexposed side of test assembly before fire test.
3	Chart of furnace temperatures.
4	Chart of unexposed surface temperature.
5	Appearance of exposed side of test assembly after fire and before hose stream tests.
6 through 17	Construction details of doors.

WPH/HSE:sn



R8440-1

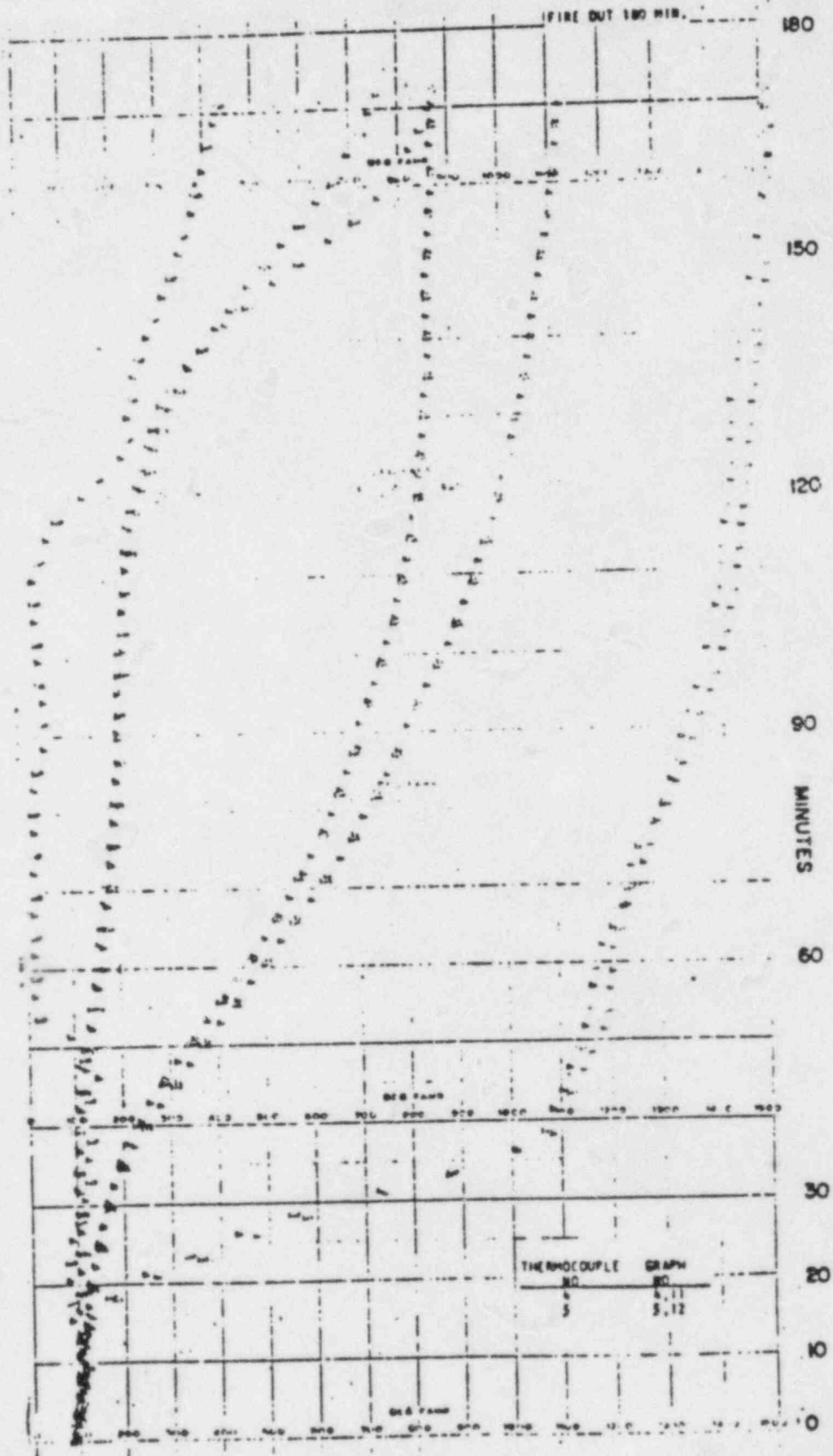


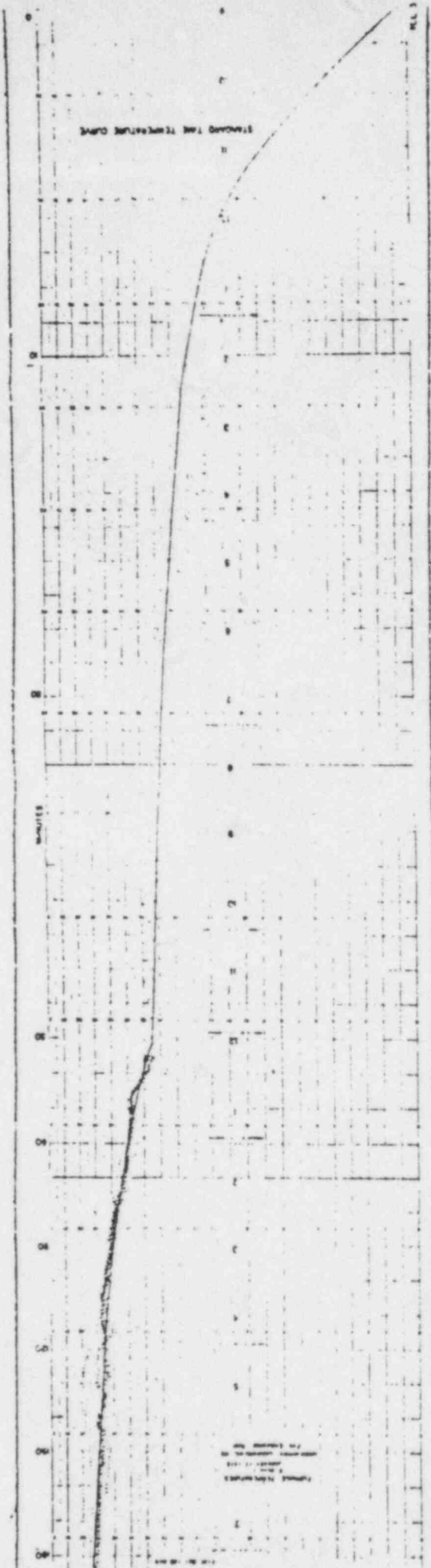
K78-457 A

UNEXPOSED SURFACE TEMPERATURES
APRIL 25, 1978

Underwriters' Laboratories, Inc.
Fire Endurance Test

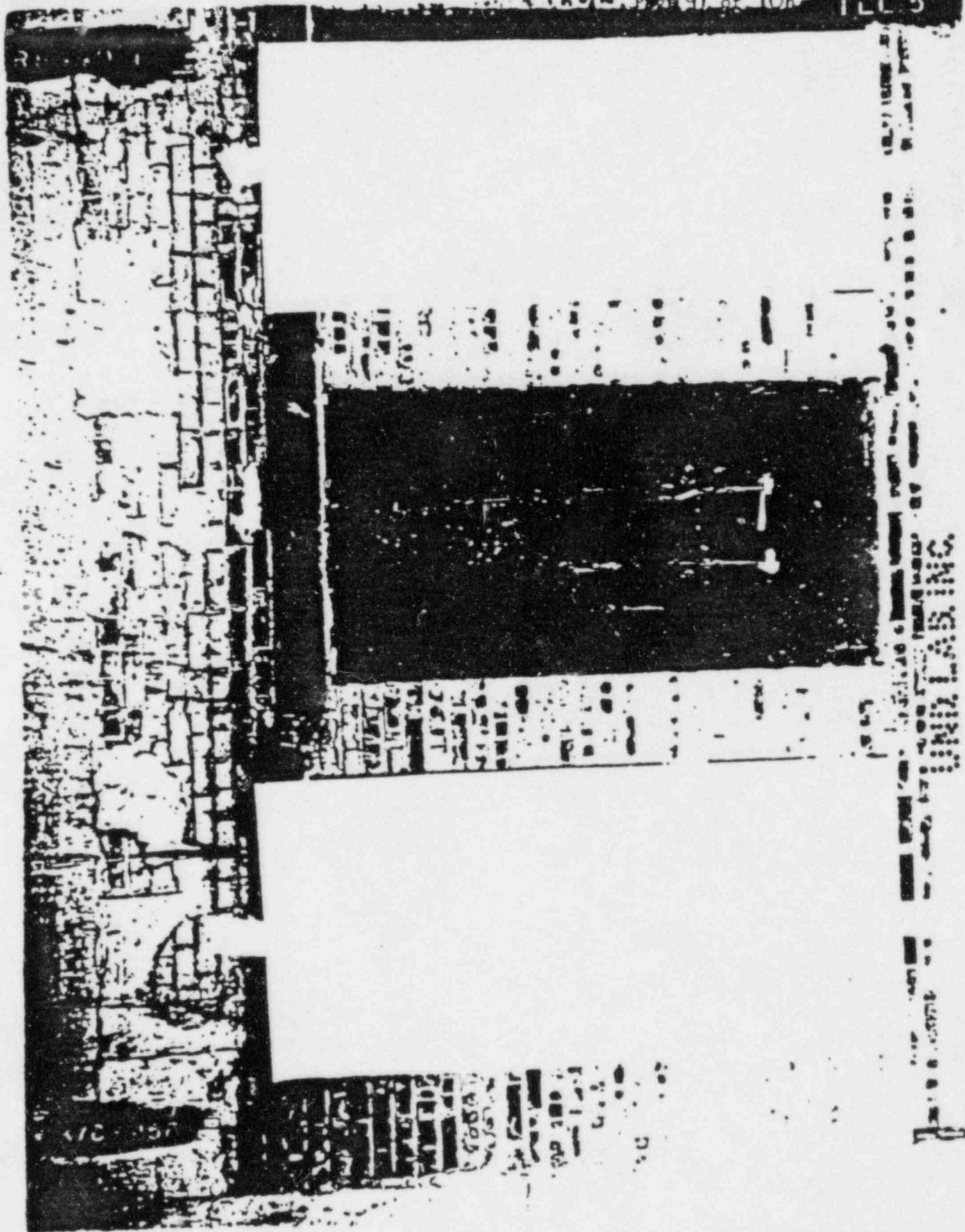
Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 89 of 108

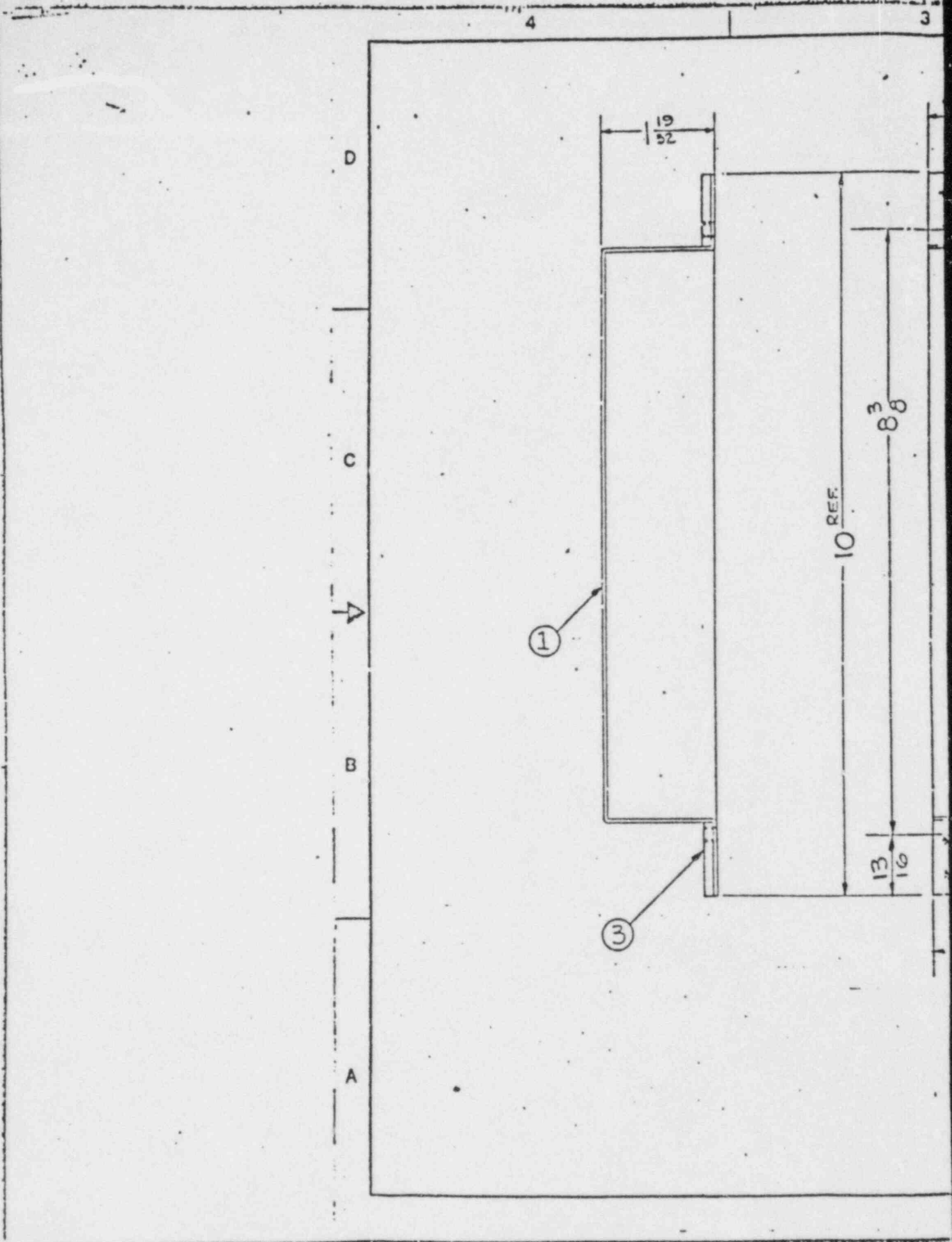




Attachment 1
ST-HL-AE-1511
File No.: G9.17
Page 91 of 108

ILL 5





V

2

1

REVISIONS			
ECN	REV	DESCRIPTION	DATE

DRILL & TAP FOR

*12-24 SCR.

2-REQD.

Attachment
ST-HL-AE-1511
Page 92 of 108

TI APERTURE CARD

Also Available On
Aperture Card

1 1/2 - 3

②

FILE

88440-1

ILL: 17

ITEM	PART NUMBER	PART NAME	QTY
1	C-J18752	BODY-HOUSING	1
2	A-J18747-D	SIDE	1
3	A-J18747-C	TAPPING PLATE	2

TOLERANCES

FRAC. + -
DEC. + -
ANG. + -

MATERIAL (SPEC.)

FINISH (SPEC.)

ORDER NO.

DR BY: MCGREGOR

DATE: 3-11-77

CHECK BY:

DATE:

APPD:

DATE:

APPD:

(CUST.)

Masler

HAMILTON, OHIO 43012

TITLE

ASSY. LOCK HOUSING

FOR

B.R. DOOR

PRODUCT

SIZE DWG. NO.

C J20008

REV

0

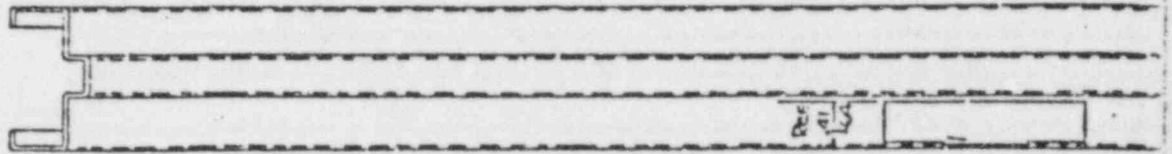
SCALE

CONT. CN

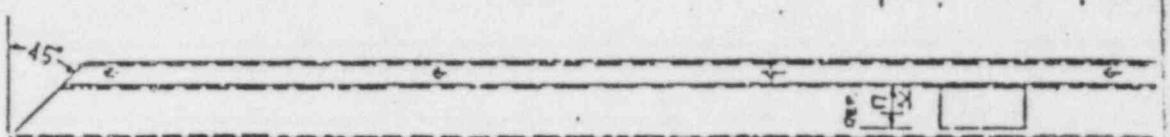
8511050150-01

8 7 6 5

D



TOP



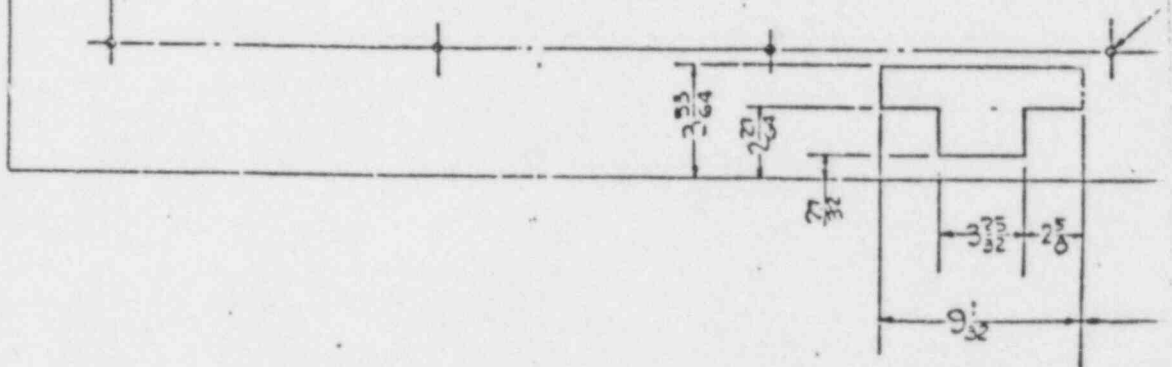
FORMED VIEW

82

(5) SPACES @ $15\frac{3}{16} \times 7\frac{1}{2}$

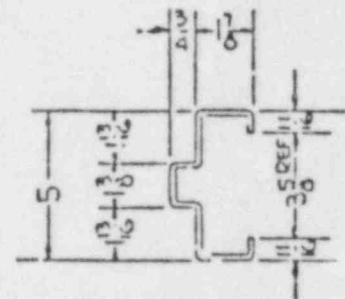
FLAT SHEET

TOP



Attachment
ST-HL-AE-1511
Page 93 of 108

Also Available On
Aperture Card

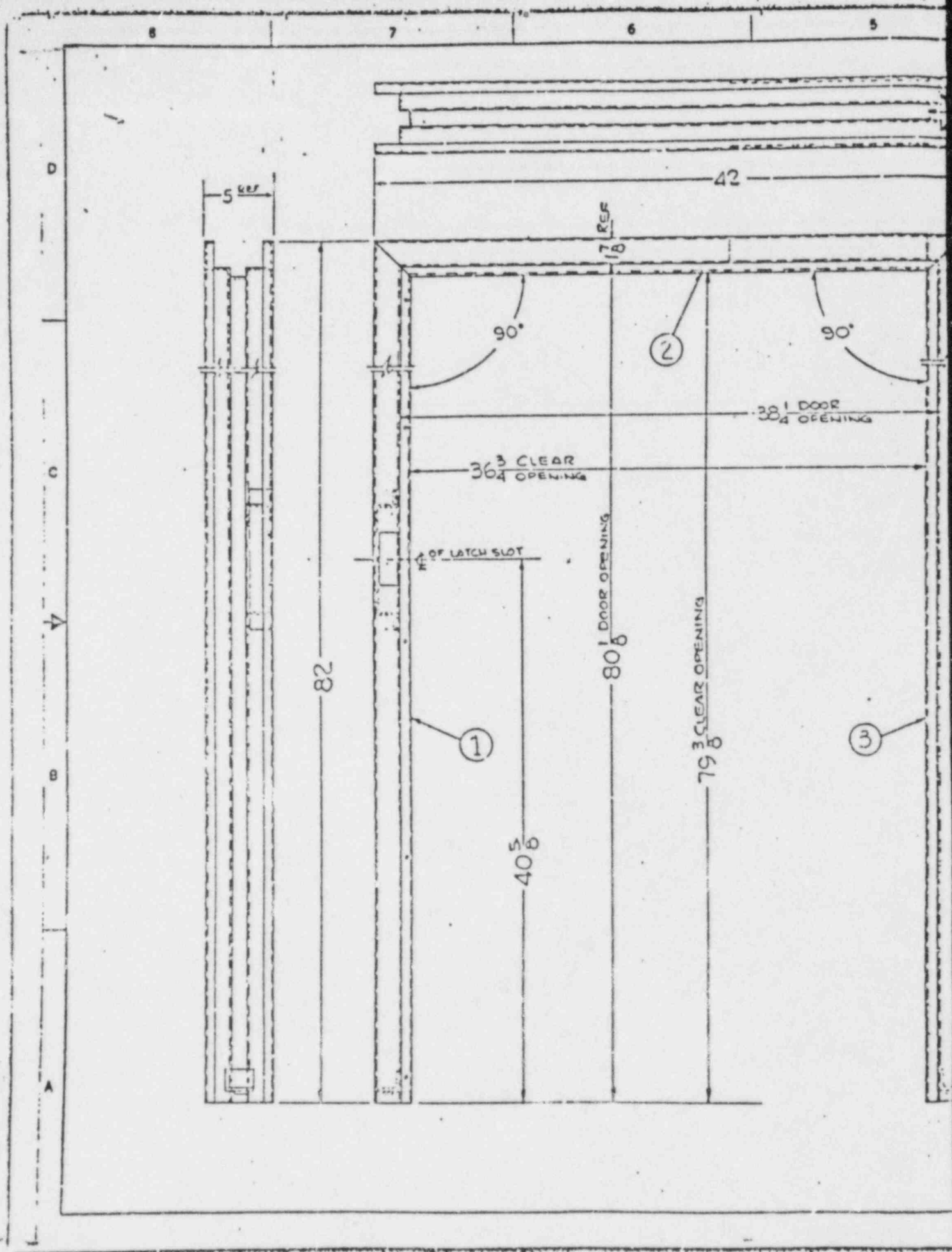


FILE RE440-1
ILL 16

SWING OF DOOR { RIGHT HAND OUT
LEFT HAND IN

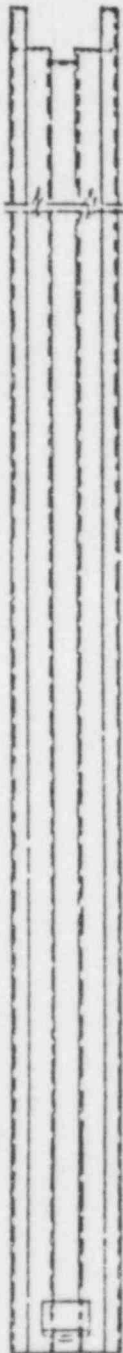
TOLERANCES	ORDER NO.	Mosler	
FRAC. + -	DR BY V. CURKIN	TITLE	FRAME-LOCKSIDE
DEC. + -	D. T. TAYLOR, 8/1977	FOR	
ANG. + -	CHECK BY	3. R. DOOR	
MATERIAL (SPEC)	DATE	PROD. CT	SIZE
11GA CS5 CR	APPRO	D	DWG NO.
FINISH (SPEC)	DWG		J25715
	APPRO		REV
	(CUST.)		0

8511050150-02



NOTE:

WELD ALONG SEAMS
BOTH ENDS ON INSIDE



REVISIONS			
ITEM	DESCRIPTION	DATE	APPD

Attachment
ST-HL-AE-1511
Page 94 of 108

**TI
APERTURE
CARD**

Also Available On
"Aperture Card"

FILE NO.
88940-1
ILL. 15

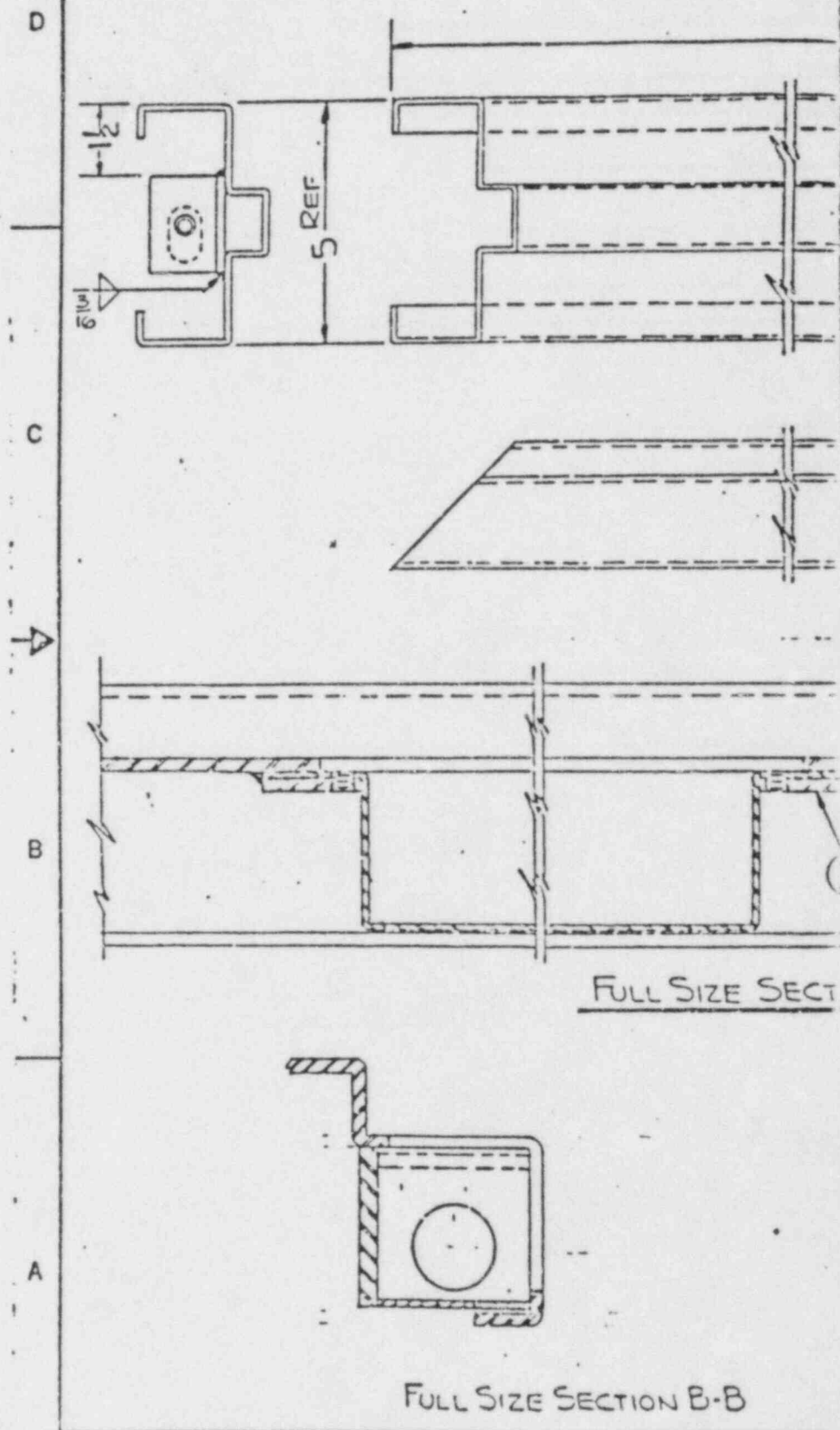
ITEM	PART NUMBER	PART NAME	QUAN.
1	C-J28709	ASSY FRAME-LOCKSIDE <small>8 1/2" OUT 1 1/2" IN</small>	1
2	C-J28719	ASSY FRAME-TOP	1
3	C-J28801	ASSY FRAME-HINGE SIDE <small>8 1/2" OUT 1 1/2" IN</small>	1

SWING OF DOOR { RIGHT HAND OUT
LEFT HAND IN

TOLERANCES		ORDER NO.	Mosler	
FRAC. + -		BY: M. CURRANS	TITLE: ASSY-FRAME-WELD.	
DEC. + -		DATE: 2-23-77	FOR: B.R. DOOR	
ANG. + -		CHECK BY:	PRODUCT: SIZE: DWG NO. REV.	
MATERIAL (SPEC.)		DATE:	0 J28710 0	
FINISH (SPEC.)		DATE:	0	
		DATE:		
		DATE:		
		DATE:		

8511050150-03

Attachment
ST-HL-AE-1511
Page 95 of 108





2

1

REVISIONS			
ECN	REV	DESCRIPTION	DATE

82 REF.

Ø OF OPENING

B

A

A

40⁵₈4³₁₆ HOLD

B

②

①

3/4

TI APERTURE CARD

Also Available On
Aperture Card

FILE
85410-1
ILL: 14

ITEM	PART NUMBER	PART NAME	QTY.
1	D-J281	FRAME-LOCKSIDE	1
2	A-J28200	ASSY LEVELING ANGLE	1
3	C-J20008	ASSY-LOCK HOUSING	1

TOLERANCES		ORDER NO.		Moser	
FRAC. + -		DR BY: M. CURRINS		HAMILTON, OHIO 45012	
DEC. + -		DATE: 3-21-77		TITLE: ASSY. FRAME-LCKSD	
ANG. + -		CHECK BY:		FOR: B.R. DOOR	
MATERIAL (SPEC.)		DATE:		PRODUCT SIZE DWG. NO.	
FINISH (SPEC.)		APPD:		C J28709	
		DATE:		REV. C	
		APPD:		SCALE	
		(CUST.)		EIGHT ON	



8511050150-04

D

15" REF

C

GLASS FRM. ANG. -
SIDES - C-J29577
(2-REQ'D.)



B

TYPICAL
4 CORNERS

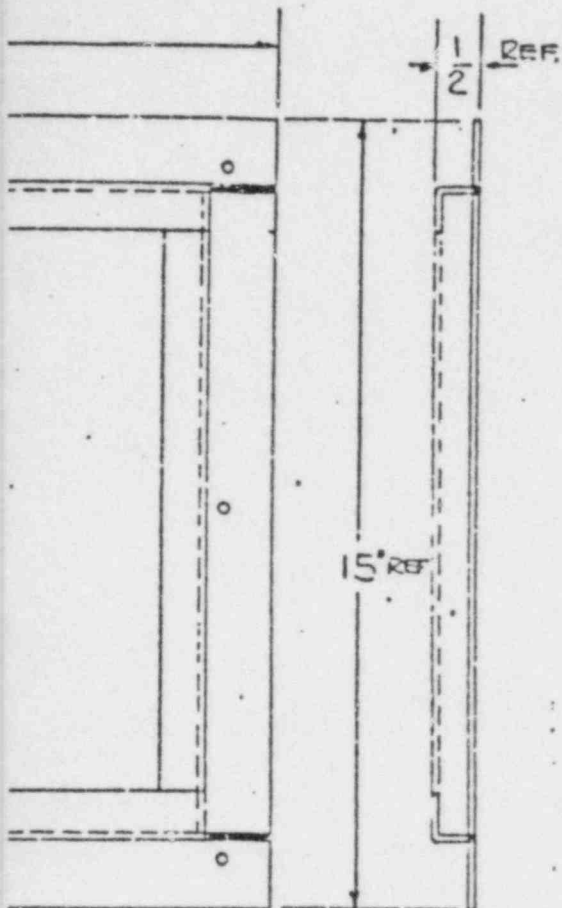


A

GLASS FRM. ANG. - TOP & BTM.
C-J29576 - (2-REQ'D.)

REVISIONS			
ECN	REV	DESCRIPTION	DATE

Attachment
ST-HL-AE-1511
Page 9 of 108



TI APERTURE CARD

Also Available On
Aperture Card

FILE	R2440-1
ILL	13

TOLERANCES		ORDER NO.	Modeler	
FRAC. + -		DR BY: M. CURPENS	TITLE INSIDE	
DEC. + -		DATE: 7-12-77	ASSY. GLASS FRAME	
ANG. + -		CHECK BY:	FOR	CLASS
MATERIAL (SPEC.)		DATE:	B.R. Door	3
FINISH (SPEC.)		APPD:	PRODUCT	SIZE
		DATE:	C	J29575
		APPD:	SCALE	ONT ON
		(CUST.)		

8511050150-05

5

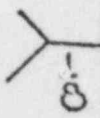
4

D

C

B

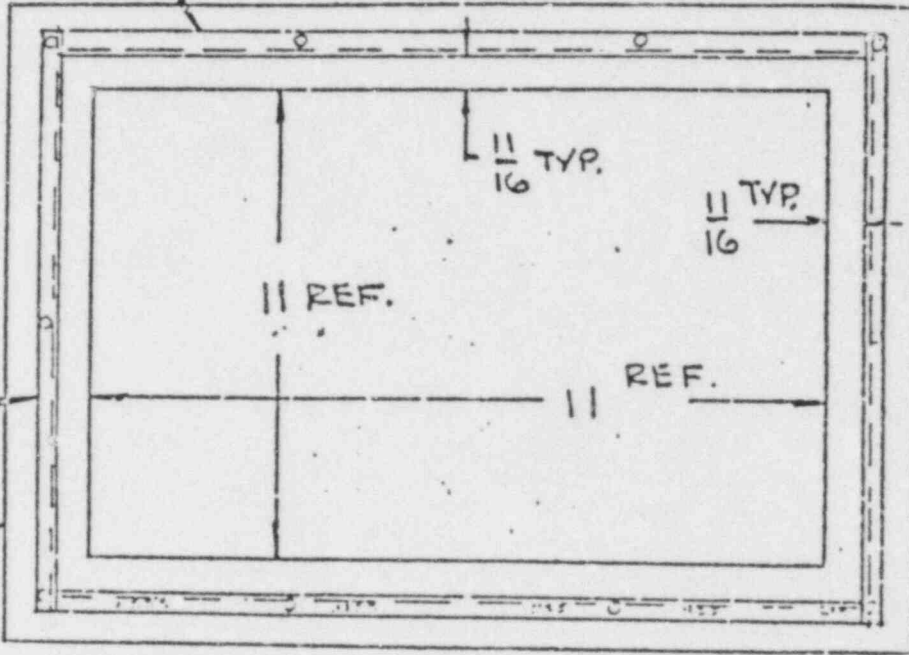
A



3

2

1



15 REF.

3	2	1
REVISIONS		
E.C.N.	REV.	DESCRIPTION
		DATE
		APPD.

Attachment
SF HL-AE-1511
Page 97 of 108

TI
APERTURE
CARD

Also Available On
Aperture Card

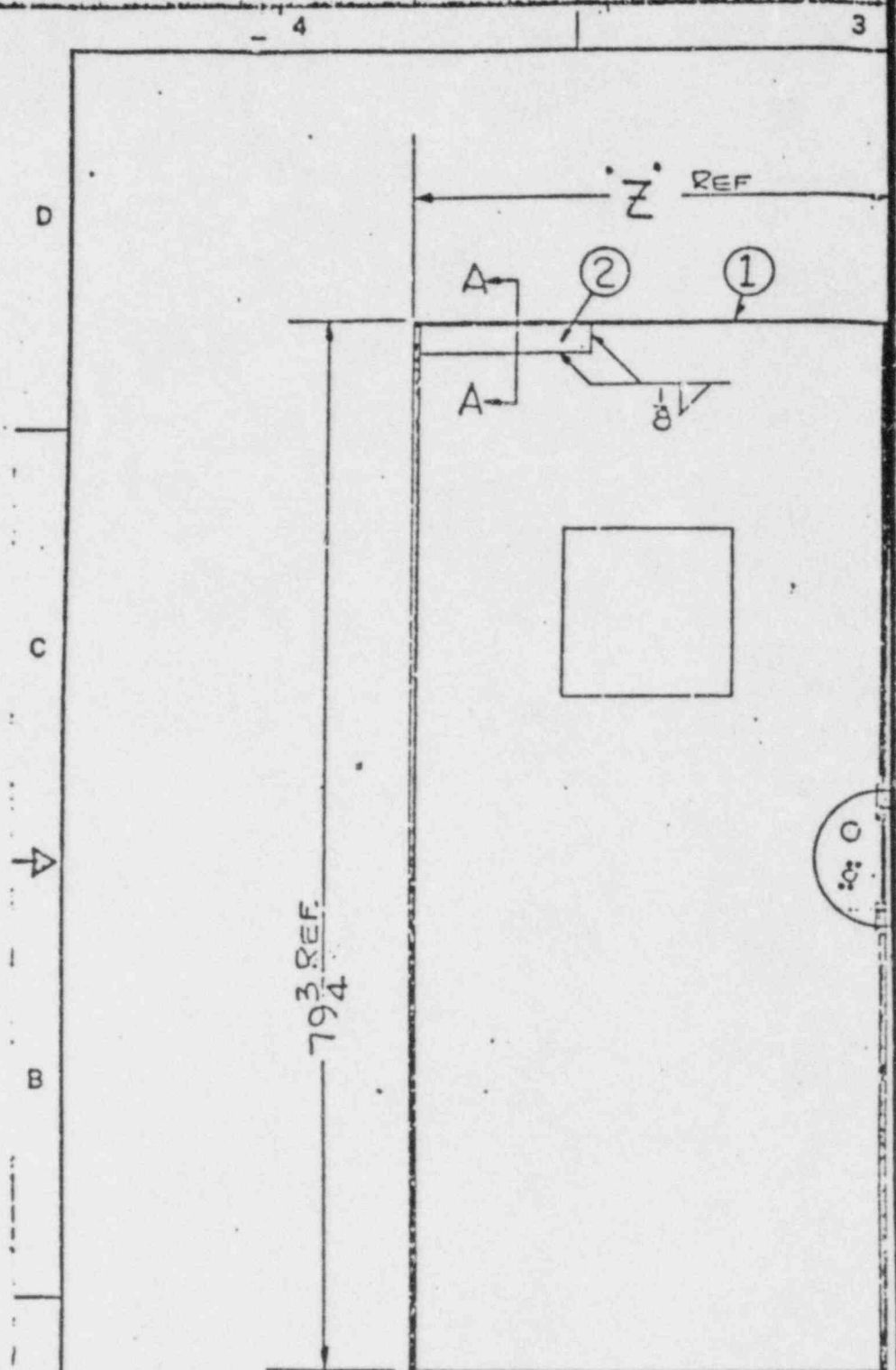
FILE
R2440-1
ILL 12

3	FRAME ANGLE	B-J27816	2
2	FRAME ANGLE	B-J27817	2
1	GLASS FRAME	B-J27813	1
ITEM	PART NAME	PART NO.	QUAN.

TOLERANCES RAC. + OR - 1/32 F.C. + - V.G. + - MATERIAL (SPEC.) 1010 - 1020 4125 OR CFS FINISH (SPEC.)	ORDER NO.	Mosier HAMILTON, OHIO 45012		
	DR BY: PRIDGETT	TITLE		
	DATE: 2-5-77	ASSY GLASS FRAME		
	CHECK BY:	FOR		
	DATE:	BR. DOOR		
	APPD:	PROD. CODE.	SIZE	DWG. NO.
	DATE:		B	J 27815
	APPD:			
(CUST.)	SCALE	CONT. ON		

MICROFILMED
REV. 0

8511050150-06



PART NUMBER	OUTER DOOR PANEL	REINF. PLATE DOOR CLOSER	MOUNTING PLATE
C-J28718-A	D-J27968	A-J18747-F	A-J27297
" -B	D-J29585	A-J18747-F	A-J27297

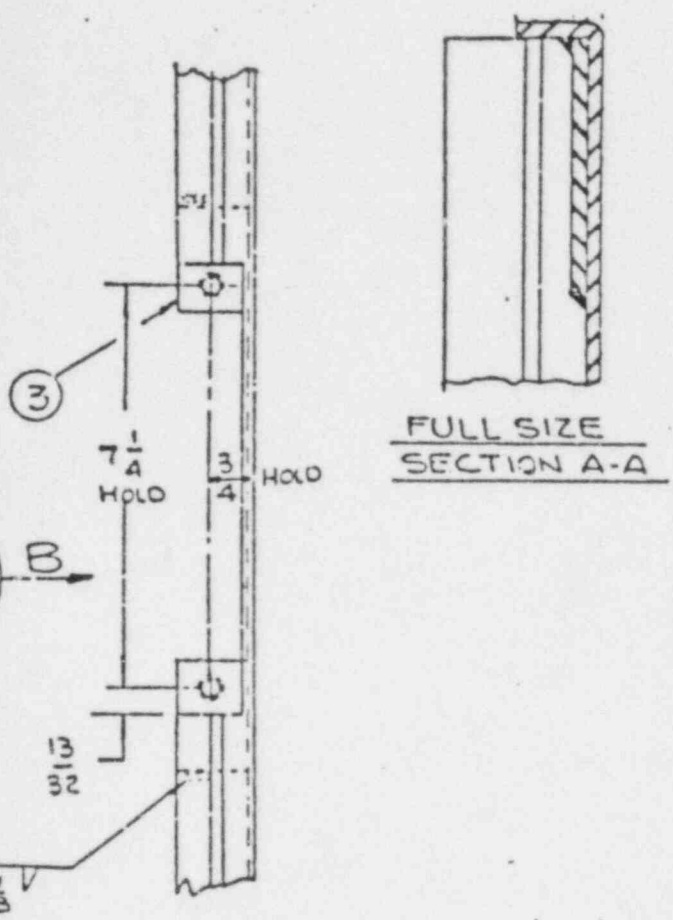
1

2

1

REVISIONS			
ECN	REV	DESCRIPTION	DATE

Attachment
ST-HL-AE-1511
Page 8 of 108



FULL SIZE
SECTION A-A

HALF SIZE
FACE VIEW
OF DETAIL 'B'

TI APERTURE CARD

Also Available On
Aperture Card

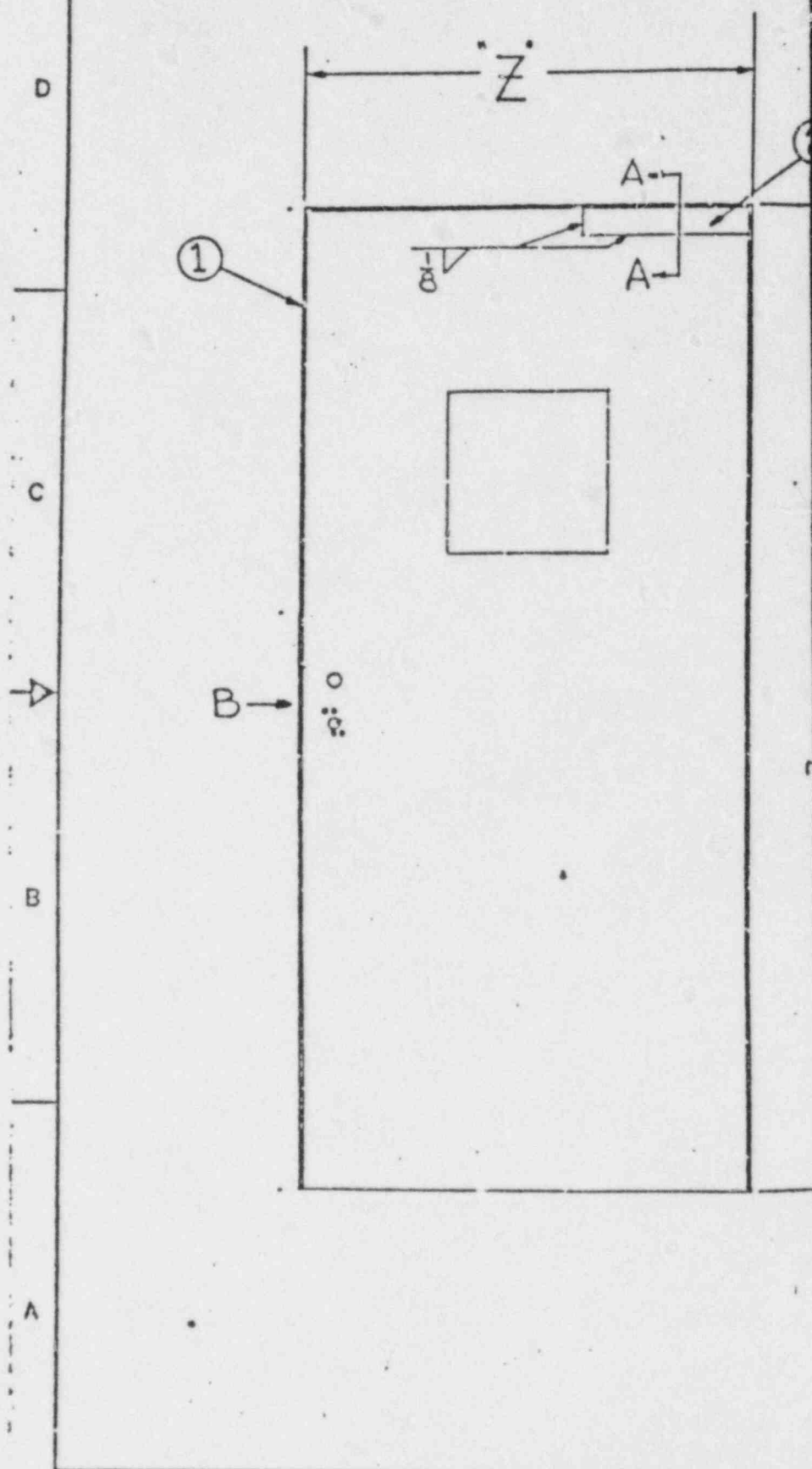
FILE	RE110-1
ILL	11

TOLERANCES FRAC. + - DEC. + - ANG. + -		ORDER NO. DR BY: M. CURRENS DATE: 5-14-77 CHECK BY:		Mosier HAMILTON, OHIO 45012	
MATERIAL (SPEC.)		DATE:		TITLE ASSY. OUTER DOOR	
FINISH (SPEC.)		APPD:		FOR B.R. DOOR	
(CUST.)		DATE:		PRODUCT	
SCALE		SIZE		DWG. NO. C J28718	
REV. 0		PORT. ON			

Z
37 3/4
32 1/4



8511050150-07





2

1

REVISIONS			
ECN	REV	DESCRIPTION	DATE

Attachment
SI-HL-AE-1511
Page 99 of 108

TI
APERTURE
CARD

Also Available On
Aperture Card



FULL SIZE SECT. A-A



VIEW B

FILE	83110-1
ILL	10

①

②

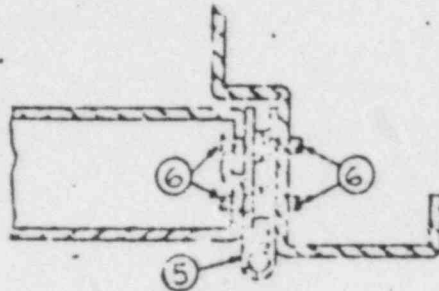
PART NUMBER	INNER DOOR PANEL	REINF. PLT - DOOR CLOSER	Z
C-J28717-A	D-J27833	AJ18747-F	37 3/4
C-J28717-B	D-J29586	A-J18747-F	32 1/4

TOLERANCES		ORDER NO.		Moeler HAMILTON, OHIO 45012	
FRAC. + -		DR BY: M. CURRIEN	DATE: 3-11-77	TITLE ASSY-INNER DOOR FOR B. R. DOOR	
DEC. + -		CHECK BY:	DATE:		
ANG. + -		DATE:	APPD:	PRODUCT SIZE D.W.G. NO. C J28717	
MATERIAL (SPEC.)		DATE:	APPD:		
FINISH (SPEC.)		DATE:	APPD:	SCALE COUNT ON	
(CUST.)		DATE:	APPD:		
				REV. O	

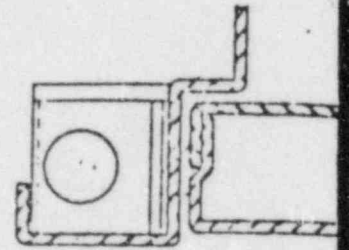


8311030150-08

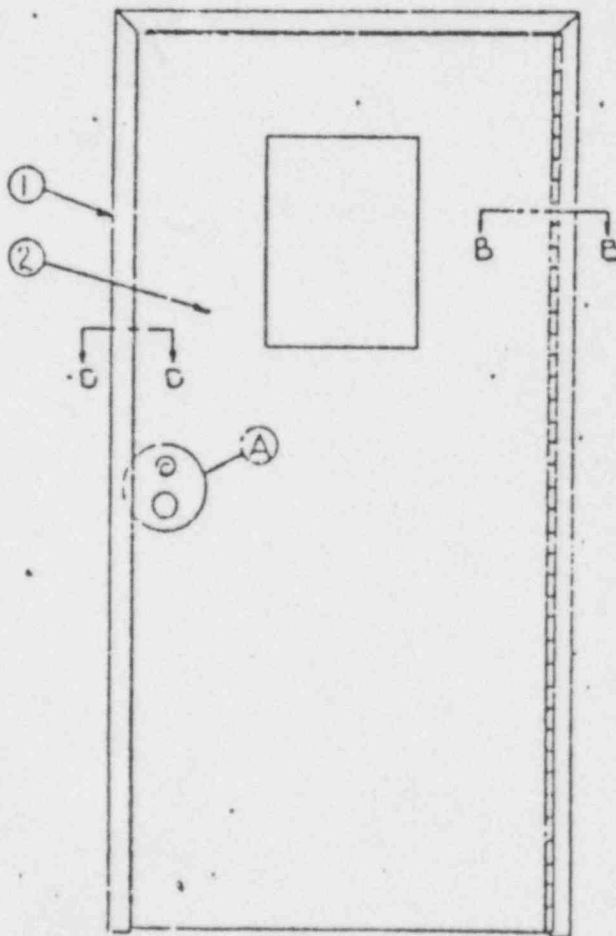
Attachment
ST-HL-AE-1511
Page¹⁰⁰ of 108



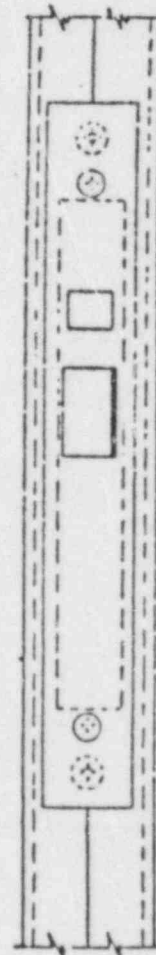
FULL SIZE SECT. B-B



FULL SIZE SECT.

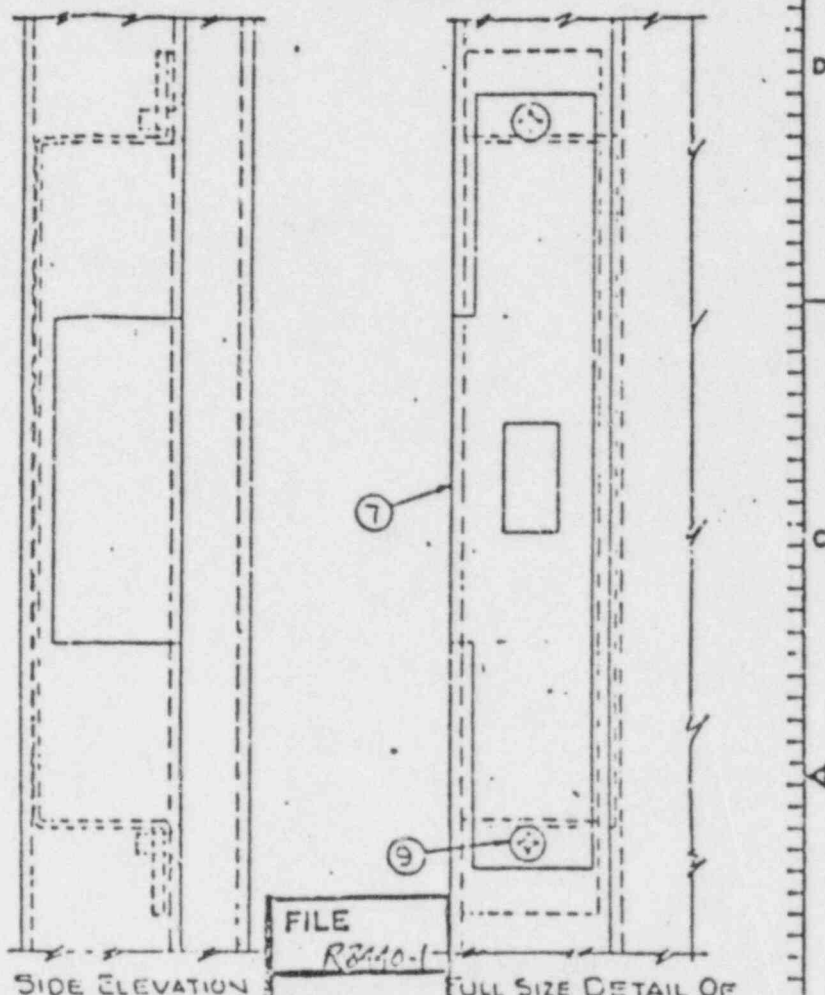


ELEVATION FROM OUTSIDE
RIGHT HAND OUT SWING SHOWN



FULL SIZE
EDGE VIEW OF
DETAIL 'A'

REV	DESCRIPTION	DATE	APPD.



FILE

R2410-1

JLL 9

FULL SIZE DETAIL OF STRIKE ON FRAME

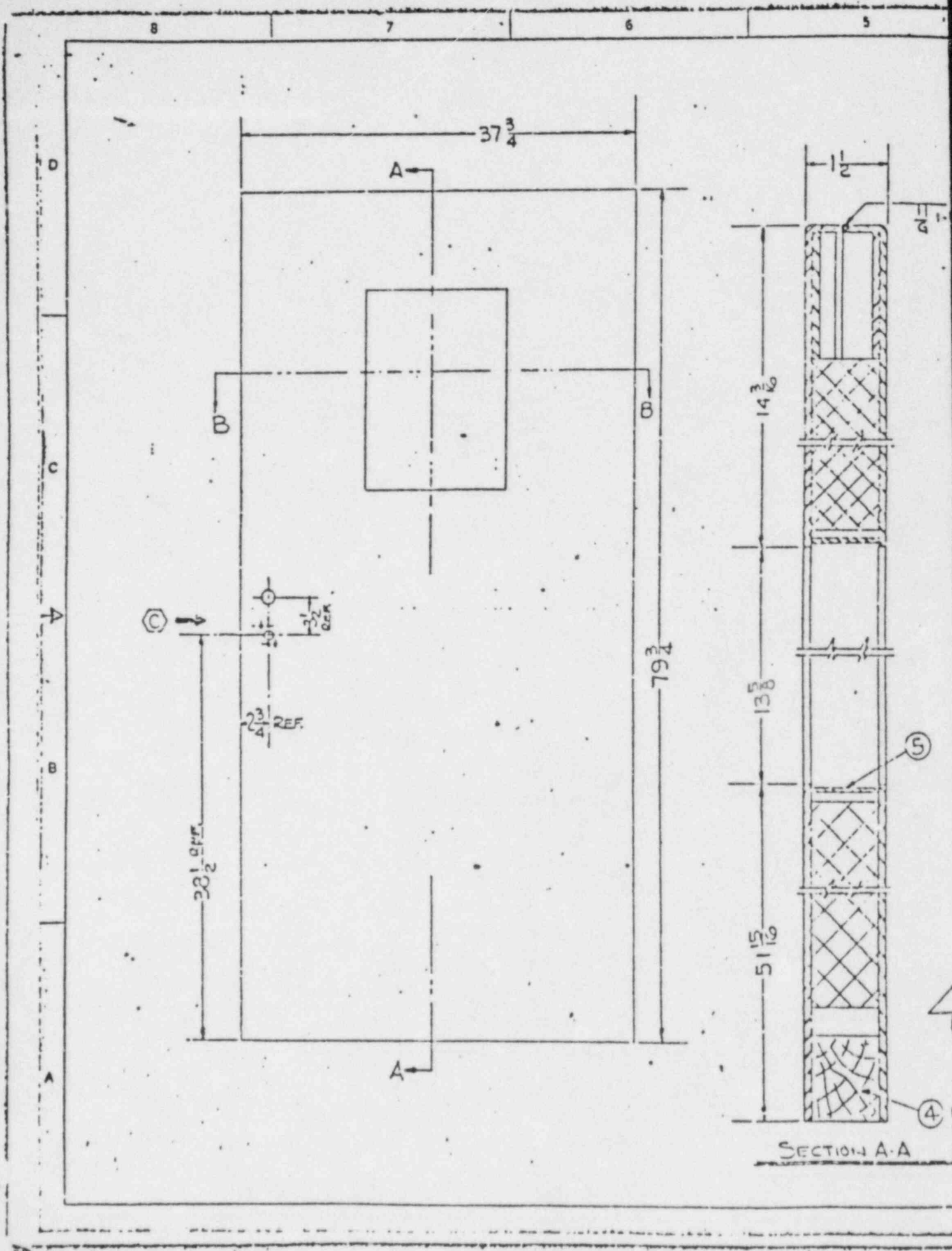
TI
APERTURE
CARD

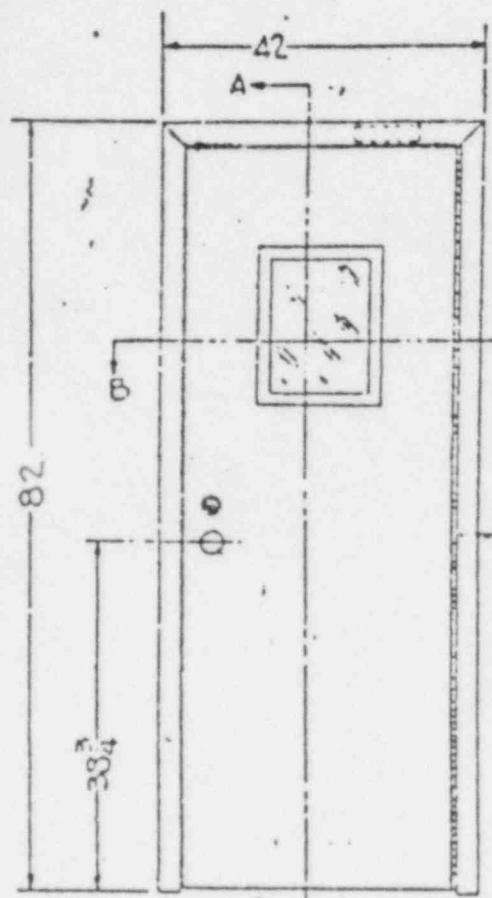
Also Available On
Aperture Card

2	7	B	68849	EA SCREEN 12-24x1/2 FLAT HD MACH	
2	9	B	65341	REF SCREEN 10-22x1/2 PAN HD MACH	
1	7	B	J27613	LOCK STRIKE PLT	
22	2	B	90171	CF SCREEN 12-22x3/8 ST OUTMR PAN	
1	5	C	J28712	CONT NUTS HINGE	
4	4	B	65849	EDH SCRS 12-22x3/8 FLAT HD MACH	
1	5	B	90431	8 MORTISE TYPE KEYLOCK	
1	7	D	J29618	ASSY DOOR	5
1	7	D	J28710	ASSY FRAME WELDMENT	5

TOLERANCES		ORDER NO.	Master
DR BY MC 5/3/77		FILE - 551 DOOR & FRAME	
CHECK BY		FOR B.R. DOOR	
APPD.		2 OUT 12-10 OUT SWING	
MATERIAL		SHEET 2 OF 2	
FINISH		REV 2	

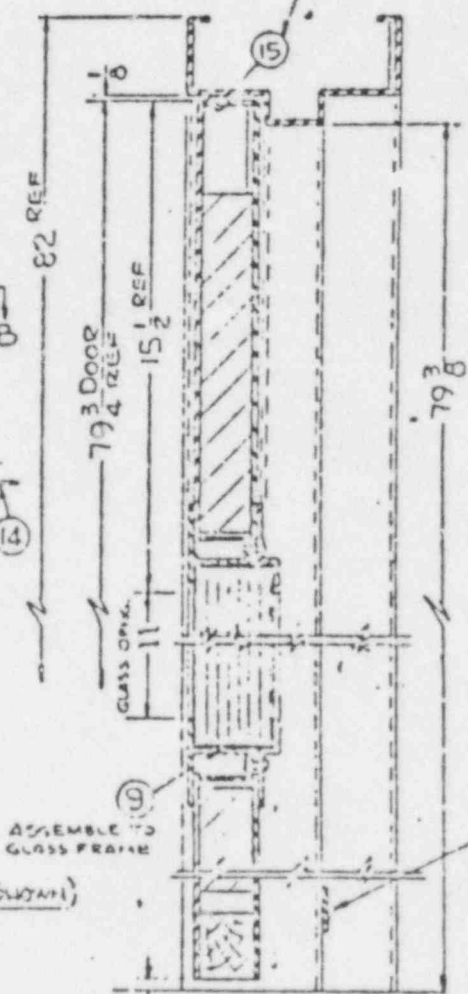
8511050150-09



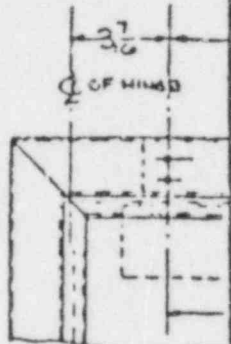


ELEVATION (RIGHT HAND OUT-SWING SWAN)

NOTE:
 REMOVE RUBBER BUMPER #15
 AFTER SWEEPED AND REPLACE
 IN TOP VERTICAL HOLE

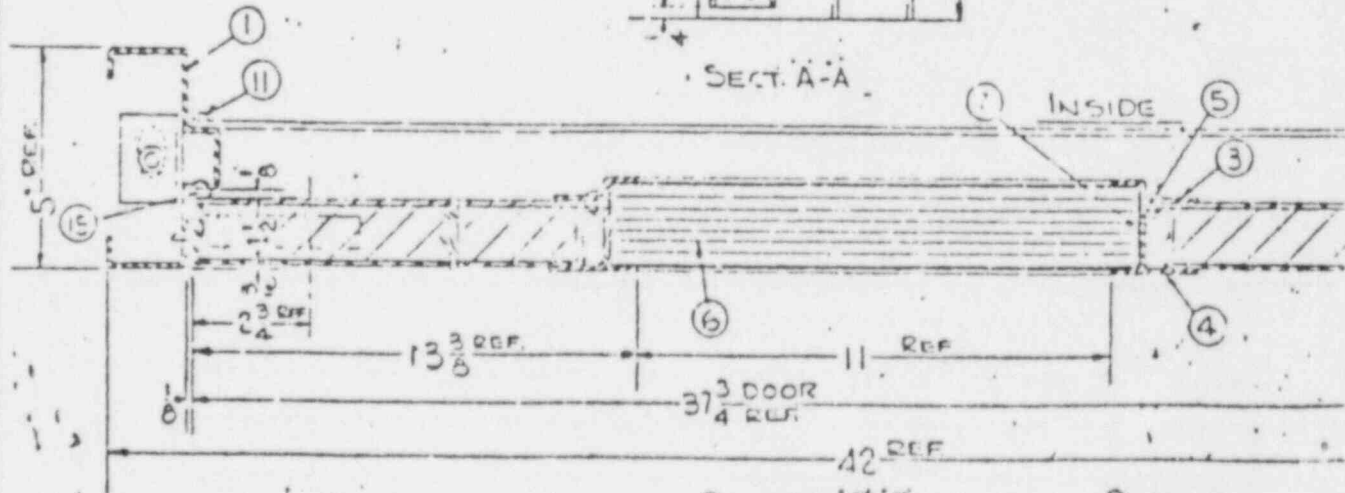


SECT. A-A



DRILLING DETAIL
 TO BE USED ON

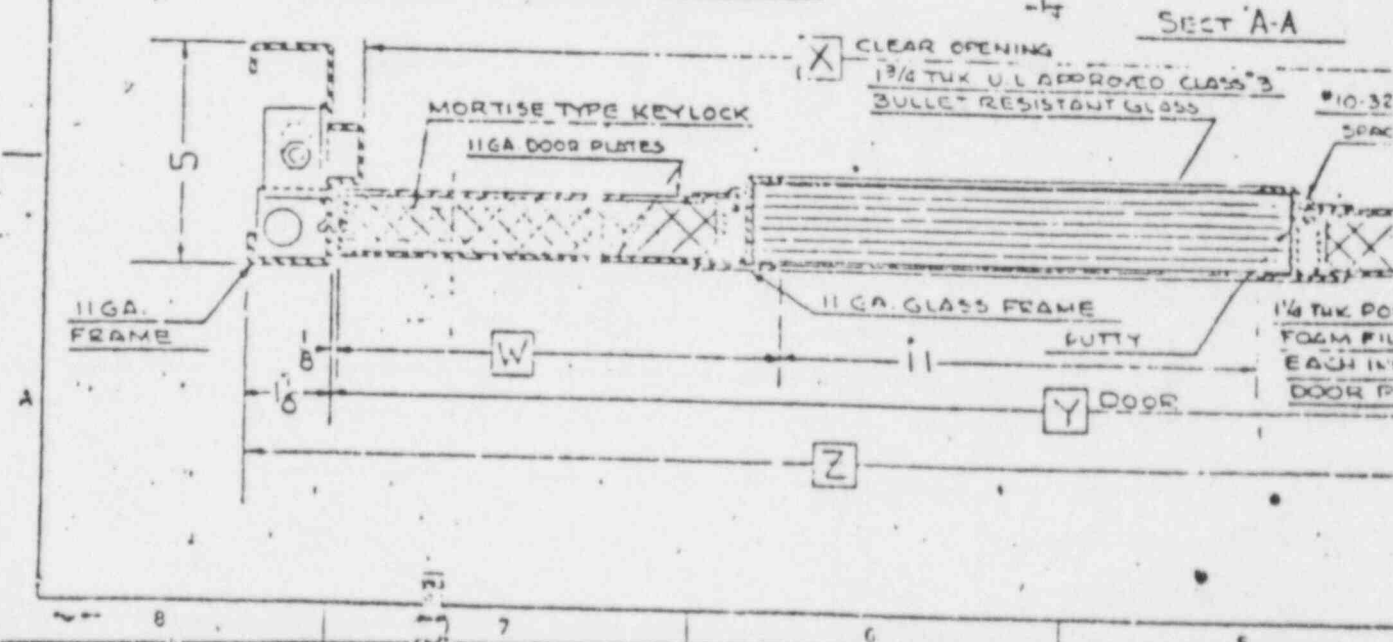
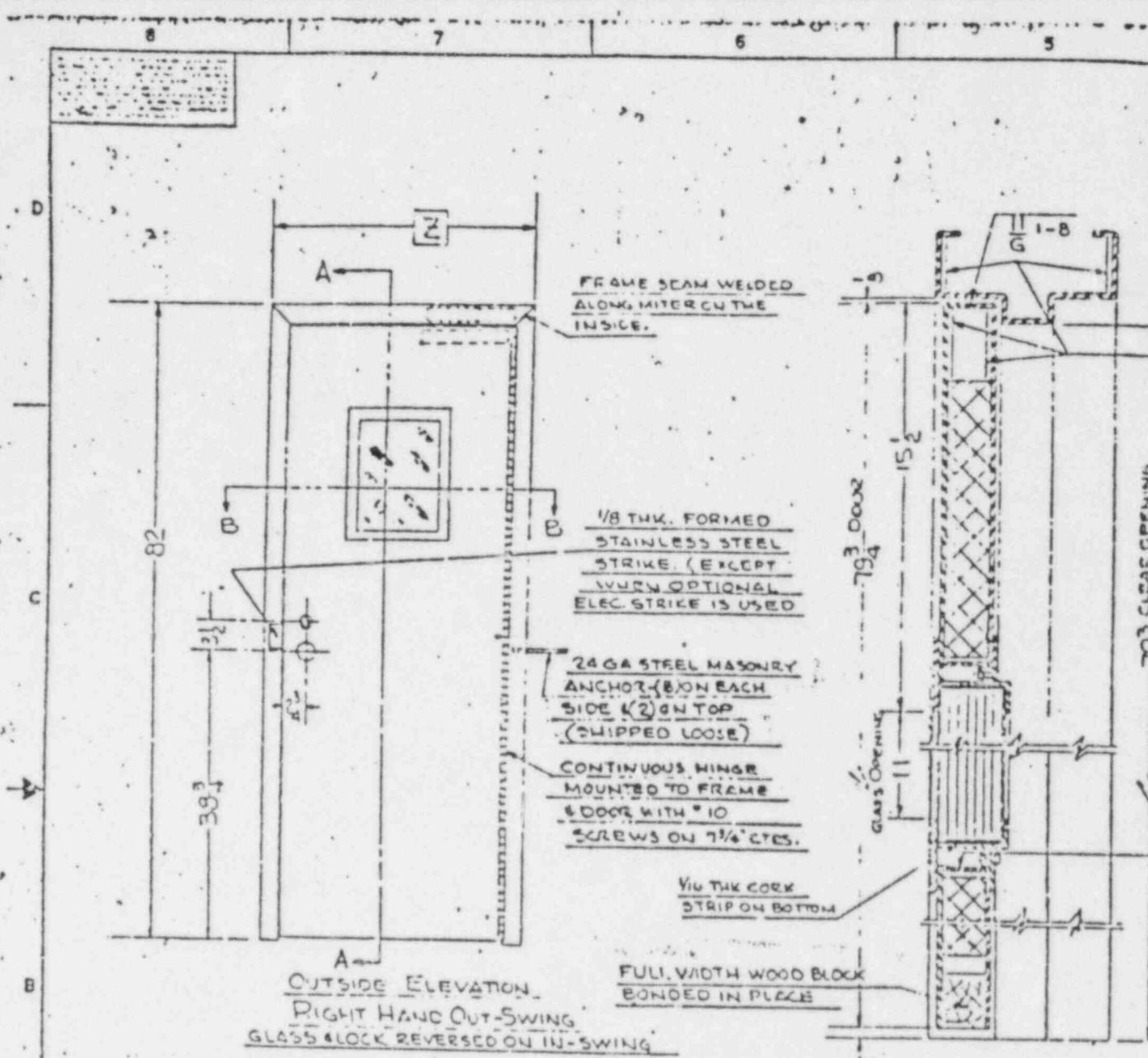
NOTE:
 REMOVE STRAP AFTER
 SHIPPED & REPLACE
 SCREW



SECTION B-B

INSIDE

OUTSIDE



REVISIONS			
ECN/REV.	DESCRIPTION	DATE	APPRO.

Attachment
ST-HL-AE-1511
Page 103 of 108

11 GA REINF. PLATES IN AREA
OF DOOR CLOSER. SPOT OR
TACK WELDED TO PROVIDE
ADDITIONAL TAPPING THICKNESS
FOR CLOSER MTG. SCREWS

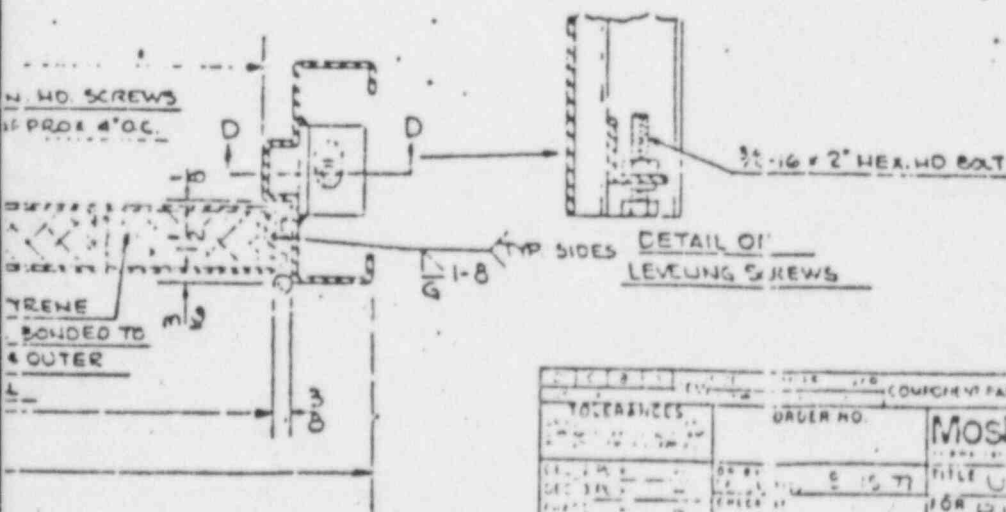
TI APERTURE CARD

Also Available On
Aperture Card

NOTE: OPTIONAL EQUIPMENT:
FOLGER ADAMS MODEL 510-2 ELECTRIC
STRIKE MOUNTED IN FRAME

CLOSURE STRIP ANGLES

PART NO.	Z	Y	X	VV	REMARKS
D-J29609-A	42	31 1/4	36 1/4	13 1/3	
D-J29609-C	36 1/2	32 1/4	31 1/4	10 5/8	



FILE
R8440-1
ILL 7

TOLERANCES		ORDER NO.	COMPONENT PART NAME	SA UN/AN
DEC 31 1957 MATERIAL FINISH		8 15 77 APPR. REAT 8511	Mosier FILE U1. 255-10000 FOR BULLET RESISTANT DOOR CLF 5"3 1/2 FIREPROOF STABOED. 1502 113 D1 SCALE 1/2"=1'-0"	2

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File R8440-1

Page T1-1

Issued: 6-6-78

T E S T R E C O R D N O. 1

TEST ASSEMBLY:

The fire test assembly consisted of a single swing, 1-3/4 in. thick special purpose type fire door, and frame assembly. The door was provided with a full mortise type single-point latch.

DOOR

The door was designed for an opening 36 in. in width and 80 in. in height.

The door consisted of No. 11 gauge steel faces bonded to a 1-1/4 in. thick polystyrene core board with Scotch Grip Insulation Adhesive No. 321. Fabrication of the test door was witnessed by a representative of Underwriters Laboratories Inc.

The construction details of the doors are as shown on ILLS. 6 through 17.

FRAME

The pressed steel single unit frame in which the door was mounted consisted of No. 11 gauge steel, with anchors for fastening into a masonry wall.

HARDWARE

The door was provided with a continuous hinge mounted to the frame and door with No. 10 screws, 7-3/4 in. O.C.

The door incorporated a Listed mortise type single-point latch, with a 3/4 in. throw, secured to the door with machine screws.

INSTALLATION:

The door was built into a 12 in. thick brick wall in a test frame. After the door was installed, the clearances averaged 3/16 in. along the top, 0 in. along the hinged edge, 3/32 in. along the latch edge and 5/16 in. above the sill.

The general appearance of the installed assembly is shown by ILLS. 1 and 2.

FIRE ENDURANCE TEST:

METHOD

After the brick wall had seasoned, the fire test was conducted in accordance with the Standard for Fire Test of Door Assemblies, UL10B.

Throughout the fire test, observations were made on the character of the fire, the condition of the exposed and unexpected faces, and all developments pertinent to the door as a fire barrier with special reference to stability and flame passage.

RESULTS

Observations Of Fire Side

The fire was luminous and well-distributed during the fire test. The temperatures within the furnace chamber were controlled in accordance with the Standard Time-Temperature Curve as shown in ILL. 3.

The steel faces of the doors began to bow and bulge during the first minute of the test. After 30 min, no additional bowing or buckling was observed for the remainder of the 180 min fire test.

After 50 min of the exposure, glass began to melt on the surface of the door. This continued until the glass melted completely through after 9 hr and 37 min of fire exposure.

The general appearance of the exposed face after the fire exposure and before application of the hose stream is shown by ILL. 5.

Observation Of Unexposed Side

The deflections of the door were determined by measurements at about the center-point of the door on a horizontal line at midheight. The face of the door bowed into the fire a maximum of 1-1/2 in. at the center point of the door at 180 min of fire exposure.

The hinge edges moved tight against the frame and the bottom of the door settled on the sill during the first 15 min of fire exposure. However, the latch edge, at the midheight of the door, deflected a maximum of 3/8 in. away from the stop of the frame at 180 min.

After 1 hr, 37 min of fire exposure, the top 1/3 of the glass opening melted into the exposed side of the door.

The average unexposed surface temperature was 80 F prior to the start of the test. After 30 min of fire exposure, the average surface temperature rise was 1110 F. The recorded temperatures of the unexposed surface are shown on ILL. 4.

HOSE STREAM TEST:

METHOD

Immediately after the 180 min fire exposure, the assembly was withdrawn from the furnace chamber and the door was subjected to the impact and cooling effects of the 45 psi hose stream as specified in the Standard for 3 hr doors.

RESULTS

During application of the hose stream, the faces of the doors had a tendency to flatten. Normal amounts of water were projected through the edges and above the sill. No through openings developed.

A maximum separation of 1-5/8 in. occurred between the frame stop and the latch edge of the door, at the midheight.

WRH/HSF

C O N C L U S I O N

The following conclusions represent the judgement of Underwriters Laboratories Inc. based upon the results of the examination and tests presented in this Report as they relate to established principles and previously recorded data.

FIRE RETARDANT PROPERTIES:

Single swinging special purpose type doors for openings not exceeding 36 in. in width and 80 in. in height, installed as described in this Report are judged not suitable for use in openings in walls for 3 hr locations.

The opening which occurred after the glass melted out of the door, failed to meet the requirements as specified in Standard For Safety, UL10B, "Fire Tests Of Door Assemblies."

The 3/4 in. latch bolt remained effective throughout the fire test.

The separation of the door edges from the frame stops, were within the limits specified by the Standard.

No fire passed through or around the assembly during the 180 min fire test.

The maximum deflection was 1-1/2 in. after 180 min of fire exposure.

The average unexposed surface temperature rise measured after 30 min of fire exposure was 1110 F.

HOSE STREAM RESISTANCE:

The application of the 45 psi hose stream immediately after the fire test did not dislodge or appear to weaken the assembly for it remained securely in position.

REVISED CONSTRUCTION:

The submitter has proposed to revise the construction by eliminating the glass light in the door. This would prevent an opening from occurring should the glass melt out.

Accordingly, it is judged that when constructed with the revised details, and as described in this Report, the special purpose type fire door and frame assembly provides protection for openings in walls for 3 hr locations.

File RS440-1

Page C2

Issued: 6-6-78

CLASSIFICATION AND FOLLOW-UP SERVICE:

A sample of the product covered by this Report has been found to comply with the requirements for Fire Hazard only covering the class and the product is judged to be eligible for Classification and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Classification Marking on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Classification Marking are considered as Classified by Underwriters Laboratories Inc.

The fire door Classification Marking reading, "Special Purpose Fire Door and Frame Assembly, Fire Rating: 3 Hr (A)" will cover the size, design, and construction of the door.

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