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INTRODUCTION AND GENERAL DESCRIPTION OF PLANT

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CHAPTER 1

INTRODUCTION AND GENERAL DESCRIPTION OF PLANT

1.1 INTRODUCTION

This Post-Defueling Monitored Storage (PDMS) Safety Analysis Report (SAR) is submitted in support of the application of GPU Nuclear Corporation (GPU Nuclear) as agent for Metropolitan Edison Company (Met-Ed), Jersey Central Power & Light Company (JCP&L), and Pennsylvania Electric Company (Penelec) for revision of the existing Class 103 license to delineate the non-operating status of the nuclear electric generating station designated as Three Mile Island Nuclear Station Unit 2 (TMI-2). There are various sections of this SAR which reference either the Unit 1 USAR or Unit 2 FSAR for relevant information. These refer to information which has been previously reviewed and approved by the NRC, remains valid, and does not require further review. The TMI-1 USAR will continue to be updated in accordance with 10 CFR 50.71(e) whereas the TMI-2 FSAR update is no longer required.

The Three Mile Island Unit 2 operating license was issued on February 8, 1978, and commercial operation was declared on December 30, 1978. On March 28, 1979, the unit experienced an accident which resulted in severe damage to the reactor core. TMI-2 has been in a non-operating status since that time. GPU Nuclear has been conducting a substantial program to defuel the Reactor Vessel and decontaminate the facility. As a result, TMI-2 has been defueled and decontaminated to the extent that the plant is in a safe, inherently stable condition suitable for long-term management and any threat to the public health and safety has been eliminated. This long-term management condition is termed Post-Defueling Monitored Storage.

1.1.1 POST-DEFUELING MONITORED STORAGE

Post-Defueling Monitored Storage has been established at this time based on three principal considerations:

1. The Reactor Vessel and the Reactor Coolant System have been defueled and the core material has been shipped off-site.

2. Decontamination has been completed to the extent that further major decontamination programs are not justified on the basis of worker dose.

3. A condition of stability and safety has been established such that there is no risk to public health and safety.

These three criteria are interrelated in that each has some degree of dependence on the other. A significant amount of decontamination had to be completed prior to the beginning of defueling. As defueling progressed and was completed, further decontamination tasks were undertaken which allowed for the completion of other cleanup activities. Extensive decontamination and the completion of defueling were required to establish the inherently stable and safe condition of the facility such that there was no risk to public health and safety.

Although it would be possible to continue decontamination of the facility, this effort would not appreciably enhance the overall stability and maintainability of the facility nor would it add to the overall margin of safety for the public. However, additional decontamination at this time would result in unnecessary additional occupational exposure to personnel who would be conducting the decontamination tasks. In addition, further decontamination might require some destructive decontamination techniques which would be best conducted when the plant is decommissioned. By placing TMI-2 in a long-term monitored storage condition at this time (i.e., until the time of decommissioning of TMI-1), it is possible to realize a significant savings in occupational exposure by deferring remaining decontamination activities for a number of years. For example, assuming all other factors to be equal, natural decay of the dominant radioactive isotopes (Sr-90, Cs-137) over a 30-year period would result in the occupational exposure being reduced by a factor of approximately two for any given task. It is possible that additional reductions in occupational exposure also could result from advances in decontamination technology and robotics. Although the exact reductions in occupational exposure are extremely difficult to quantify, it is clear that postponement of the remaining pre-decommissioning decontamination activities will result in a significant savings in occupational exposure. A preliminary estimate indicated that a savings of approximately 4300 person-rem would result from the deferral of remaining decontamination activities. This estimate was based on information published by the NRC in Supplement 1 to the Programmatic Environmental Impact Statement (PEIS) and adjusted to account for variations in the scope of the work and actual exposure experience during the cleanup.

Based on this preliminary analysis and using revised data, GPU Nuclear, in 1985, more accurately quantified the potential savings in occupational exposure due to the deferral of the remaining decontamination tasks. The results of this extensive effort are presented in Appendix 1A. Given that occupational exposure remains the singular contributor to environmental impact, avoidance of unnecessary exposure where the public health and safety are not at risk is appropriate.

1.1.2 TRANSITION TO POST-DEFUELING MONITORED STORAGE

The formal transition from the current post-accident condition to PDMS required NRC approval and implementation of the enclosed license revision proposed by GPU Nuclear. The establishment of the actual PDMS condition occurred over a period of time preceding the formal implementation of PDMS and extending into PDMS. Not all activities leading to the final PDMS configuration must be completed prior to the implementation of PDMS. However, during the transition period, all of the prerequisites to PDMS were satisfied. The following sections outline those conditions which were established prior to the implementation of PDMS and those activities which extended for some period of time subsequent to PDMS implementation.

1.1.2.1 Prerequisites for PDMS

The following prerequisites were satisfied prior to the implementation of PDMS.

1. It has been demonstrated that there is no credible possibility of nuclear criticality. This condition has been assured by the removal of substantially all of the fuel from the Reactor Vessel and elimination of all potentially critical configurations. The elimination of any credible possibility of nuclear criticality was demonstrated as a requirement for transition to Mode 2 in accordance with the TMI-2 Recovery Technical Specifications. A report supporting this condition was submitted to the NRC.

2. All fuel and core debris which have been removed from the Reactor Vessel and associated systems have been shipped off-site.

3. Any potential for a significant release of radioactive material has been eliminated. Radioactive material has been removed and other sources of radioactivity have been isolated so that any potential radioactive release will be within 10 CFR 50 Appendix I guidelines for off-site dose consequences.

4. As a precondition to implementing PDMS, water has been removed to the extent practical from the Reactor Coolant System and the Fuel Transfer Canal, and the fuel transfer tubes have been isolated. To the extent that the Spent Fuel Pools are needed to support Accident Generated Water disposal activities, water may remain in these pools subsequent to the implementation of PDMS. The treatment and processing of the Accident Generated Water is discussed in Section 1.1.3.

5. All radioactive waste from the major cleanup activities has been shipped off-site or has been packaged and staged for shipment off-site.

6. Radiation within the facility has been reduced, as necessary, consistent with As-low-as-is-reasonably-achievable (ALARA) principles to levels which will allow necessary plant monitoring activities, the performance of required maintenance, and any necessary inspections.

1.1.2.2 Transition Activities

Although the conditions described in Section 1.1.2.1 were established prior to the implementation of PDMS, there were some conditions described in this SAR which were not essential to the implementation of PDMS and the related activities were conducted subsequent to the implementation of PDMS. A general description of some of those activities and conditions follows.

1. Decontamination - During the initial stages of PDMS, removal or isolation of small sources of radioactivity or radioactive material will be ongoing.

2. Radioactive Waste - Small quantities of radioactive waste will continue to be generated, accumulated, and packaged during PDMS. Thus, radioactive waste shipments will continue during PDMS.

3. PDMS Electrical Modification - The TMI-2 PDMS Electrical Modification results in a safer, more reliable power system than the system existing during Facility Mode 3. Although many electrical loads were eliminated during PDMS preparation, this modification further consolidates loads to produce a simpler, easier to maintain electrical power system. The PDMS Electrical Modification is scheduled to be completed in the second quarter 1994.

4. Cork Seam - The TMI-2 cork seam is a cork-filled construction joint located between the various major structures at TMI-2 (See Figure 1.1-1). During the TMI-2 accident, the cork seam located in the Auxiliary Building Seal Injection Valve Room (SIVR) was contaminated with radioactive water. Since the accident, radioactive material has spread along the joint in one direction into the Annulus, and in the other direction into the Auxiliary Building, Service Building and Control Building Area. The radioactive contamination is prevented from entering the ground water table by a PVC waterstop and thus represents no threat to the health and safety of the public.

   Core boring holes were made in the M-20 and Auxiliary Building areas of the seam (Figure 1.1-1, Holes S2 and S6); cork and water samples were extracted from these holes. The M-20 area was found not to be contaminated. The data retrieved from the Auxiliary Building hole (S6) was analyzed; it was determined that the 40-year Total Integrated Dose (TID) to the PVC waterstop in this area would be 6.4E5 rads. This is less than 5% of the dose that would cause degradation of the material.

   Additional work will be performed on the cork seal prior to and shortly after entry into PDMS (See Figure 1.1-1). A core bore will be drilled in the cork seam in the Control Building Area and a dam installed to prevent contamination in the seam from spreading into the M-20 area, which is presently not contaminated. Another core bore will be drilled in the cork seam in the Auxiliary Building between the existing dam and the Auxiliary/Service Building wall and a dam installed to prevent further contamination spread into the Service/Control Building Area. Prior to installing the new dam at this location, the contaminated water in the seam will be pumped out into a receiving tank, sampled, and then transferred to the plants' Radioactive Water Storage System, pending future processing operations. This water removal process will be performed from this new hole, the S6 hole, and any other holes that may be deemed necessary. The need for further drilling and dam installation at the two locations (S4 and S5) noted on Figure 1.1-1 will then be determined.

After the water removal process has been completed, a liquid-level monitoring device will be inserted in each of the four sections in the one-inch diameter holes (S2, S6, S7, and S8). At least monthly, for a period of one year, these holes will be monitored for water entering the seam. The monitoring program will be reevaluated after the initial one year period. Finally, after the dams and pumping/monitoring holes are installed and the water is removed, an evaluation will be performed to determine whether additional actions are required, e.g., removal of cork material or capping of the cork seam.

TMI-2 has been maintained in a safe, monitored condition throughout the transition period prior to PDMS, and will be maintained accordingly following implementation of PDMS even though some transition activities are ongoing. A commitment tracking process has been established to verify the status and completion of all activities performed in preparation for PDMS and during the PDMS transition period to ensure all required activities described in this SAR are completed.

1.1.3 APPLICABLE REGULATIONS

GPU Nuclear is requesting an amended facility license for TMI-2 in accordance with the provisions of Title 10 to the Code of Federal Regulations, Part 50 (10 CFR 50). The provisions of 10 CFR 50, as established, were intended to be applicable to an operable nuclear power plant. For this reason, many of the requirements originally imposed on TMI-2 no longer apply or can be substantially reduced in scope because of the status of TMI-2 during PDMS. Because nuclear criticality has been precluded with removal of substantially all of the fuel from TMI-2, and because radiation hazards have been substantially reduced due to the immobilization of essentially all of the radioactivity remaining in the plant, many systems, structures, and components are no longer required and the regulations governing these systems, structures, and components have a significantly reduced scope of applicability at TMI-2.

In order to assure compliance with the appropriate requirements of the regulations in 10 CFR 50, a thorough review of these regulations was undertaken. Chapter 3 of this SAR presents the results of that review and serves as the basis for determining which regulations have a controlling impact on TMI-2.

The determination of applicability does not suggest that some regulations can be ignored. Rather, the intent of some regulations can be met with no impact or additional requirements imposed due to the PDMS status of TMI-2.

1.1.4 SAFETY-RELATED STRUCTURES, SYSTEMS, AND COMPONENTS

There are no structures, systems, or components classified as safety-related at TMI-2 during PDMS. GPU Nuclear procedures define safety-related structures, systems, and components as those which are necessary to ensure:

a. The integrity of the reactor coolant pressure boundary,

b. The capability to shutdown the reactor and to maintain it in a safe shutdown condition, or

c. The capability to prevent or mitigate the consequences of accidents which could result in potential off-site exposures comparable to the guidelines exposures of 10 CFR Part 100.

Criterion a requires maintenance of the reactor coolant pressure boundary. Due to the defueled condition of TMI-2, there is no reactor coolant or reactor coolant pressure boundary required.

Criterion b requires a capability to shutdown the reactor and maintain it in a safe shutdown condition. In its current defueled state, there are no structures, systems, or components required to maintain a safe shutdown condition.

Criterion c requires a capability to prevent or mitigate the consequences of accidents that could result in potential off-site exposures comparable to the 10 CFR Part 100 guidelines. Analysis demonstrates (see Chapters 4 and 8) that there are no postulated events that result in releases greater than 10 CFR 50 Appendix I guidelines. Since 10 CFR 50 Appendix I is more restrictive, there are no postulated events which could result in exposures comparable to 10 CFR Part 100 guidelines.

Due to the non-operating and defueled status of TMI-2 during PDMS, there are no structures, systems, or components which are required to meet the safety-related criteria. Therefore, there are no structures, systems, or components classified as safety-related at TMI-2 during PDMS.

1.1.5 DEVELOPMENT OF ACCEPTABLE OFF-SITE DOSE CRITERIA

Various regulations establish permissible limits for off-site radiation exposures resulting from the operation of licensed nuclear reactors and other nuclear fuel cycle activities. These regulations include 10 CFR 20, 10 CFR 50 Appendix I, 10 CFR 100, 40 CFR 190, and the EPA Protective Action Guidelines. The licensing basis for off-site dose criteria for PDMS has been derived from these existing regulations and applicable precedents. Specifically, 10 CFR 50 Appendix I, which is recognized as demonstrably safe with respect to radiological implications, has been established as the PDMS standard. A small fraction (i.e., less than 10%) of the Appendix I off-site dose guidelines is expected to be maintained for normal conditions prevailing during PDMS. The potential off-site radiological doses resulting from postulated off-normal conditions will be within the 10 CFR 50 Appendix I guidelines.

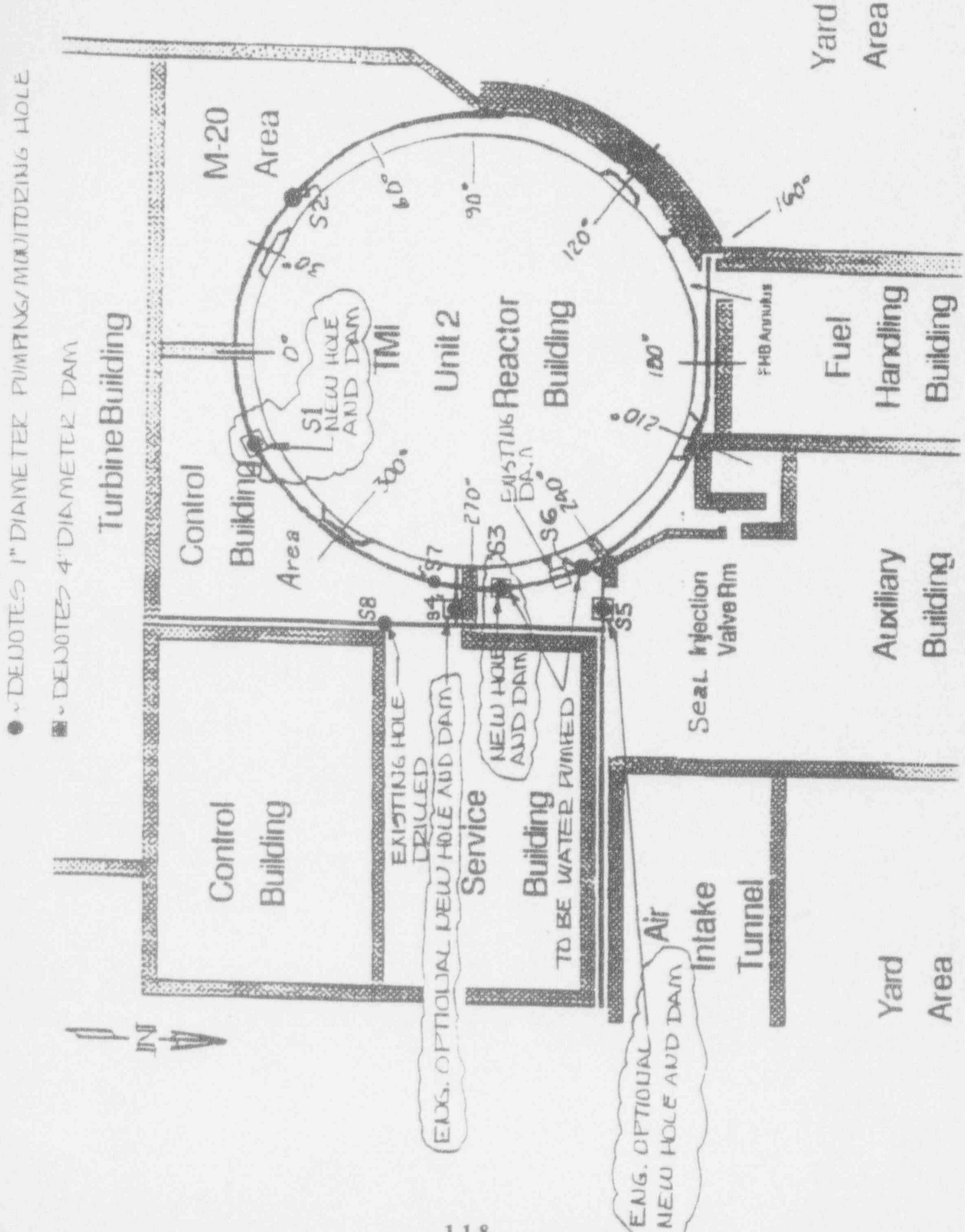
Due to the non-operating and defueled status of TMI-2, a major radiological release approaching the guidelines of 10 CFR 100 is no longer credible. As noted above, Appendix I guidelines have been selected as the limiting criteria for the evaluation of unanticipated events as an unarguable, demonstrably, conservative basis. This ultra-conservative approach far exceeds the regulatory limits for unanticipated events in operating nuclear power plants.

1.1.6 RELATIONS OF THIS PDMS SAR TO THE EXISTING UNIT 1 USAR AND UNIT 2 FSAR

This PDMS SAR makes reference to relevant portions of the Unit 1 USAR or the Unit 2 FSAR. The TMI-1 USAR will continue to be updated annually as required, and the updated document will be applicable for those changing site-related conditions that have a bearing on TMI-2. The TMI-2 FSAR will not be updated but will continue to be applied as appropriate to TMI-2 in the PDMS condition. In particular, the bounding conditions in the TMI-2 FSAR as augmented by the PDMS SAR will be used to judge the acceptability of changes, tests, and experiments and the attendant determination of unreviewed safety questions. The TMI-2 FSAR also applies for those areas not addressed by this PDMS SAR.

FIGURE 1.1-1

HOLE DRILLING AND DAM INSTALLATION WORK



1.2.8 FACILITIES AND SYSTEMS RELEASED FOR SITE USE

As a result of the accident, unique situations developed which could not be properly managed with the existing facilities or systems which were designed for normal operating power plant use. Several systems were designed and fabricated to process the radioactive wastes resulting from cleanup activities. Upon completion of cleanup activities, several of these facilities were released to general site use (and included under the TMI-1 license). These systems and facilities include:

1. Auxiliary Building Emergency Liquid Cleanup (EPICOR II)
2. Waste Handling and Packaging Facility
3. Interim Solid Waste Storage Facility
4. Solid Waste Staging Facility
5. Respirator Cleaning and Laundry Maintenance Facility
6. Solid Waste Storage Building

FIGURE 1.2-2

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FIGURE 1.2-16

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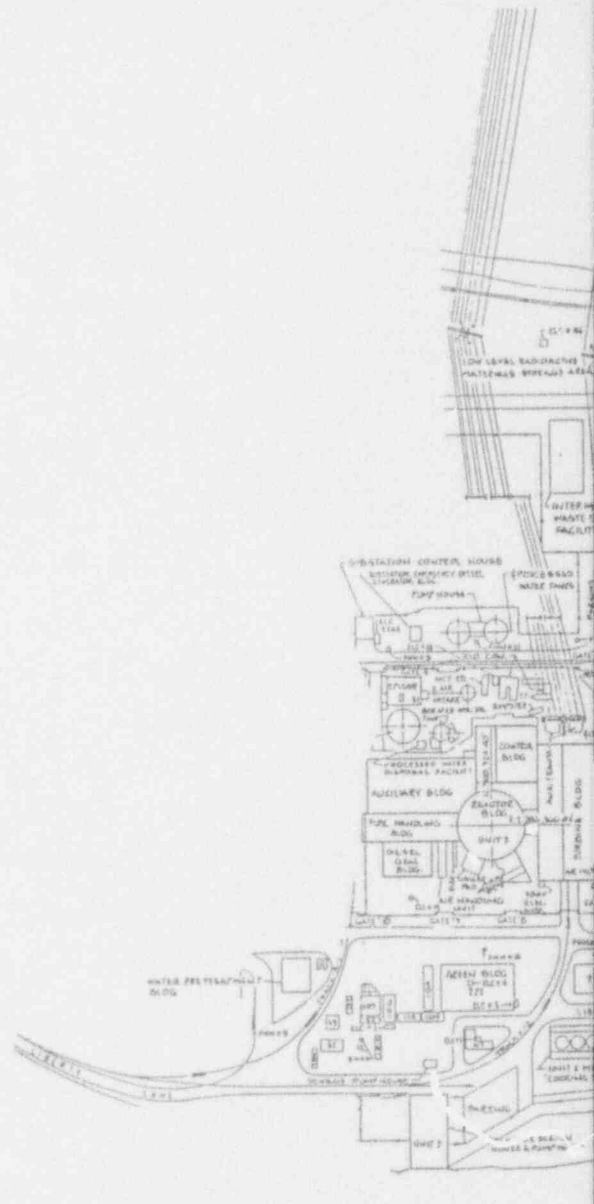

N°	UNIT	OPERATION	ZONE
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25			
26			
27	2	IRONWORKERS SHOP	D-4
28	2	CARPENTERS STOR. SHED	E-3
29			
30	2	CARPENTERS STOR. SHED	E-3
31	1/2	EPICOR II	D-6
32	2	PAINTERS WORKSHOP	E-3
33	2	CARPENTERS SHOP	E-3
34	2	CARPENTERS LUNCH ROOM	E-3
35			
36	2	TRANSPORTATION FACILITY	D-2
37	2	BOILERMAKERS SHOP	D-2
38			
39	2	WASTE MANAGEMENT	E-3
40	2	WASTE MANAGEMENT (SHED)	E-3
41	2	PAINTERS SHED	E-3

N°	UNIT	OPERATION	ZONE
42	2	TRAINING FACILITY	C-5
43	2	MAINTENANCE	D-5
44	2	MAINT. WAREHOUSE & UTIL. SHOP	D-5
45			
46			
47			
48			D-5
49			C-4
50			
51			
52	1 & 2	MEDICAL DEPT	C-6
53			
54	1 & 2	RESPIRATOR FIT	C-6
55			
56			
57			
58			
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62			
63			
64			
65			
66			
67			
68			
69			
70	2	OPERATIONS ANALYSIS	C-3
71	2	HAZ. WASTE MATERIAL BLDG.	D-4
72			
73			
74			
75			
76			
77	3	TRAILER	C-4
78			
79			
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83			

N°	UNIT	OPERATION	ZONE
84			
85			
86			
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90			
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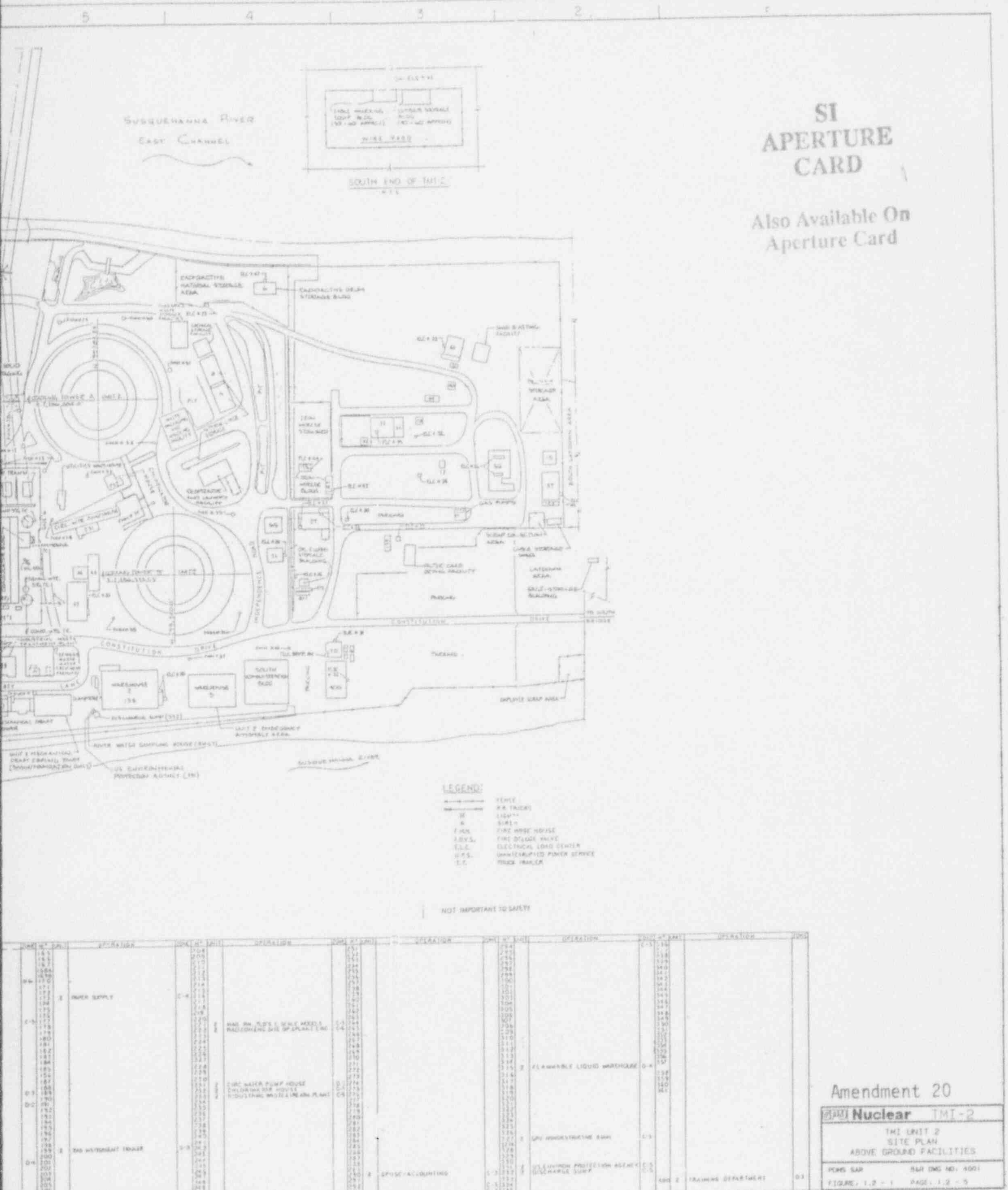
96			
97			
98			
99			
100			
101			
102			
103			
104	2	TRAILER	C-4
105			
106			
107			
108			
109			
110A			
110B			
111			
112			
113			
114			
115			
116			
117	3	CARPENTERS SHOP	C-6
118			
119			
120			
121			
122			
123			

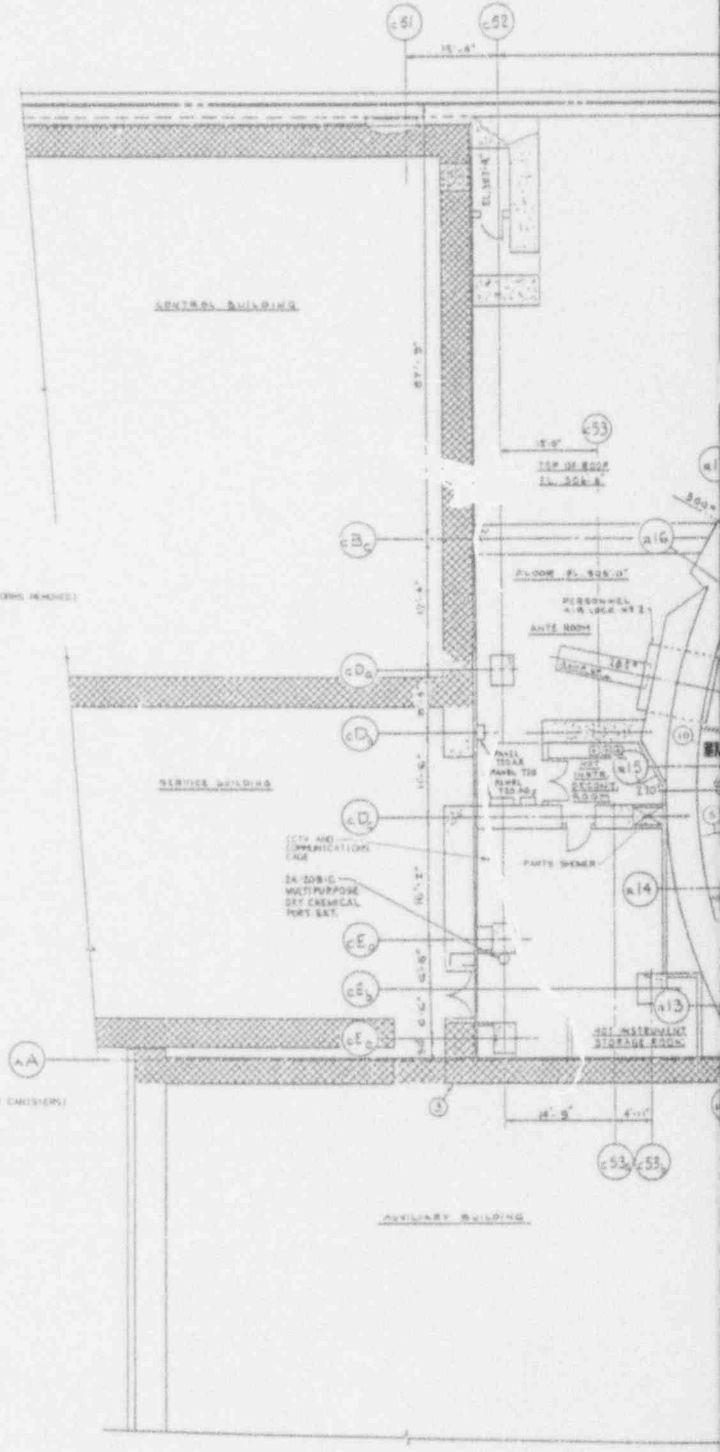
N°	UNIT	OPERATION
124		
125		
126		
127		
128		
129		
130		
131		
132		
133		
134		
135	2	WAREHOUSE #2
136		
137		
138		
139		
140		
141		
142		
143		
144		
145		
146		
147	2	IRON WORKERS BUILDING
148		
149	2	CATALYTIC
150		
151		
152		
153		
154		
155		
156A		
156B		
157		
158	2	IRON WORKERS BUILDING
159		
160		
161		
162		
163		
164		



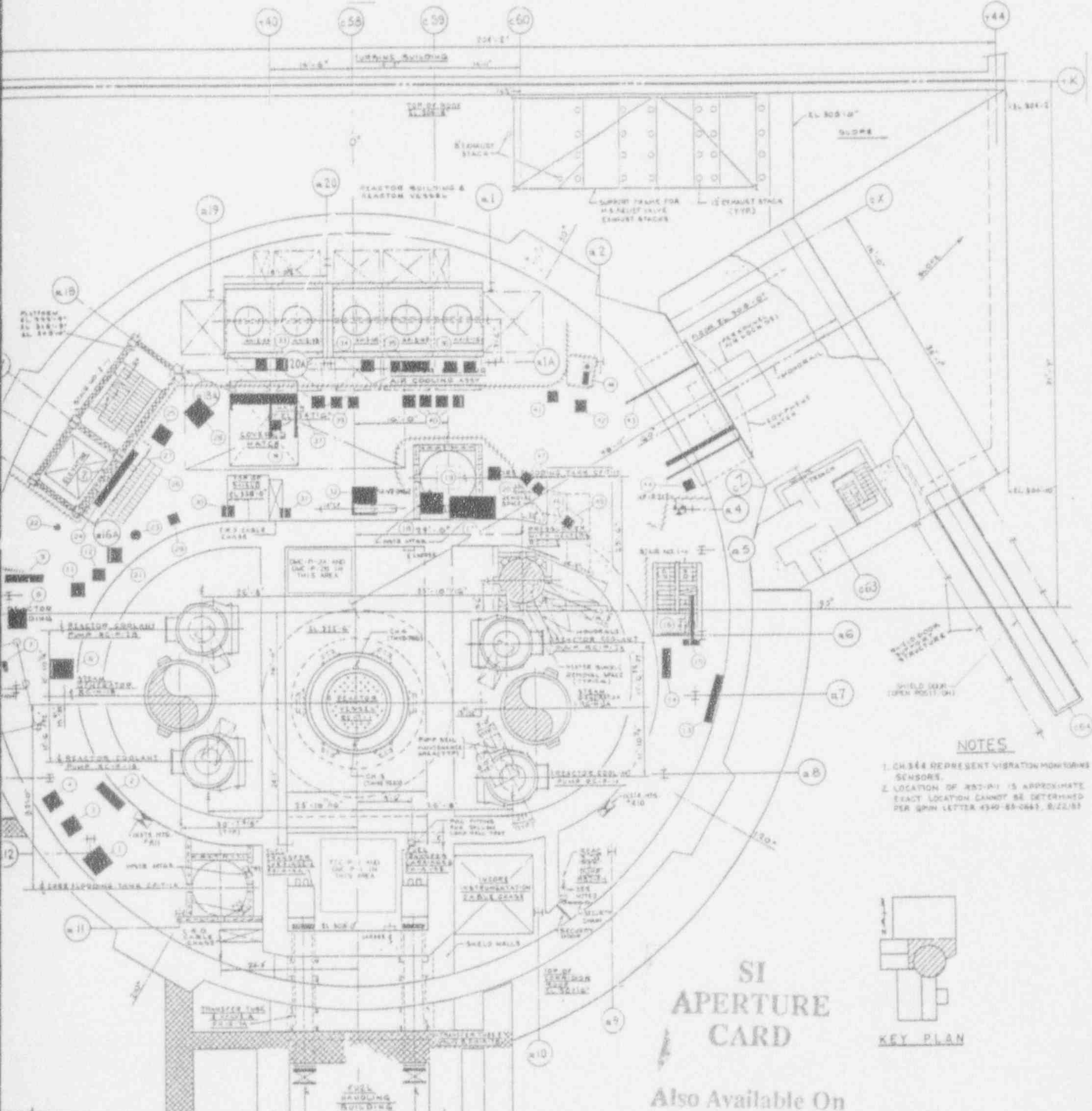
9401070221-01

INVENTORY LIST

1. LSA BOX FILLED W/LEAD BLANKETS (STORAGE)
2. SMALL STACK OF LEAD BLANKETS (STORAGE)
3. POWER PANEL'S TBEL 1 & -3
4. MULTIPLEX PANEL FOR CAMERAS
5. SCAFFOLD ACCESS TO ELECTRICAL PANELS (WOOD PLATFORMS REMOVED)
6. POWER BUGGY PPDC-1
7. BROWN TOOL BOX (STOCKED W/TOOLS)
8. I & C PENETRATION PUMP SKIDS (2 EA)
9. GREEN GANG BOX W/ELECTRICAL EQUIPMENT
10. CCTV-1 CAMERA (ACTIVE)
11. FIRE HOSE EXTENSION IN A BOX
12. STEEL TABLE W/FIRE EXTINGUISHERS ON EACH SIDE
13. LEAD BLANKETS SHIELDING SEISMIC GAP
14. LEAD BLANKETS SHIELDING FLOOR PENETRATION
15. GANTRY CRANE FOR ROBOTS TO 281' ELEVATION
16. WOODEN STAIRWAY
17. ADMAC PUMP SKID
18. ROBOT
19. ROBOT
20. HYDRAULIC PUMP UNIT
21. FIRE HOSE REEL (MOUNTED ON WALL)
22. TRASH COLLECTION DRUM FOR STEP-OFF PAD
23. 55 GAL DRUM FULL OF SCAFFOLD KNUCKLES
24. SCAFFOLD BUCK STORAGE
25. TEMPORARY HANDRAIL BASES
26. GAS BOTTLE RACK (UNDER STAIRS)
27. BARREL CART (UNDER STAIRS)
28. LSA BOX FULL OF LEAD BLANKETS
29. POWER BUGGY THB-B
30. STEEL 3-SHELF CABINET (EMPTY)
31. PILE OF LARGE LEAD BRICKS
32. COMBUSTIBLE STORAGE CABINET (EMPTY)
33. CAMERA MULTIPLEXER UNITS (2 EA DEACTIVATED)
34. TRANSFORMER (DEACTIVATED)
35. DISCONNECT RACK (DEACTIVATED)
36. POWER DISTRIBUTION PANELS (2 EA DEACTIVATED)
37. ROLLERBED CART
38. GANG BOX FULL OF "SPARE TOOLS" ON ROLLER CART
39. 3 EACH 4-PACK DEFUELING CANISTER RACKS (W/4 EMPTY CANISTERS)
40. LEAD BOXES 4 EACH (W/2 SPENT TRYFS FILTERS)
41. ACETYLENE RACK
42. STEEL CART
43. EQUIPMENT HATCH GANTRY CRANE
44. STEEL JAW HORSE
45. HOSE REEL
46. STEEL RACK AROUND HOSE REEL
47. LAUNDRY CART (1 EACH)
48. SLUDGE COLLECTION SKID



REVISIONS		
REV	ZONE	DESCRIPTION
20	ALL	THIS DRAWING WAS REFORMATTED ON CAD AND REVISED TO INCORPORATE DCN 2061 19 01



NOTES

1. CH 344 REPRESENT VIBRATION MONITORING SENSORS.
2. LOCATION OF RB3-PI1 IS APPROXIMATE. EXACT LOCATION CANNOT BE DETERMINED PER GPUN LETTER 4340-83-0661, 8/22/83

SI APERTURE CARD

Also Available On Aperture Card

LEGEND

(##) INDICATES ITEM IN FINAL PDMS INVENTORY LIST

Amendment 20

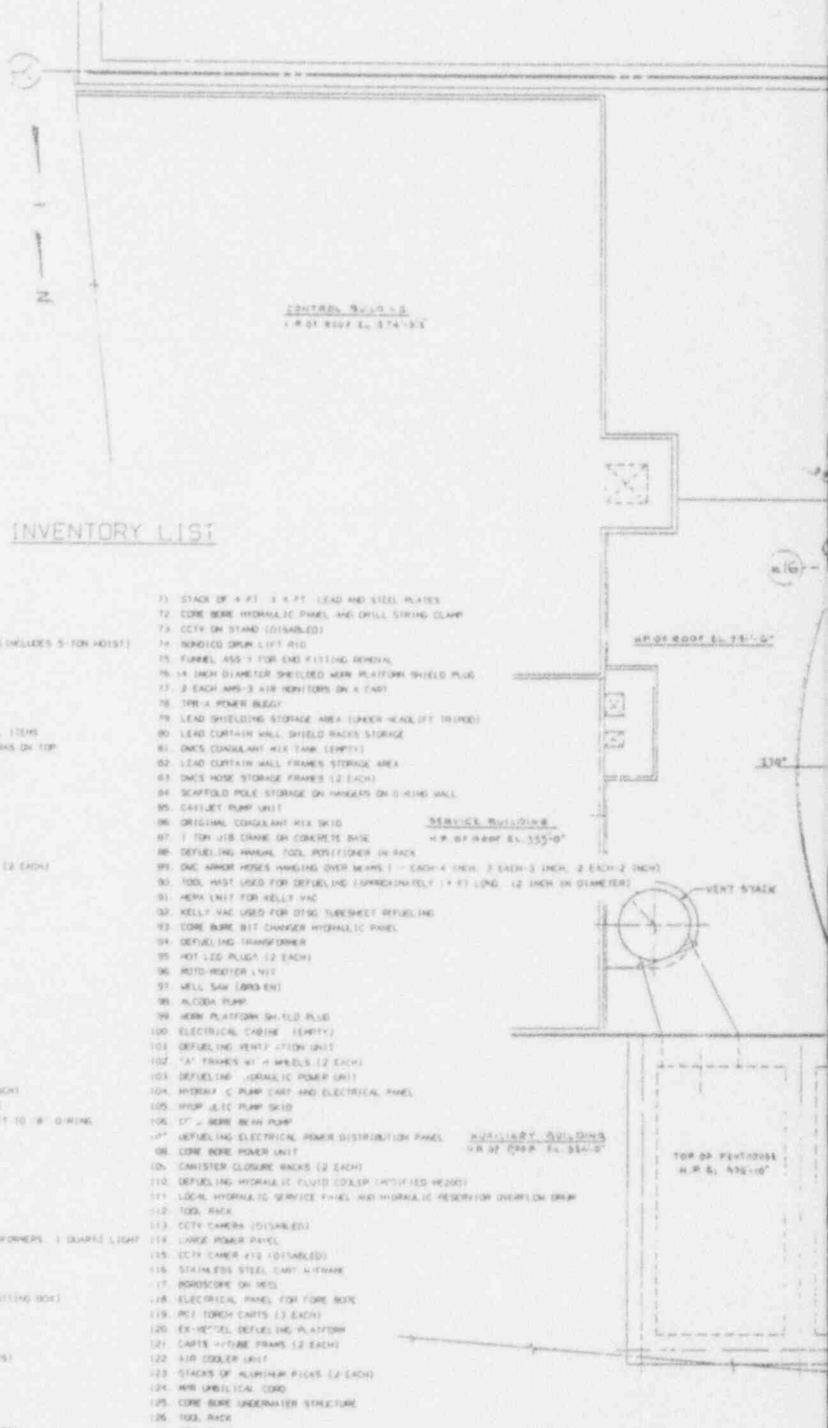
GPU Nuclear TMI-2

REACTOR BUILDING GROUND FLOOR

PDMS SAR | B&R DWG. NO. 2061

FIGURE: 1.2-4 | PAGE 1.2-8

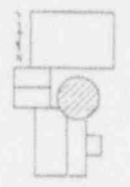
9401070221-02



INVENTORY LIST

1. EX-VESSEL VIDEO CABINET
2. PCI MCC CABINET
3. PCI PAK #5 (2 EACH, STACKED)
4. LSA BOX USED TO STORE ELECTRICAL HOIST (INCLUDES 5-TON HOIST)
5. DEFUELING SWP CONTROL CONSOLE
6. GAS BOTTLE CART (EMPTY)
7. WELDING TABLE
8. PCI X-Y BRIDGE HANGERS & 1 WASH PANEL
9. PCI X-Y BRIDGE HANGER
10. BROWN GANG BOX W/CAMERAS AND ELECTRICAL ITEMS
11. STAINLESS STEEL WORK TABLE W/CCTV CAMERAS ON TOP
12. GANG BOX FULL OF HOISTS
13. MILLER WELDER
14. PAK-10 PLASMA ARC WELDERS
15. DRILL PRESS
16. VISE MOUNTED ON A STAND
17. CCTV CAMERA (DISABLED)
18. ALUMINUM BOX FULL OF SMALL PUMP MOTORS
19. LAUNDRY CARTS FULL OF WIRE ROPE SLINGS (2 EACH)
20. STAINLESS STEEL CART
21. STACK OF CINDER BLOCKS
22. 500 CFM BLOWER W/O FILTER
23. DRY VAC W/COLLECTION DRUM
24. WET VAC W/COLLECTION DRUM
25. POWER BUGGY TPB-C (DISABLED)
26. RED TOOL BOX (EMPTY)
27. RV CHIMNEY FUNNEL
28. STEEL SAW HORSES (4 EACH)
29. STACK OF PUMP DRIP PANS
30. STAINLESS STEEL FRAME
31. DRILL PRESS (BROKEN)
32. CORE BORE DRILL STRINGS (11 EACH)
33. SAFETY HARNESSES
34. STACKS OF ALUMINUM SCAFFOLD PICKS (2 EACH)
35. HOSE BAG ATTACHED TO POLAR CRANE W/ROPE
36. ALUMINUM PICK FROM TOP OF ELEVATOR SHAFT TO "B" D-RING
37. FTC PUMPDOWN MANIFOLD
38. HIGH PRESSURE PUMP HEAD
39. FIRE EXTINGUISHER STATION
40. 6 SHELF METAL CABINET (EMPTY)
41. 3 SHELF METAL CART (EMPTY)
42. 4 METAL STACKED BINS (EMPTY)
43. POWER BUGGY TPDC #2
44. STEEL TABLE W/LARGE HAND TOOLS, 2 TRANSFORMERS, 1 QUARTZ LIGHT
45. BARREL CART
46. LIFT RIG FOR RV GAMMA SCANNER
47. DWCS GAUGES (DISABLED)
48. LARGE STEEL BOX (FORMERLY NRC SAMPLE CUTTING BOX)
49. SMALL SKIP PAN
50. LARGE SKIP PAN
51. RED TOOL BOX STOCKED W/VARIOUS TOOLS
52. VARIOUS STEEL PIECES (PLATE, NUTS, HOOKS)
53. LEADSCREW STORAGE RACK
54. SHORT SCAFFOLD PICK & BLUE LIFT RIG
55. 250 CFM BLOWER (W/O FILTER)
56. BIN OF SHACKLES
57. HEPA UNIT FOR DECON FACILITY (W/O FILTERS)
58. BAND SAW
59. STEEL WORK TABLE
60. DOSE REDUCTION BOX (EMPTY)
61. STEEL TABLE
62. FIRE EXTINGUISHER STATION
63. METAL BAG RACK (EMPTY)
64. HEPA UNIT FOR CUT FACILITY (FILTER REMOVED)
65. 3 EACH - 55 GAL DRUMS (1 SCAFFOLD KNUCKLES, 2-STEEL RIGGING)
66. LARGE GANG BOX W/HYDRAULIC HAND PUMPS & FILTERS
67. 12 FT. STEP LADDER
68. 1 FT. X 1 FT. X 2 FT. LEAD BOX
69. CORE BORE BIT INSERT OF AGER
70. 2 EACH POWTCO DRY. W/LEAD LINED 55-GAL DRUMS INSIDE
71. STACK OF 4 FT. X 4 FT. LEAD AND STEEL PLATES
72. CORE BORE HYDRAULIC PANEL AND DRILL STRING CLAMP
73. CCTV ON STAND (DISABLED)
74. SONOICO DRUM LIFT RIG
75. FUNNEL ASS'Y FOR END FITTING REMOVAL
76. 14 INCH DIAMETER SHEILDED WORK PLATFORM SHIELD PLUG
77. 2 EACH AMS-3 AIR MONITORS ON A CART
78. TPB-A POWER BUGGY
79. LEAD SHIELDING STORAGE AREA (UNDER HEADLIFT TRIPOD)
80. LEAD CURTAIN WALL SHIELD RACKS STORAGE
81. DWCS COAGULANT MIX TANK (EMPTY)
82. LEAD CURTAIN WALL FRAMES STORAGE AREA
83. DWCS HOSE STORAGE FRAMES (2 EACH)
84. SCAFFOLD POLE STORAGE ON HANGERS ON D-RING WALL
85. CAVIJET PUMP UNIT
86. ORIGINAL COAGULANT MIX SKID
87. 1 TON JIB CRANE ON CONCRETE BASE
88. DEFUELING MANUAL TOOL POSITIONER IN RACK
89. DWC ARMOR HOSES HANGING OVER BEAMS 1 - EACH-4 INCH, 3 EACH-3 INCH, 2 EACH-2 INCH)
90. TOOL MAST USED FOR DEFUELING (APPROXIMATELY 14 FT LONG, 12 INCH IN DIAMETER)
91. HEPA UNIT FOR KELLY VAC
92. KELLY VAC USED FOR OTSG TUBESHEET REFUELING
93. CORE BORE BIT CHANGER HYDRAULIC PANEL
94. DEFUELING TRANSFORMER
95. HOT LEG PLUGS (2 EACH)
96. ROTO-ROOTER UNIT
97. WELL SAW (BROKEN)
98. ALCODA PUMP
99. WORK PLATFORM SHIELD PLUG
100. ELECTRICAL CABINET (EMPTY)
101. DEFUELING VENTILATION UNIT
102. "A" FRAMES W/4 WHEELS (2 EACH)
103. DEFUELING HYDRAULIC POWER UNIT
104. HYDRAULIC PUMP CART AND ELECTRICAL PANEL
105. HYDRAULIC PUMP SKID
106. CORE BORE BEAN PUMP
107. DEFUELING ELECTRICAL POWER DISTRIBUTION PANEL
108. CORE BORE POWER UNIT
109. CANISTER CLOSURE RACKS (2 EACH)
110. DEFUELING HYDRAULIC FLUID COOLER (MODIFIED HE200)
111. LOCAL HYDRAULIC SERVICE PANEL AND HYDRAULIC RESERVIOR OVERFLOW DRUM
112. TOOL RACK
113. CCTV CAMERA (DISABLED)
114. LARGE POWER PANEL
115. CCTV CAMER #12 (DISABLED)
116. STAINLESS STEEL CART W/FRAME
117. BOROSCOPE ON REEL
118. ELECTRICAL PANEL FOR CORE BORE
119. PCI TORCH CARTS (3 EACH)
120. EX-VESSEL DEFUELING PLATFORM
121. CARTS W/TUBE FRAMS (2 EACH)
122. AIR COOLER UNIT
123. STACKS OF ALUMINUM PICKS (2 EACH)
124. MPR UMBILICAL CORD
125. CORE BORE UNDERWATER STRUCTURE
126. TOOL RACK
127. TOOL RACK
128. TOOL RACK
129. D-RING HANDRAIL SECTIONS
130. LSA BOXES FILLED W/HIGH RAD MATERIALS (2 EACH)
131. REACTOR VESSEL CHIMNEY
132. LSA BOX W/3 REACTOR VESSEL INCORE GUIDE TUBE PLATES
133. DEFUELING CANISTER 4-PACK RACK
134. LADDER TO DEEP END COVER
135. 55 GAL DRUMS FILLED W/HIGH RAD MATERIALS (2 EACH)

REV	ZONE	DESCRIPTION
23	ALL	THIS DRAWING WAS REFORMATTED ON CAD AND REVISED TO INCORPORATE DCN 2062-22-01



KEY PLAN

NOTES

1. [illegible]
2. INDICATES EQUIPMENT ADDED FOR TMI RECOVERY PROGRAM

SI
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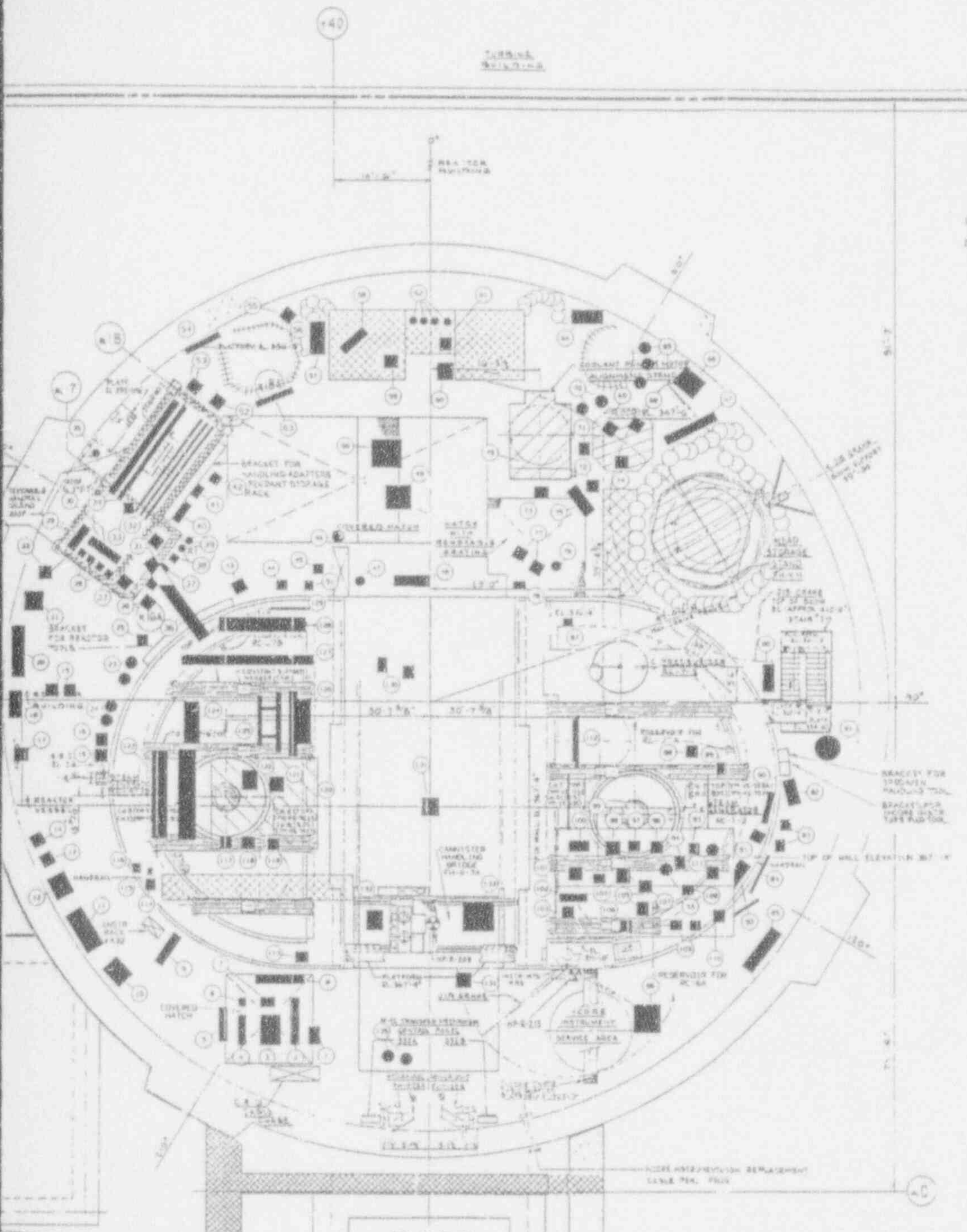


LEGEND

INDICATES ITEM ON P.I.W.C. PDMS INVENTORY LIST

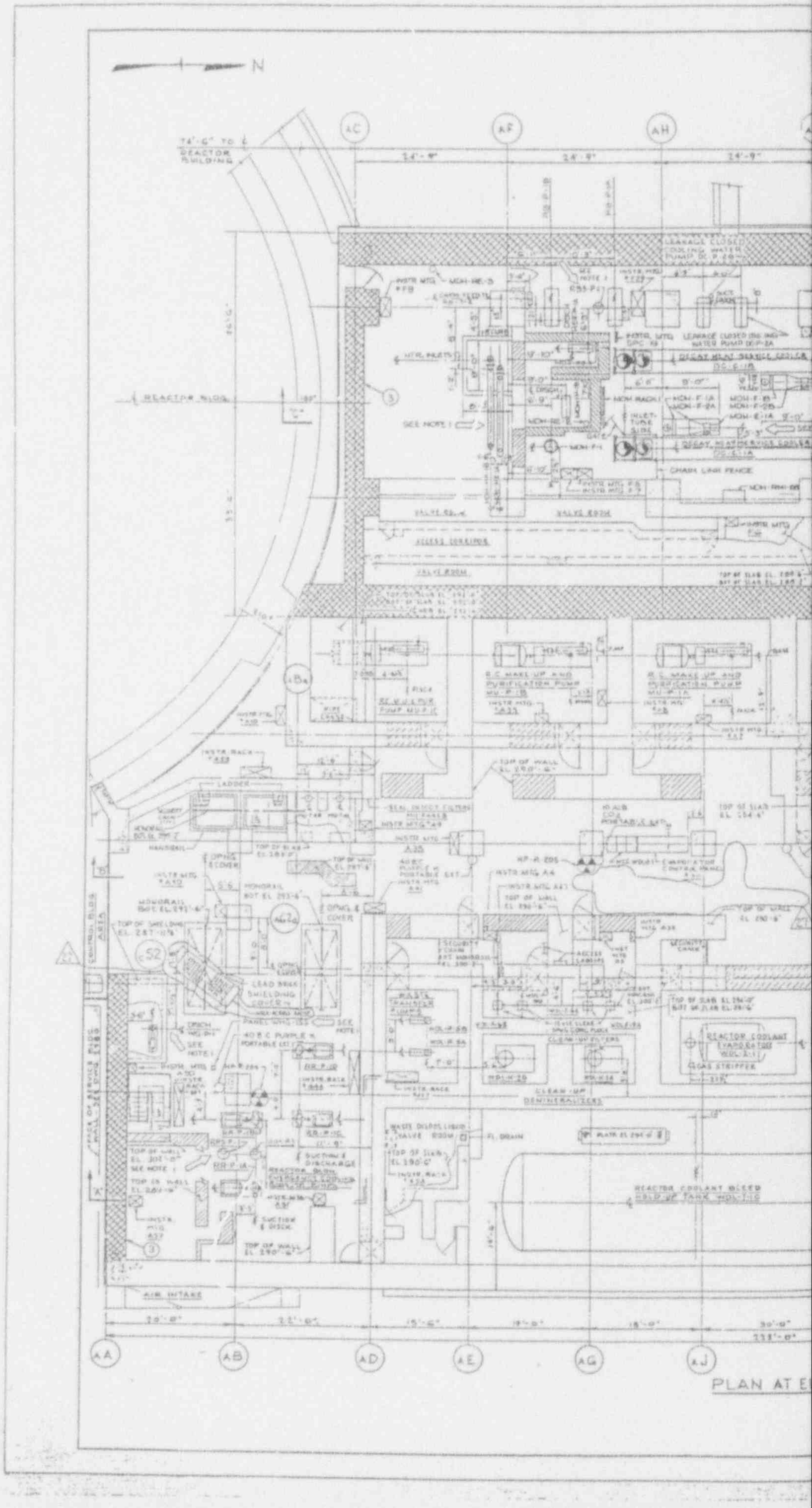
Amendment 20

GPU Nuclear TMI-2

REACTOR BUILDING
OPERATING FLOOR

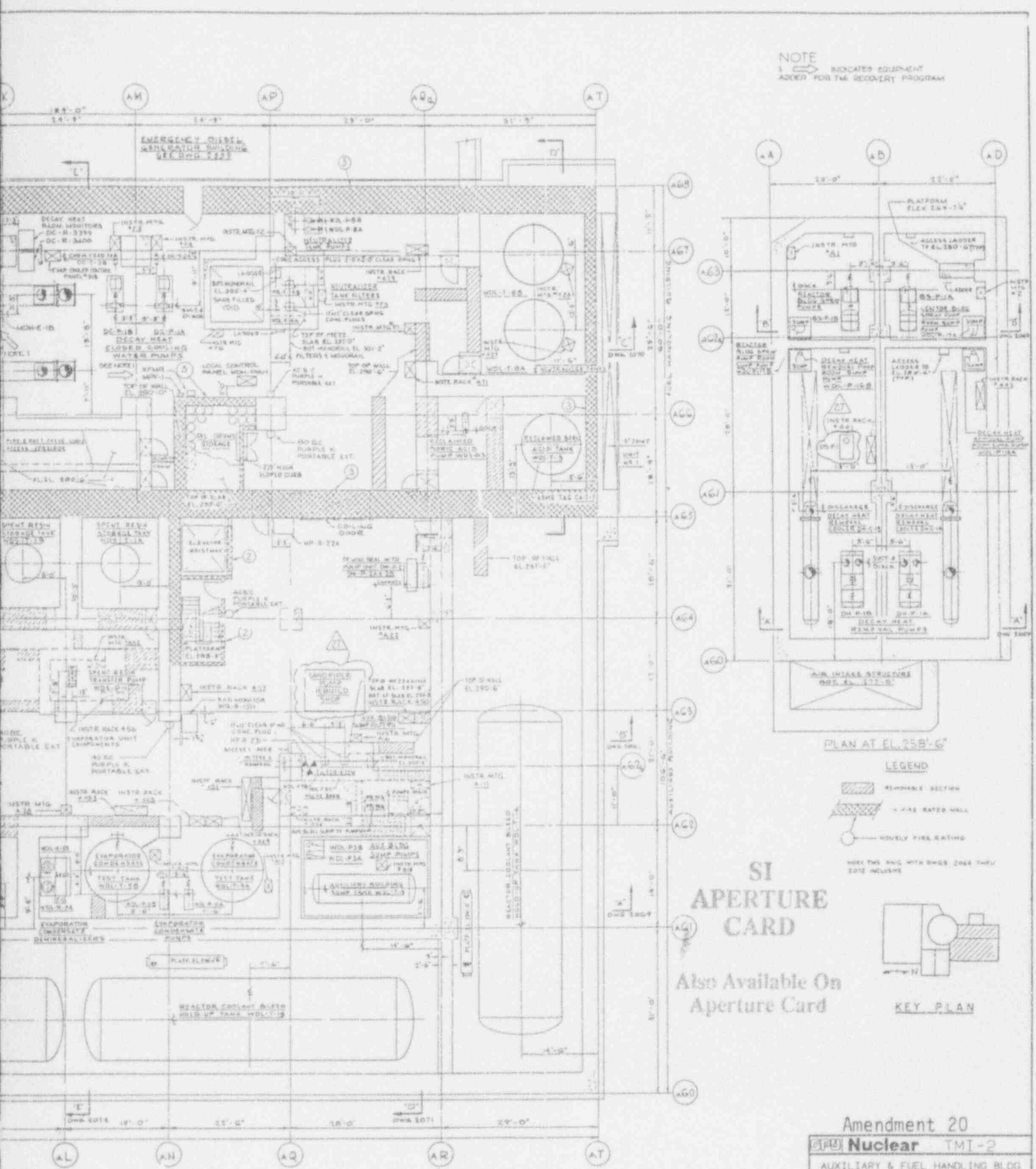
PDMS SAR	B&R DWG. NO. 2062
FIGURE: 1.2-5	PAGE 1.2-9

9401070221-03



N
AC
AF
AH
REACTOR BLDG.
SEE NOTE 1
VALVE ROOM
ACCESS CORRIDOR
R.C. MAKE-UP AND PURIFICATION PUMP
TOP OF WALL
LADDER
LEAD BRICK SHIELDING COVER
WASTE TRANSFER PUMPS
CLEAN-UP FILTERS
CLEAN-UP DEMINERALIZERS
REACTOR COOLANT EVAPORATOR
GAS STRIPPER
REACTOR COOLANT BLEED HOLD-UP TANK
AIR INTAKE
AA
AB
AD
AE
AG
AJ

PLAN AT E



SI
APERTURE
CARD

Also Available On
Aperture Card

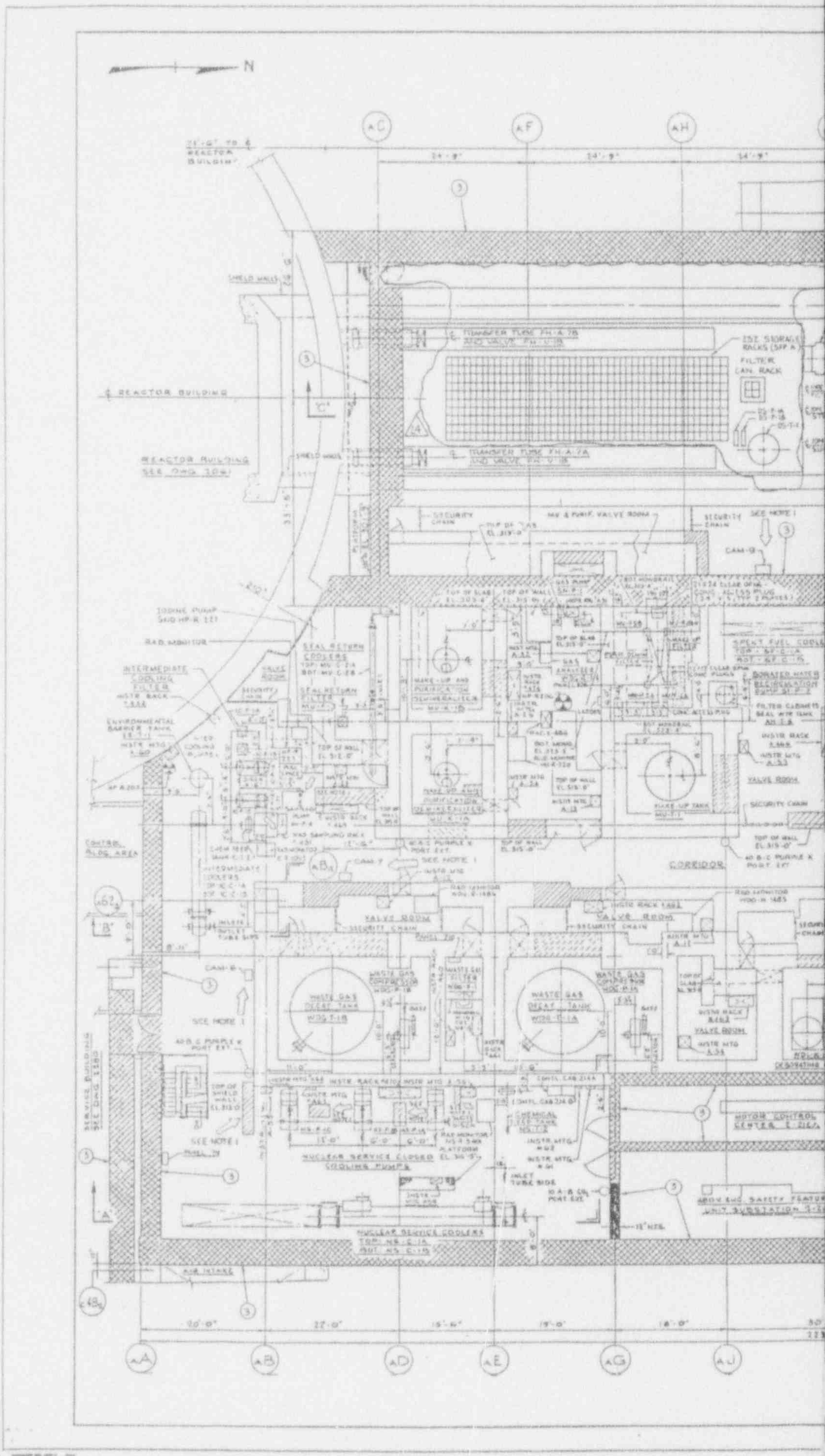
Amendment 20

GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG
BASEMENT & SUB-BASEMENT
FLOOR

PDMS SAR B&R DWG NO. 2065
FIGURE 1.2 - 8 PAGE 1.2 - 12

9401070221-04



N
AC
AF
AH
AA
AB
AD
AE
AG
AJ
24'-9"
24'-9"
24'-9"
SHIELD WALLS
TRANSFER TUBE FH-A-7B AND VALVE FH-V-1B
TRANSFER TUBE FH-A-7A AND VALVE FH-V-1A
252 STORAGE RACKS (SFP-A)
FILTER CAN. RACK
℄ REACTOR BUILDING
REACTOR BUILDING SEE DWG 3041
SECURITY CHAIN
MU & PURIF. VALVE ROOM
SEE NOTE 1
CAM-9
IODINE PUMP
RAD. MONITOR
SEAL RETURN COOLERS
INTERMEDIATE COOLING FILTER
SEAL RETURN FILTER
MAKE-UP AND PURIFICATION DEMINERALIZER
ENVIRONMENTAL BARRIER TANK
SPENT FUEL COOLER
BORATED WATER RECIRCULATION PUMP
VALVE ROOM
SECURITY CHAIN
MAKE-UP TANK
CORRIDOR
CONTROL BLDG AREA
INTERMEDIATE COOLERS
CAM-7
CAM-6
VALVE ROOM
SECURITY CHAIN
WASTE GAS DECAY TANK WDG-T-1B
WASTE GAS DECAY TANK WDG-T-1A
WASTE GAS COMPRESSOR
WASTE GAS FILTER
VALVE ROOM
SEE NOTE 1
SERVICE BUILDING SEE DWG 3180
CHEMICAL ADDITION
NUCLEAR SERVICE CLOSED COOLING PUMPS
NUCLEAR SERVICE COOLERS
MOTOR CONTROL CENTER
UNIT SUBSTATION
AIR INTAKE
20'-0"
22'-0"
15'-6"
19'-0"
18'-0"

NOTES
1. ⟹ INDICATES EQUIPMENT ADDED FOR TMI RECOVERY PROGRAM

SI
APERTURE
CARD

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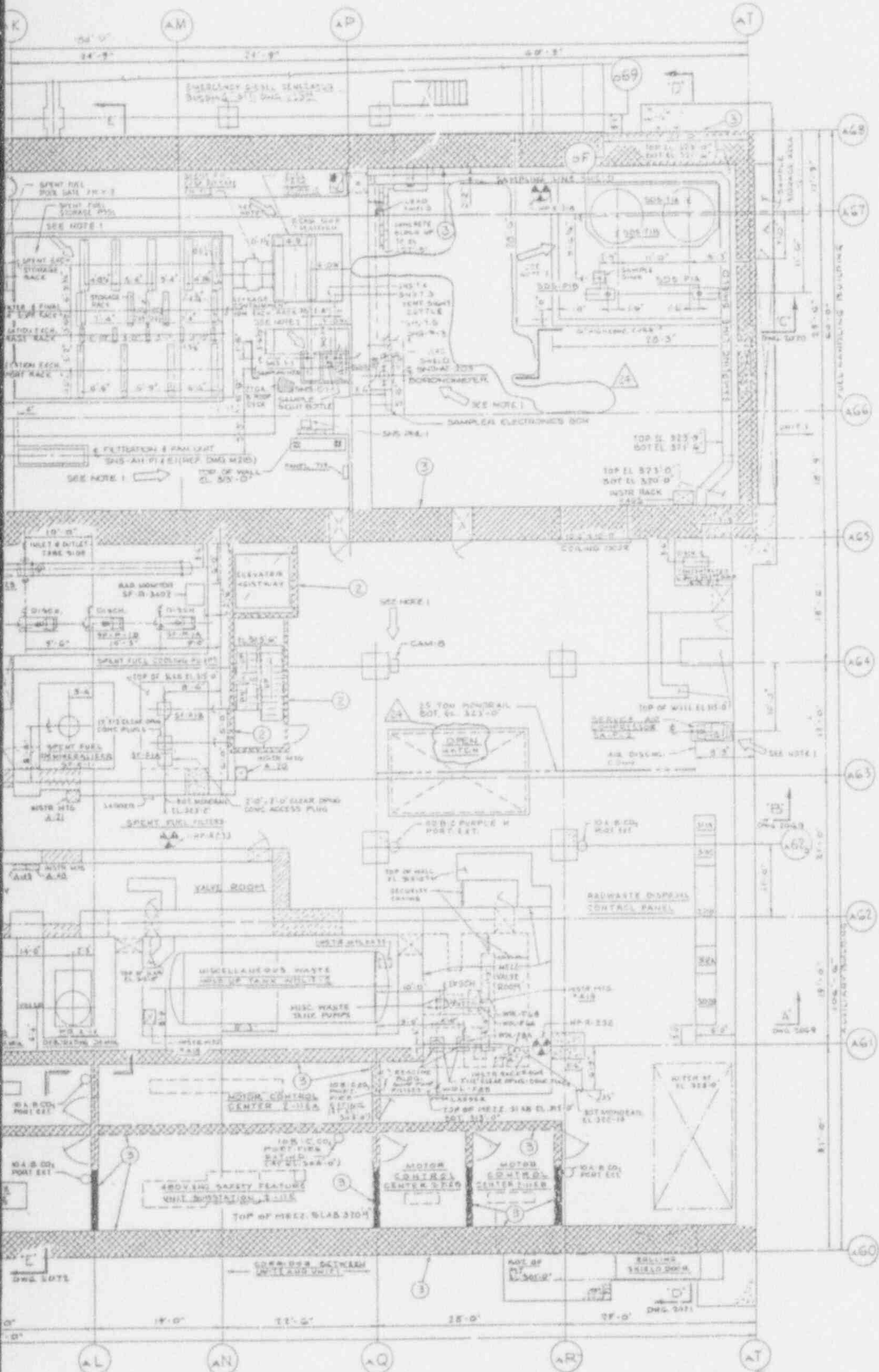


LEGEND

REMOVABLE SECTION

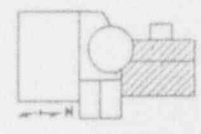
FIRE RATED WALL

HOURLY FIRE RATING

REMOVABLE SECTION & FIRE RATED WALL

HOURLY FIRE RATING

WORK THIS DRAWING WITH DWGS 2065 AND 2067 THRU 2075 INCLUSIVE



KEY PLAN

Amendment 20

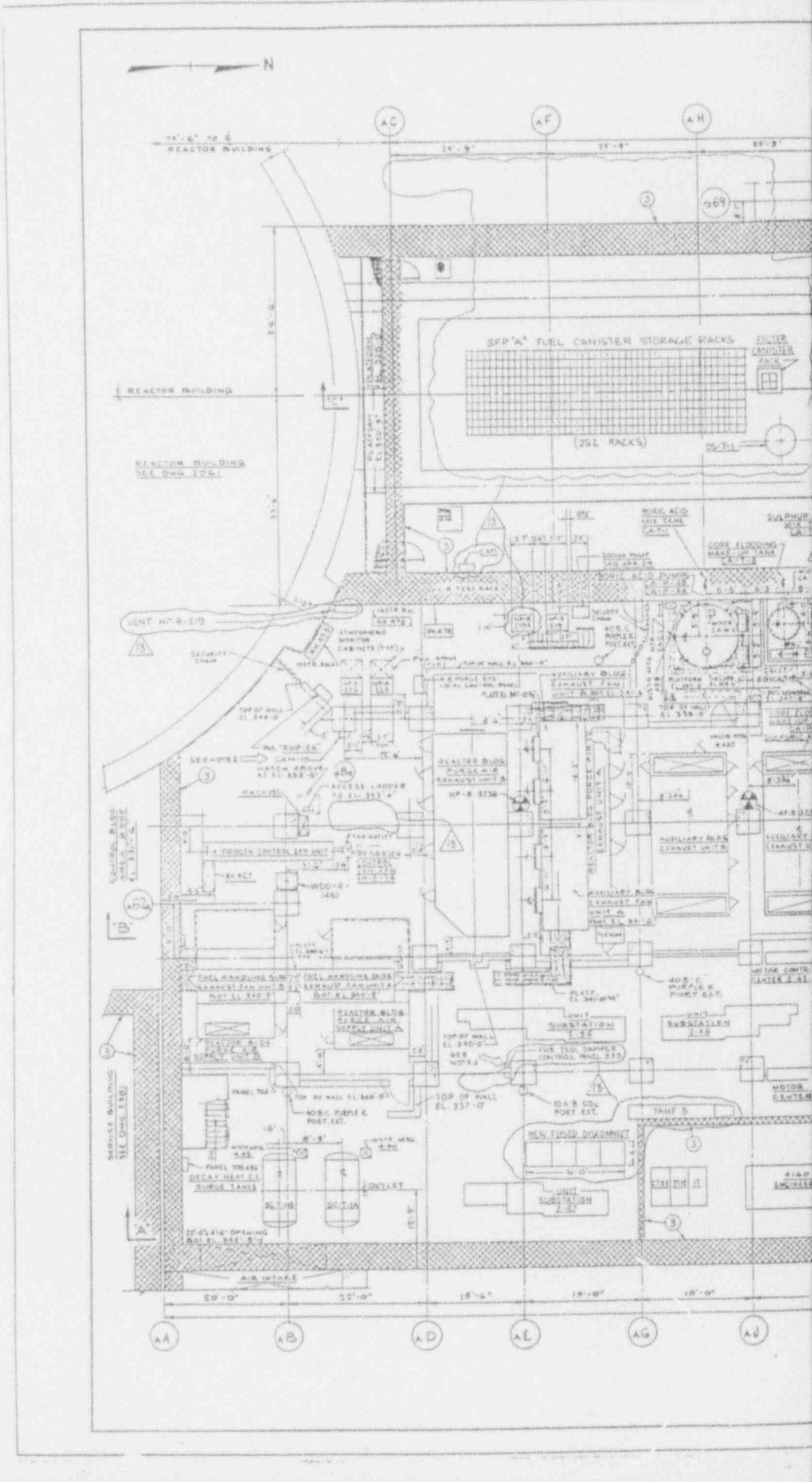
GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG
GROUND FLOOR

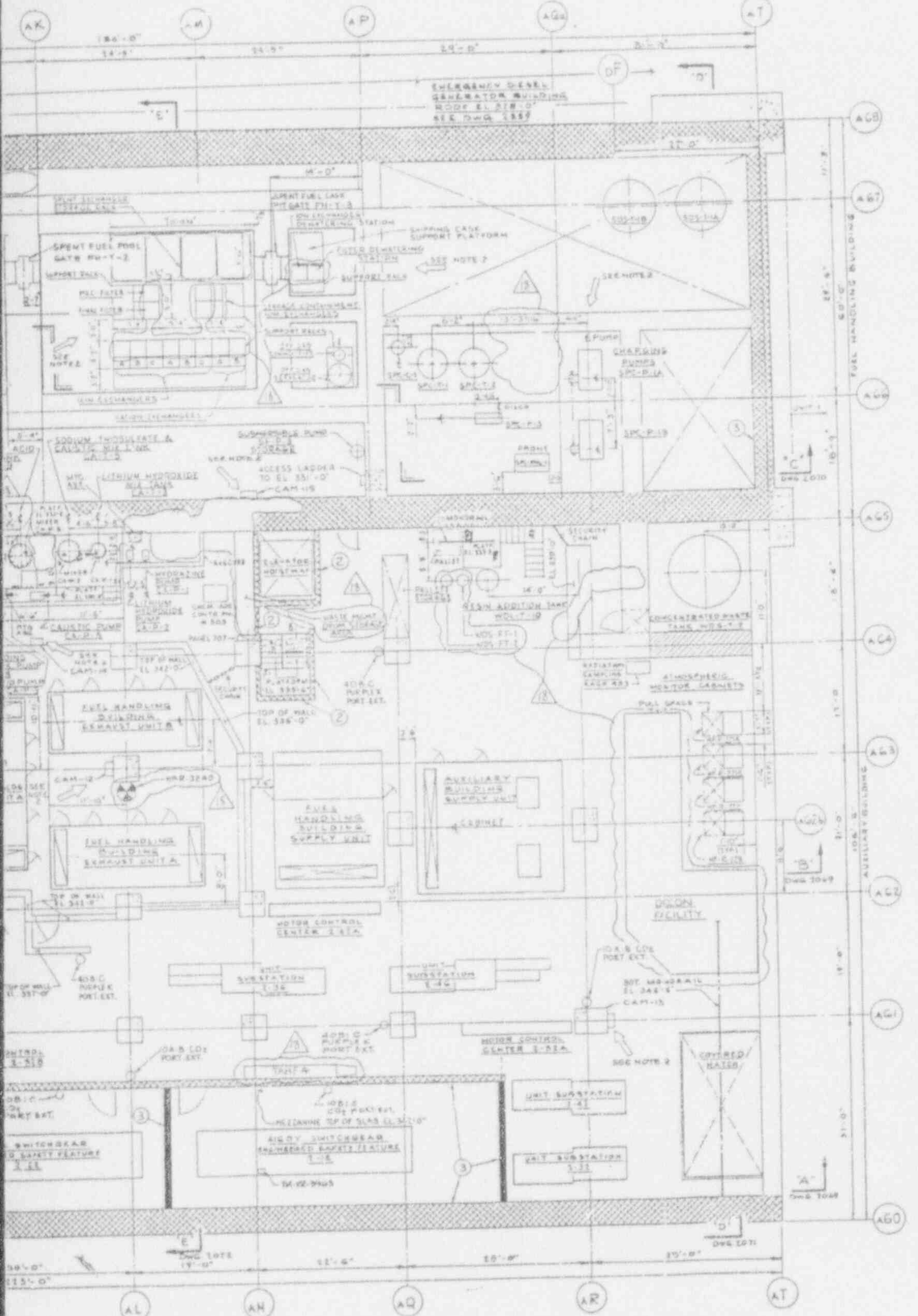
PDMS SAR — B&W DWG NO. 2066

FIGURE: 1.2 - 9 — PAGE: 1.2 - 13

9401070221-05



N
REACTOR BUILDING
SFP "A" FUEL CANISTER STORAGE RACKS
FILTER CANISTER RACK
(252 RACKS)
REACTOR BUILDING SEE DWG 2061
VENT HP-R-219
ACCESS LADDER
REACTOR BLDG PURGE AIR EXHAUST UNIT B
AUXILIARY BLDG EXHAUST UNIT B
FUEL HANDLING BLDG EXHAUST FAN UNIT B
FUEL HANDLING BLDG EXHAUST FAN UNIT A
REACTOR BLDG PURGE AIR SUPPLY UNIT A
REACTOR BLDG PURGE AIR SUPPLY UNIT B
UNIT SUBSTATION
NEW FUSED DISCONNECT
DECAY HEAT C.C. SURGE TANKS
TOP OF WALL EL. 337'-0"
AIR INTAKE
20'-0"
22'-0"
15'-6"
19'-0"
18'-0"
AA
AB
AD
AE
AG
AJ
AC
AF
AH



GENERAL NOTES

SI APERTURE CARD

Also Available On Aperture Card

LEGEND

KEY PLAN

Amendment 20

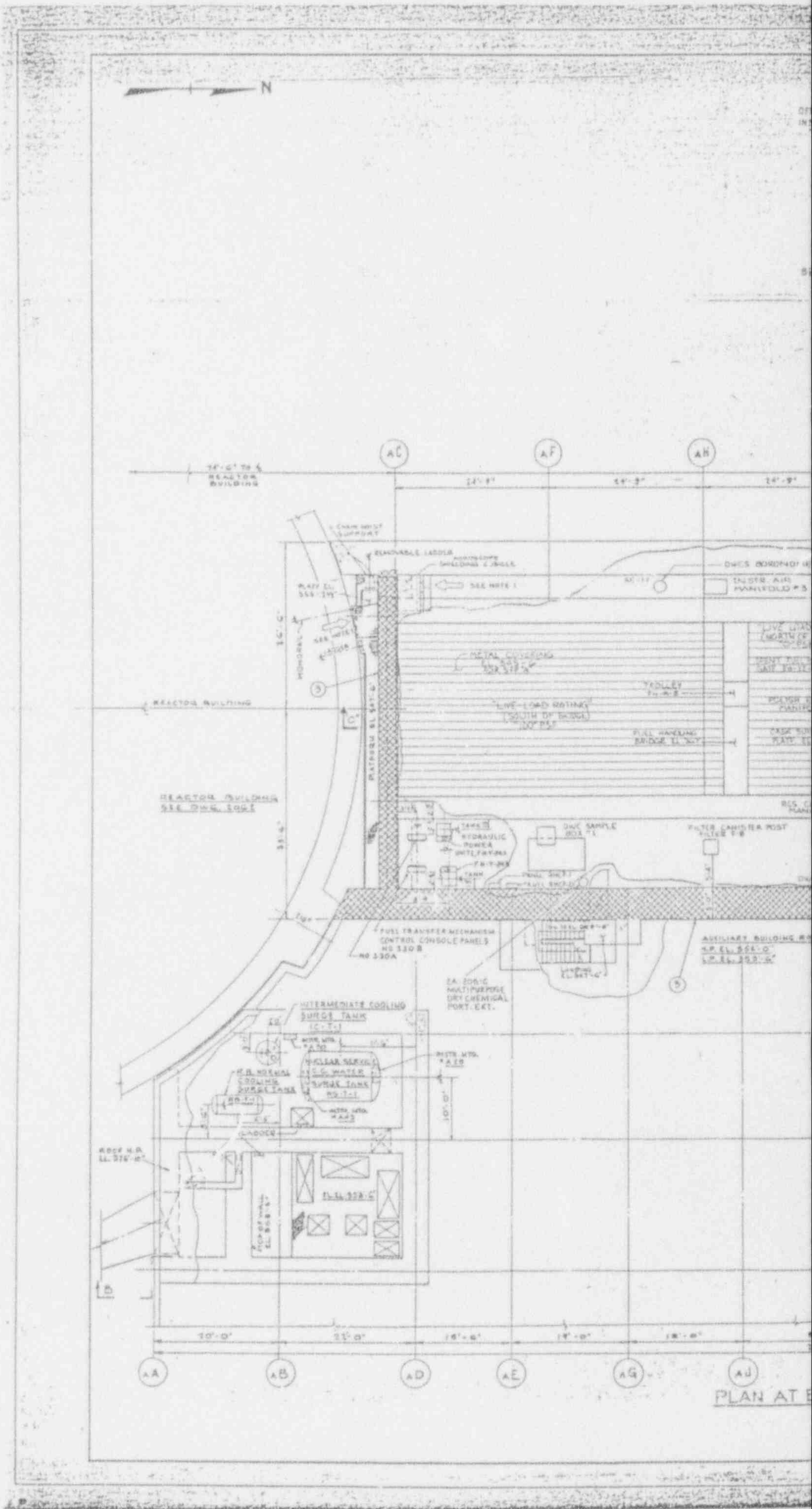
GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG FIRST FLOOR

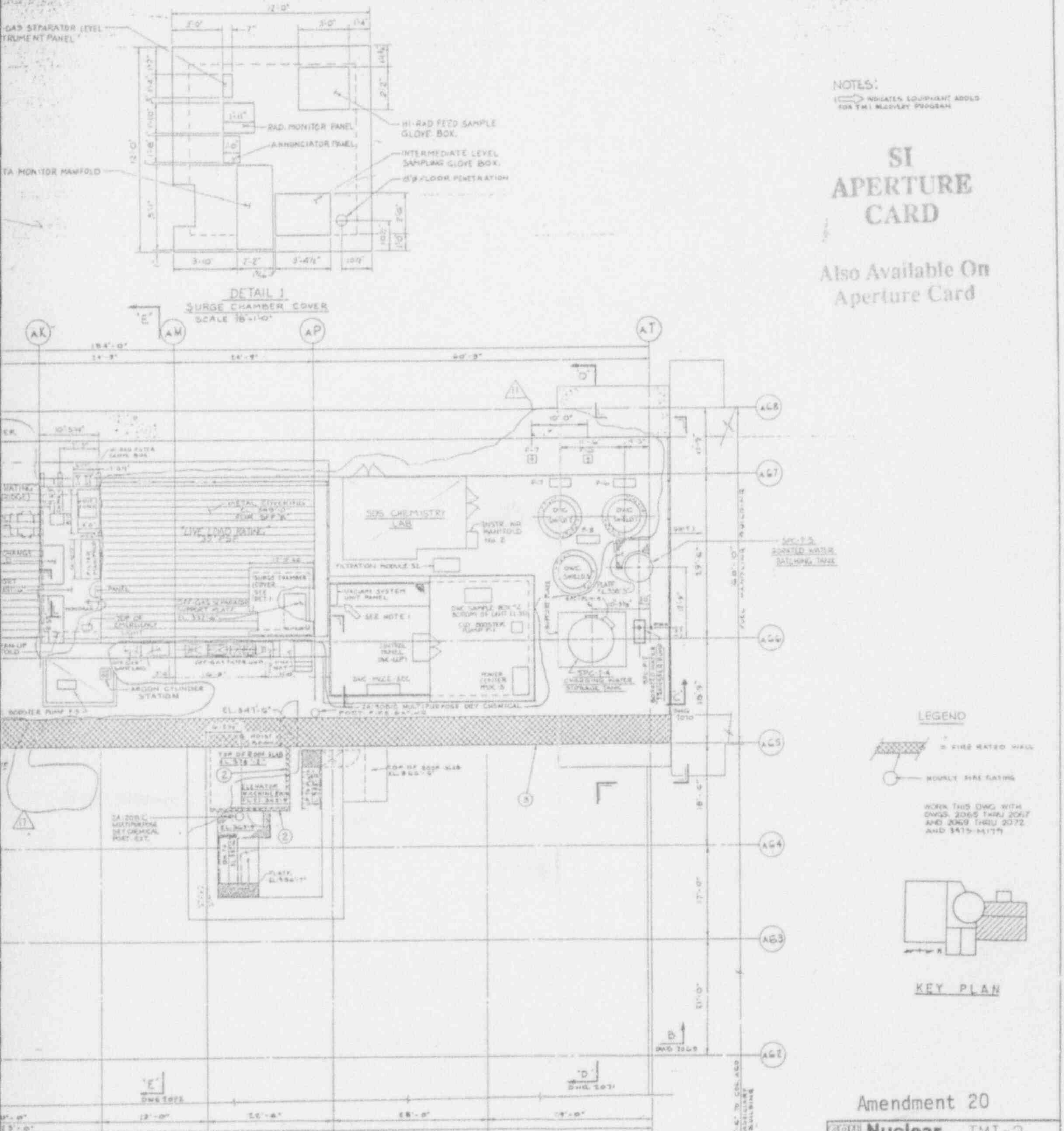
PDMS SAR B&R DWG NO: 2067

FIGURE: 1.2 - 10 PAGE: 1.2 - 14

9401070221-06



N
AC
AF
AH
REACTOR BUILDING
REMOVABLE LADDER
SEE NOTE 1
INSTR. AIR
MONORAIL
METAL COVERING
TROLLEY
LIVE-LOAD RATING
FUEL HANDLING
DWC SAMPLE
FILTER CANISTER POST
HYDRAULIC POWER UNIT
FUEL TRANSFER MECHANISM CONTROL CONSOLE PANELS
MULTIPURPOSE DRY CHEMICAL PORT. EXT.
AUXILIARY BUILDING
INTERMEDIATE COOLING SURGE TANK
NUCLEAR SERVICE C.C. WATER SURGE TANK
LADDER
20'-0"
23'-0"
19'-0"
AA
AB
AD
AE
AG
AJ
PLAN AT



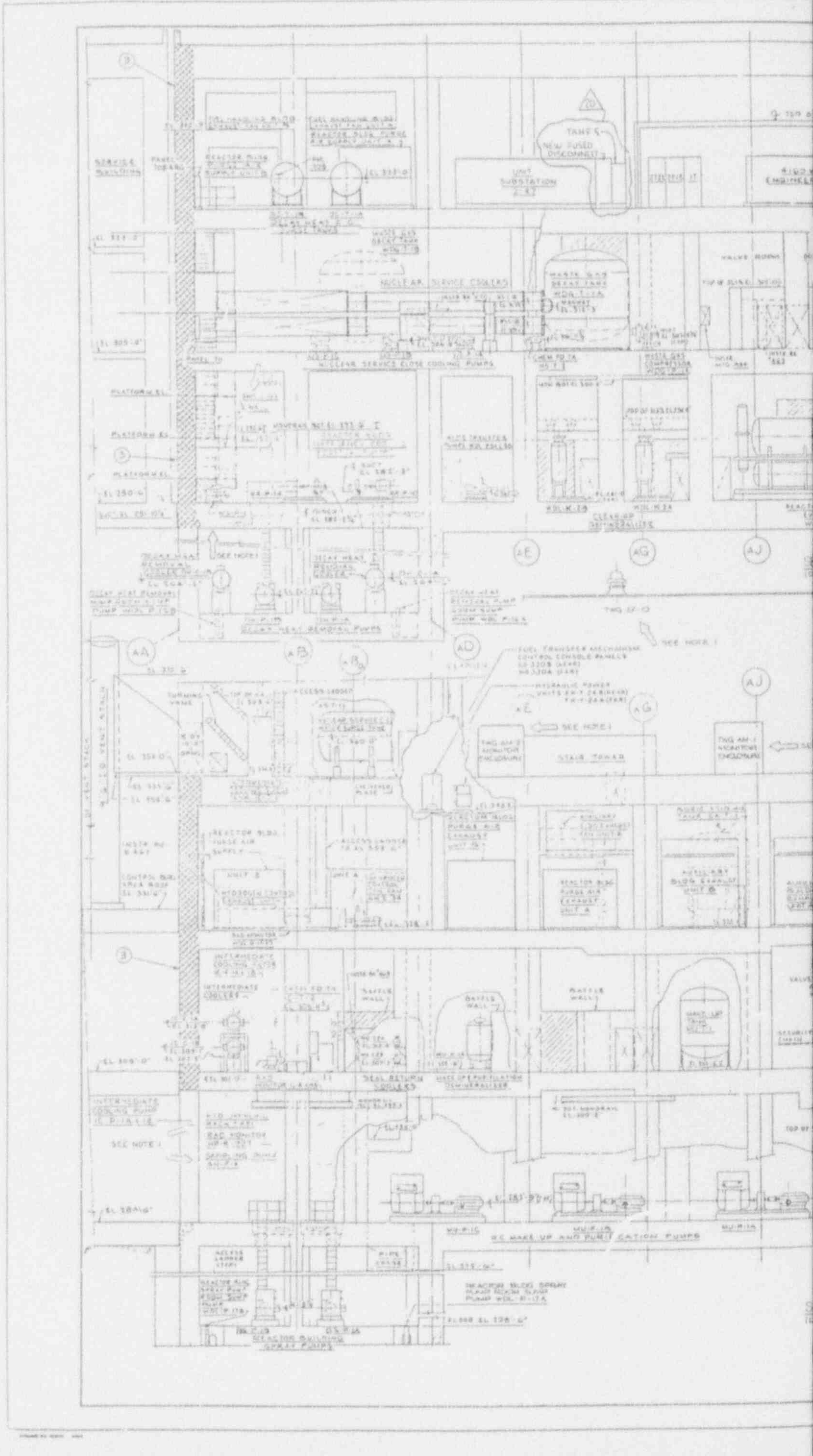
Amendment 20

GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG
OPERATING FLOOR

PDMS SAR B&R DWG NO: 2068
FIGURE: 1.2 - 11 PAGE: 1.2 - 15

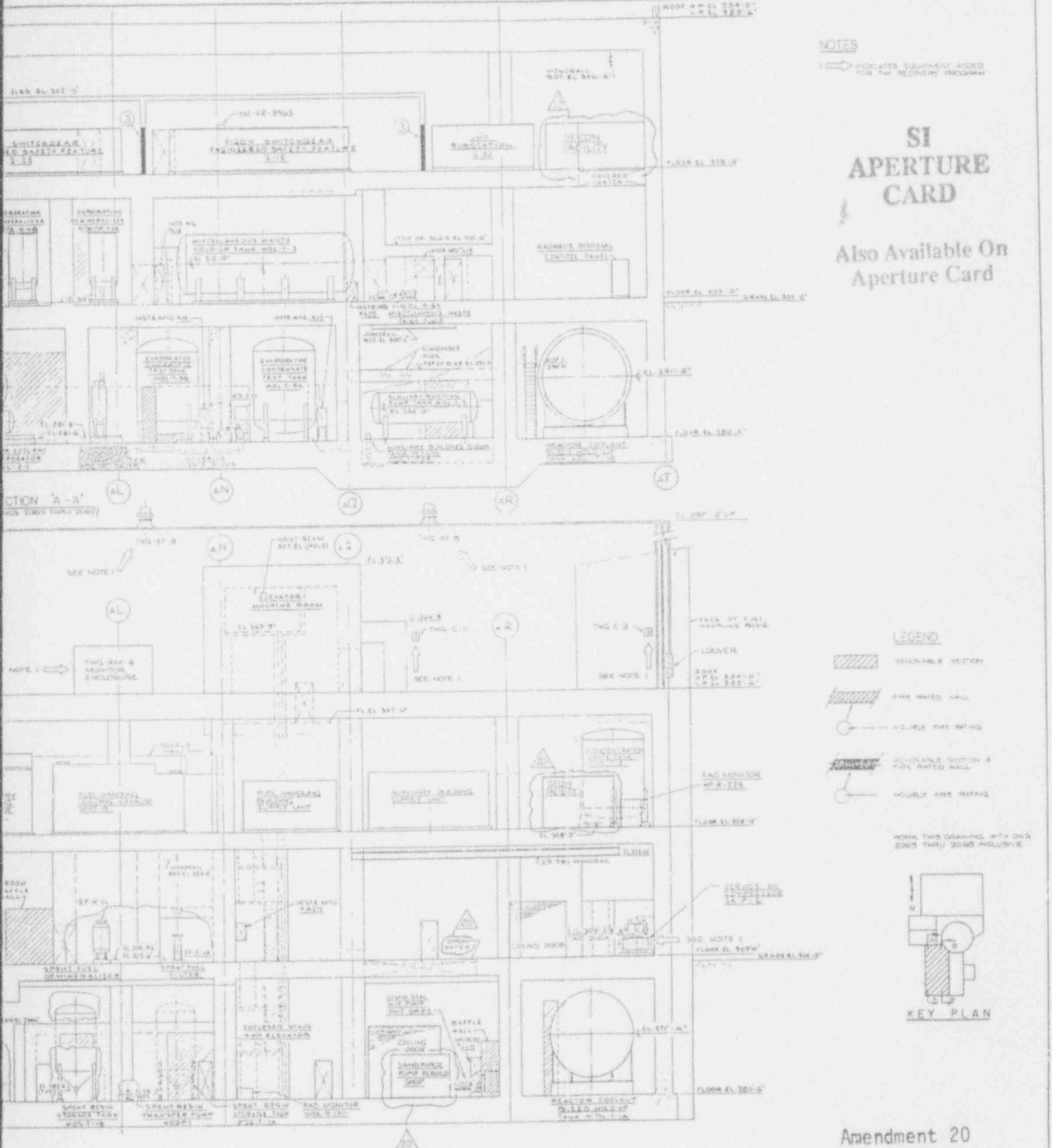
9401070221-07



SERVICE BUILDING
UNIT SUBSTATION
NEW FUSED DISCONNECT
NUCLEAR SERVICE COOLERS
NUCLEAR SERVICE CLOSE COOLING PUMPS
DECAY HEAT REMOVAL PUMPS
SEE NOTE 1
STAIR TOWER
INTERMEDIATE COOLERS
BAFFLE WALL
SEAL RETURN COOLERS
RC MAKE UP AND PURIFICATION PUMPS
REACTOR BUILDING SPRAY PUMPS

SI APERTURE CARD

Also Available On Aperture Card



Amendment 20

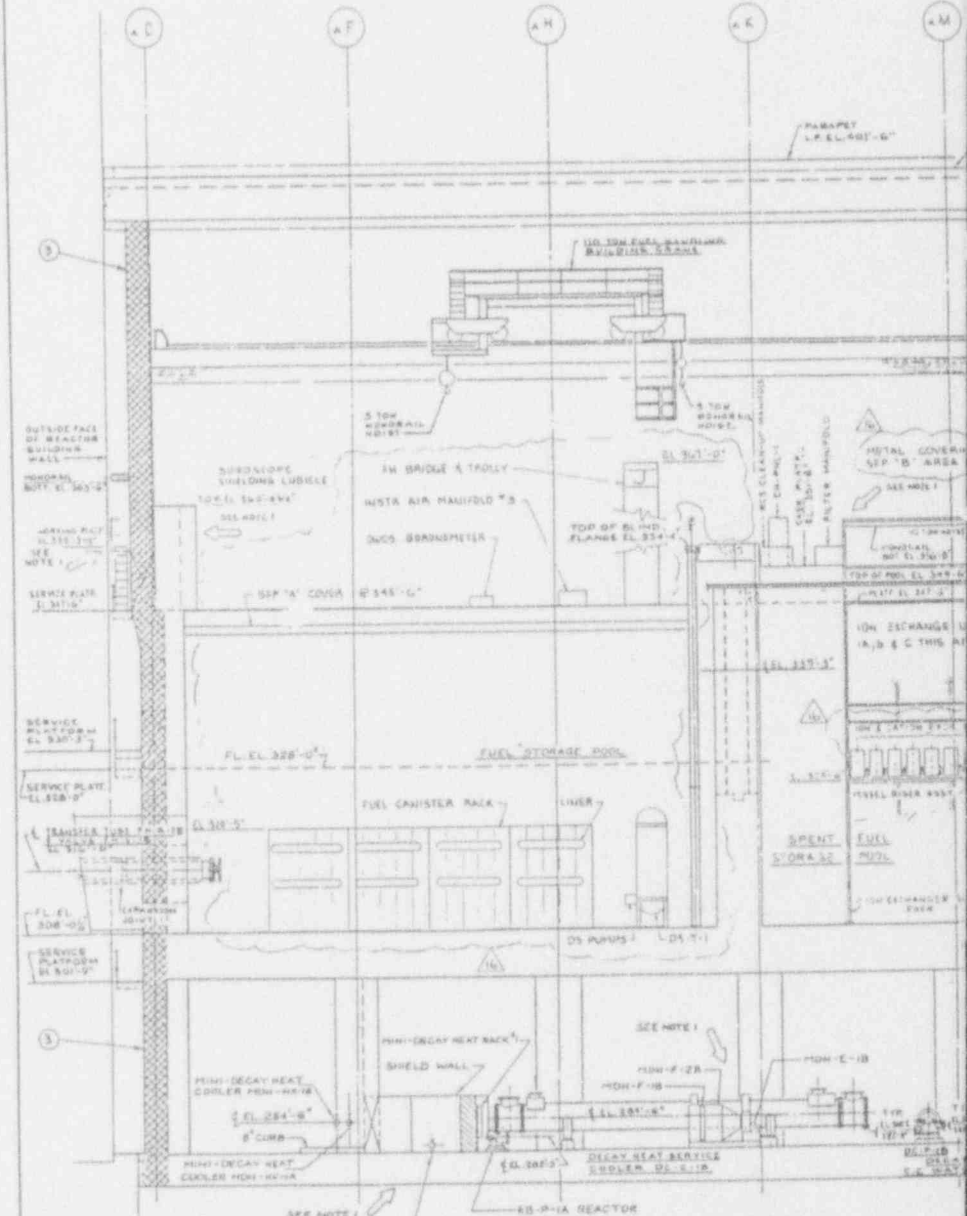
GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG SECTIONS A-A & B-B

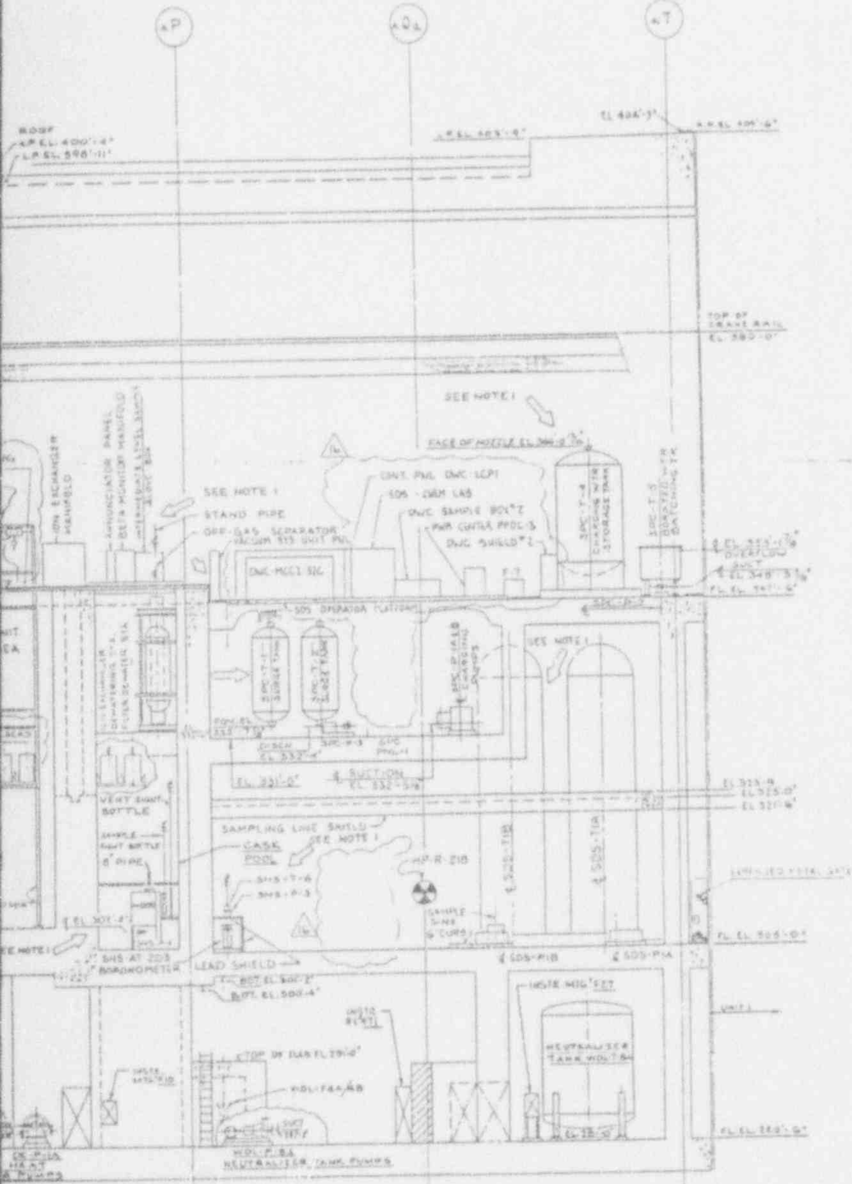
PDMS SAR B&W DWG NO: 2069

FIGURE: 1.2 - 12 PAGE: 1.2 - 16

9401070221-08



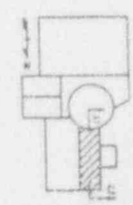
SECTION 'C-C'
(DWGS. 2065 THRU 7068)



NOTES

1. ⇨ INDICATES EQUIPMENT ADDED FOR THE RECOVERY PROGRAM.

LEGEND



Amendment 20

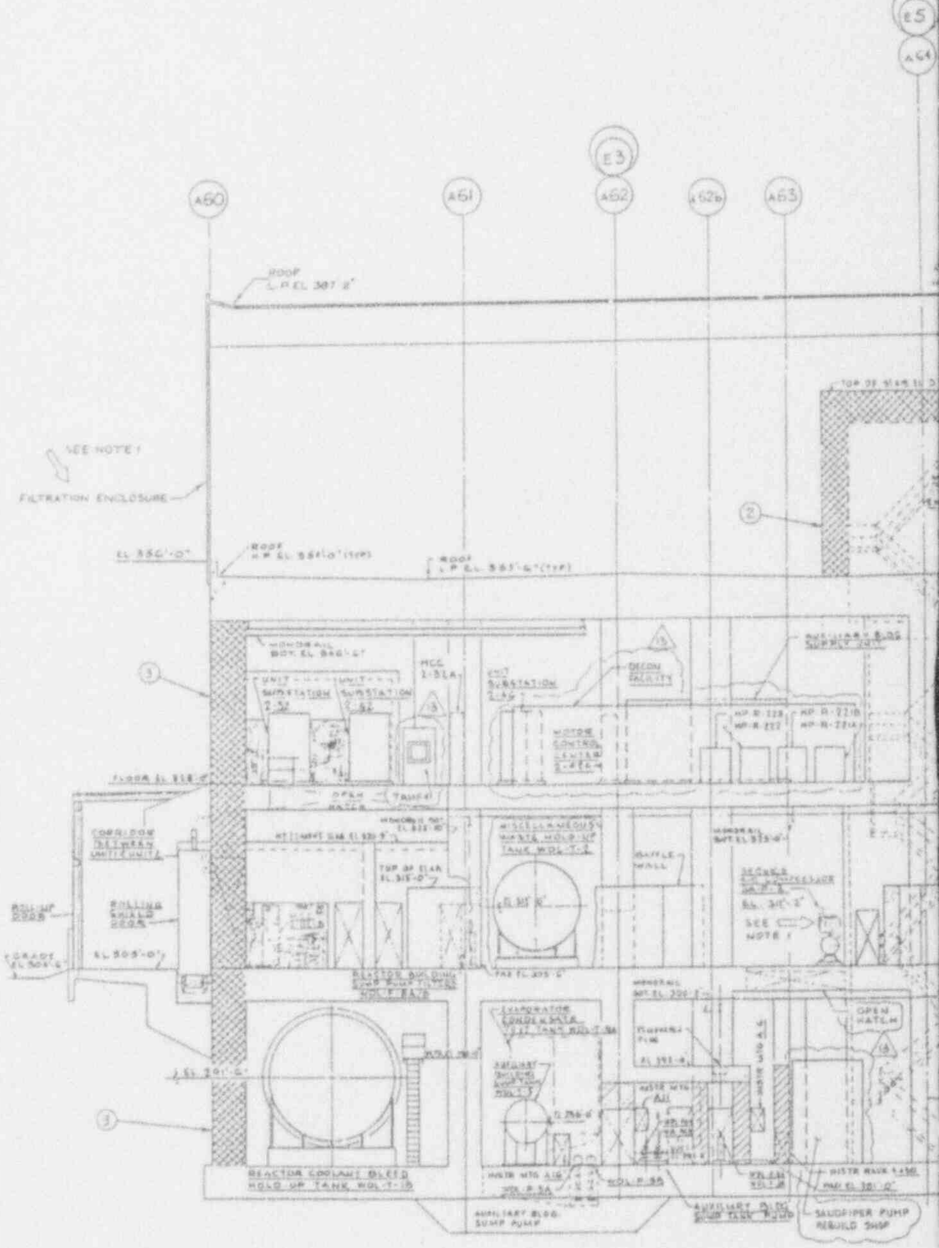
GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG
SECTION C-C

PDMS SAH | B&R DWG NO. 2070

FIGURE: 1.2 - 13 | PAGE: 1.2 - 17

9401070221-09



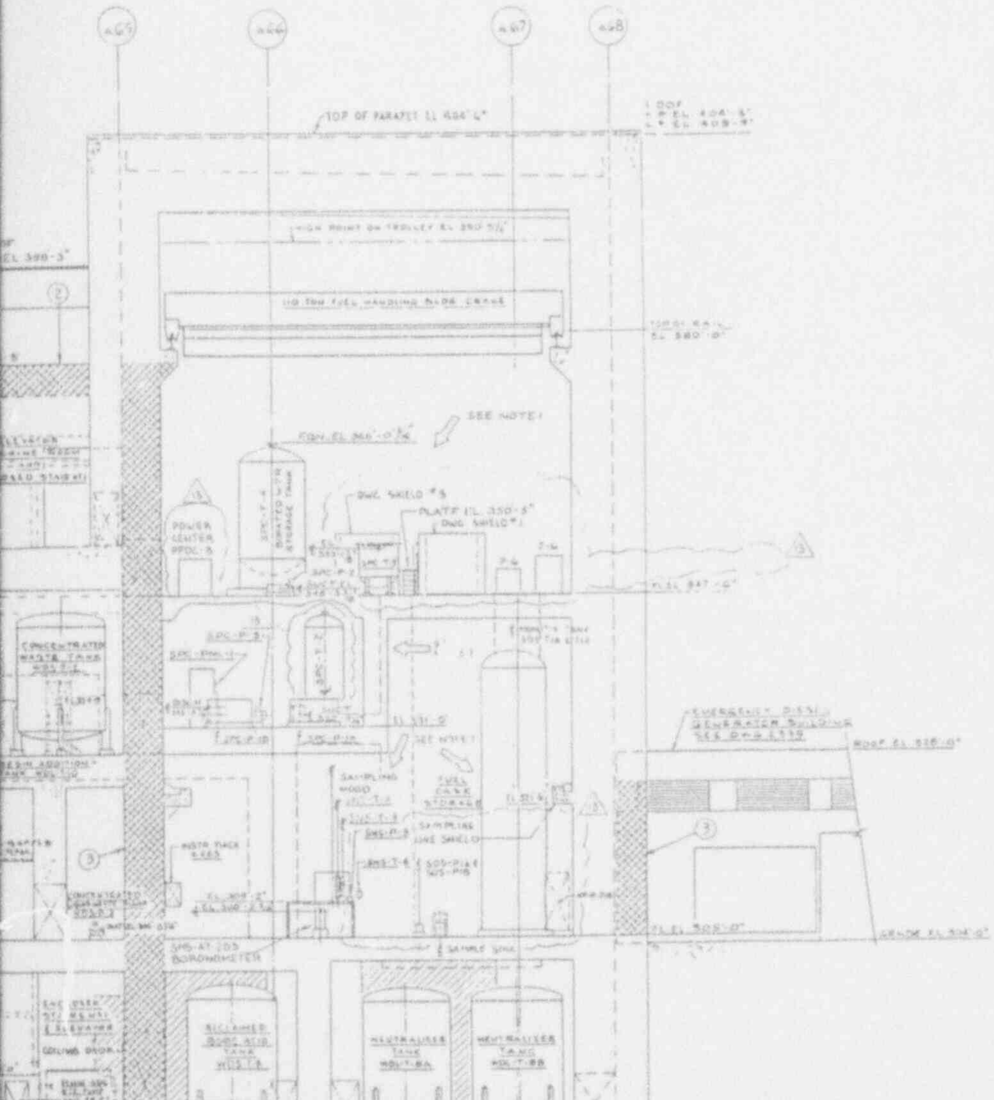
SECTION 'D-D'
(DWGS. 2066 THRU 2060)

SI
APERTURE
CARD

Also Available On
Aperture Card

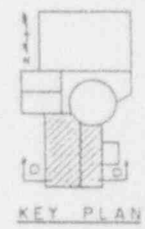
NOTES

1. ⇨ INDICATES EQUIPMENT ADDED FOR TMI RECOVERY PROGRAM



LEGEND

- REMOVABLE SECTION
- FIRE RATED WALLS
- HOURLY FIRE RATING
- REMOVABLE SECTION & FIRE RATED WALL
- HOURLY FIRE RATING



KEY PLAN

Amendment 20

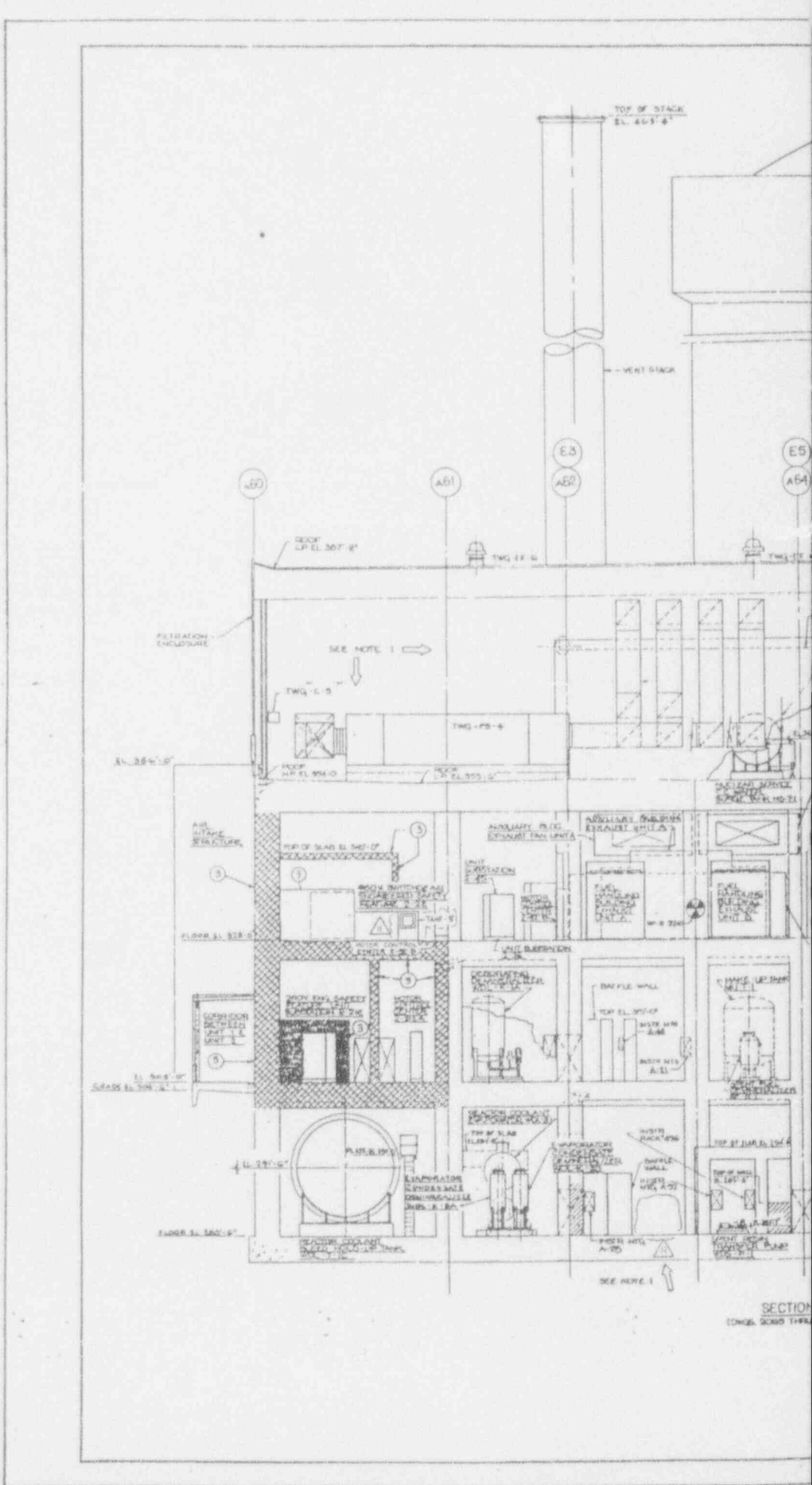
GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG
SECTION D-D

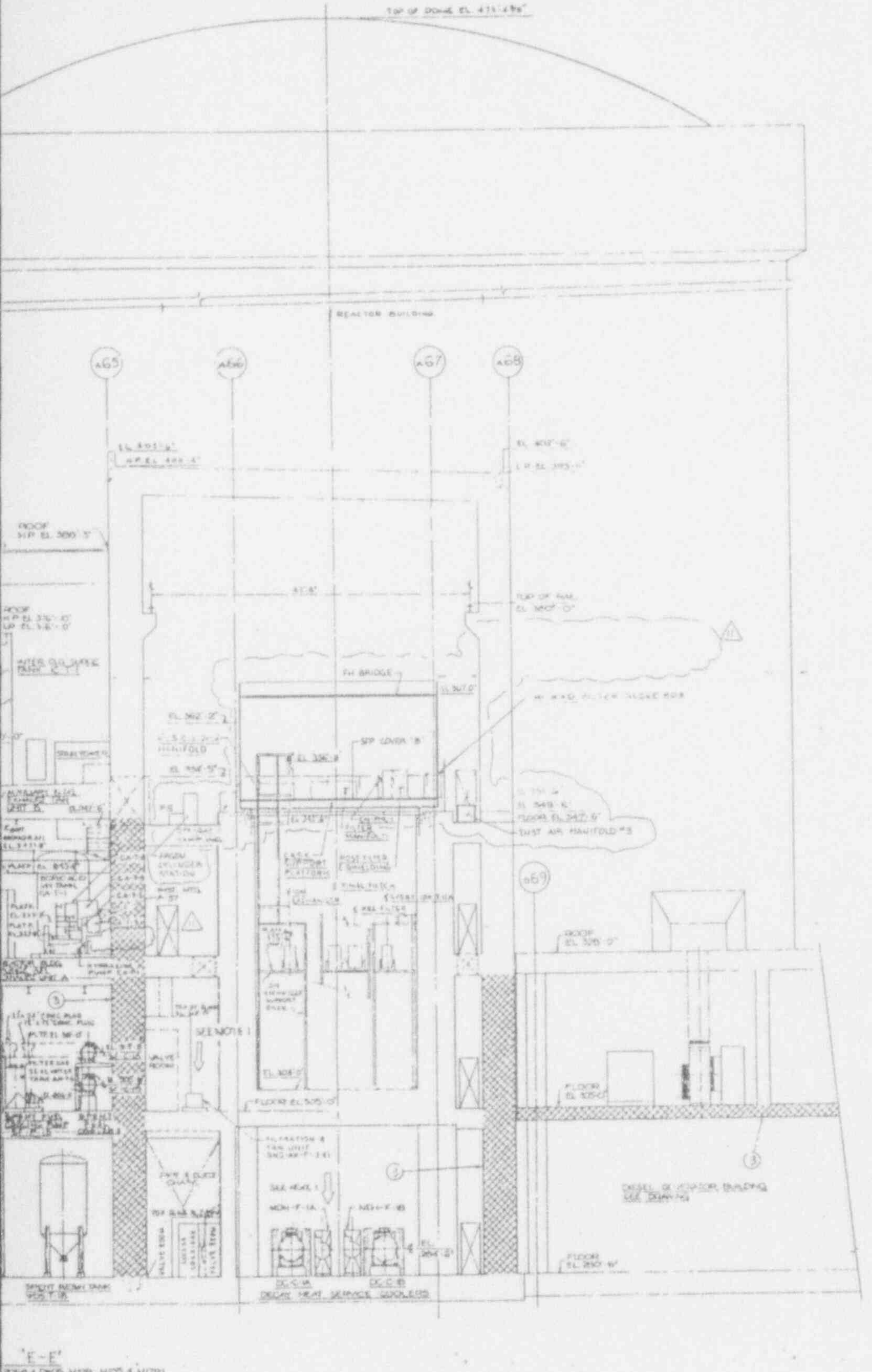
PDMS SAR B&R DWG NO. 2071

FIGURE: 1.2 - 14 PAGE: 1.2 - 18

9401070221-10



TOP OF STACK
VENT STACK
E3
A62
E5
A64
A60
A61
FILTRATION ENCLOSURE
SEE NOTE 1
AIR INTAKE STRUCTURE
AUXILIARY BLDG EXHAUST FAN UNITS
UNIT SUBSTATION
BAFFLE WALL
CORRIDOR BETWEEN UNIT 1 & UNIT 2
SEE NOTE 1
SECTION



NOTES

1 ⇨ INDICATES EQUIPMENT ADDED FOR THE RECOVERY PROGRAM

SI APERTURE CARD

Also Available On Aperture Card

LEGEND

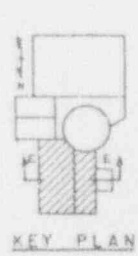
REMOVABLE SECTION

FIRE RATED WALL

HOURLY FIRE RATING

REMOVABLE SECTION & FIRE RATED WALL

HOURLY FIRE RATING



KEY PLAN

Amendment 20

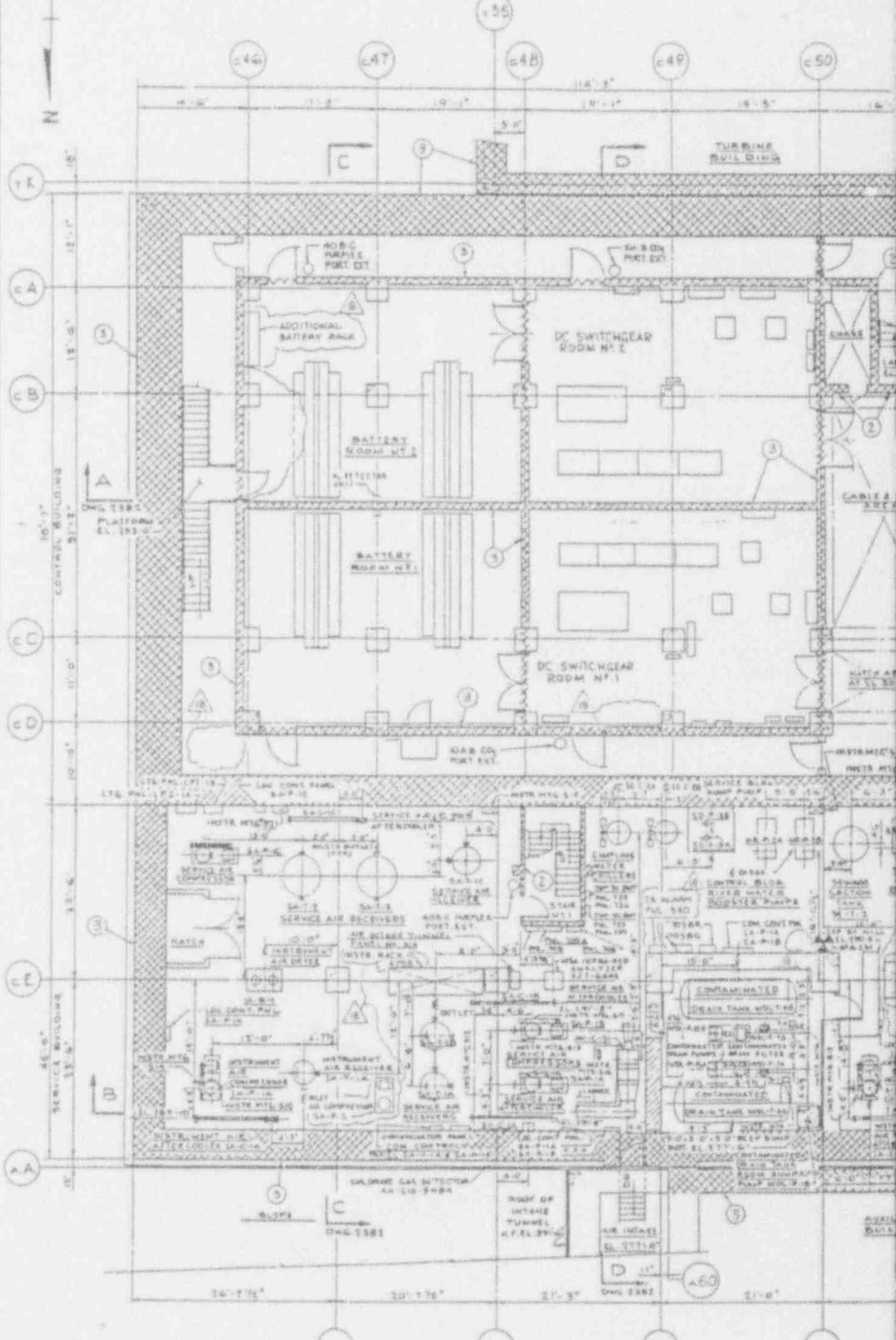
GPU Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG SECTION E-E

PDMS SAR | B&R DWG NO: 2072

FIGURE: 1.2 - 15 | PAGE: 1.2 - 19

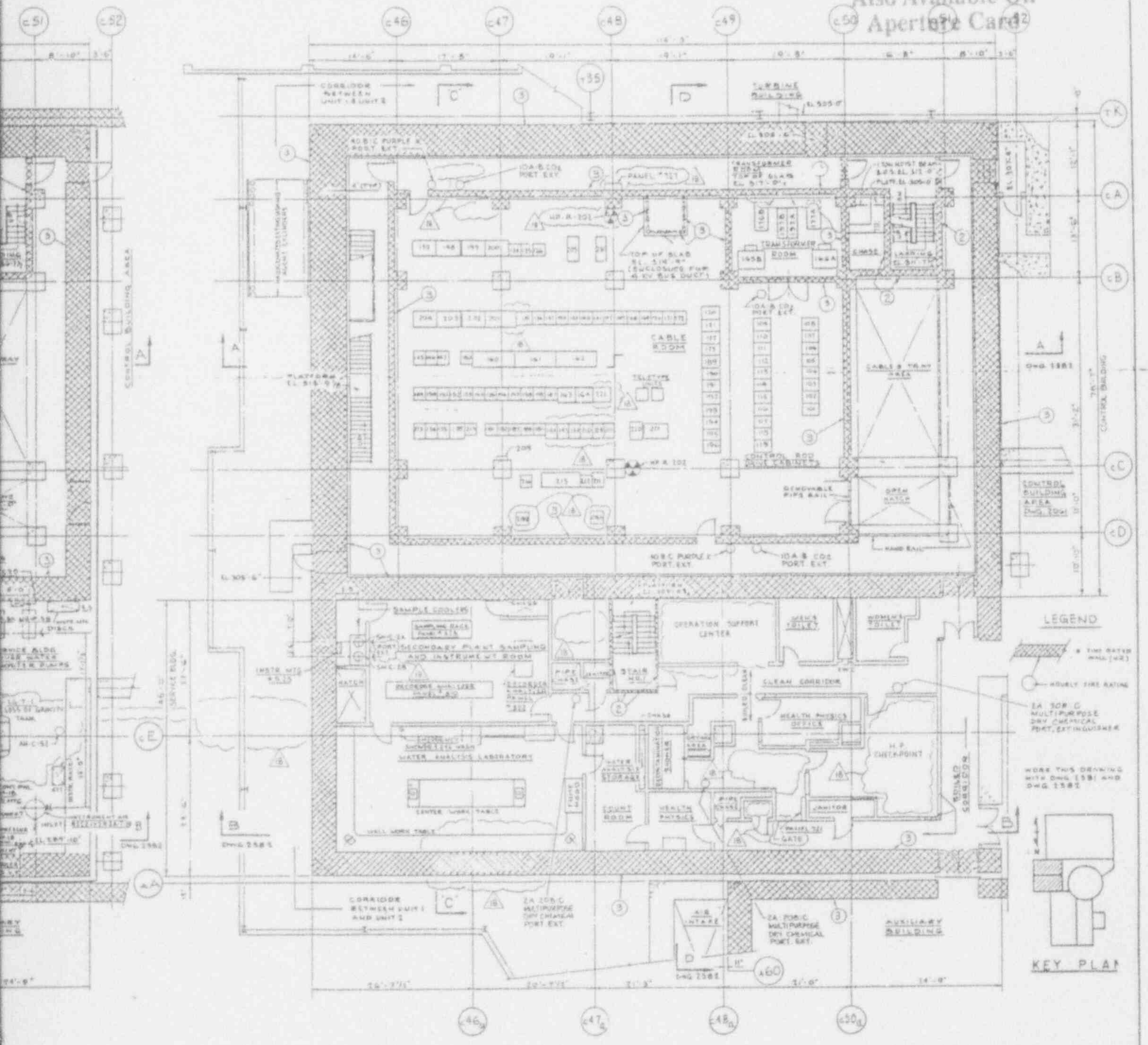
9401070221-11



PLAN AT EL 280'-6"

SI
APERTURE
CARD

Also Available On
Aperture Card



PLAN AT EL. 305'-0"

Amendment 20

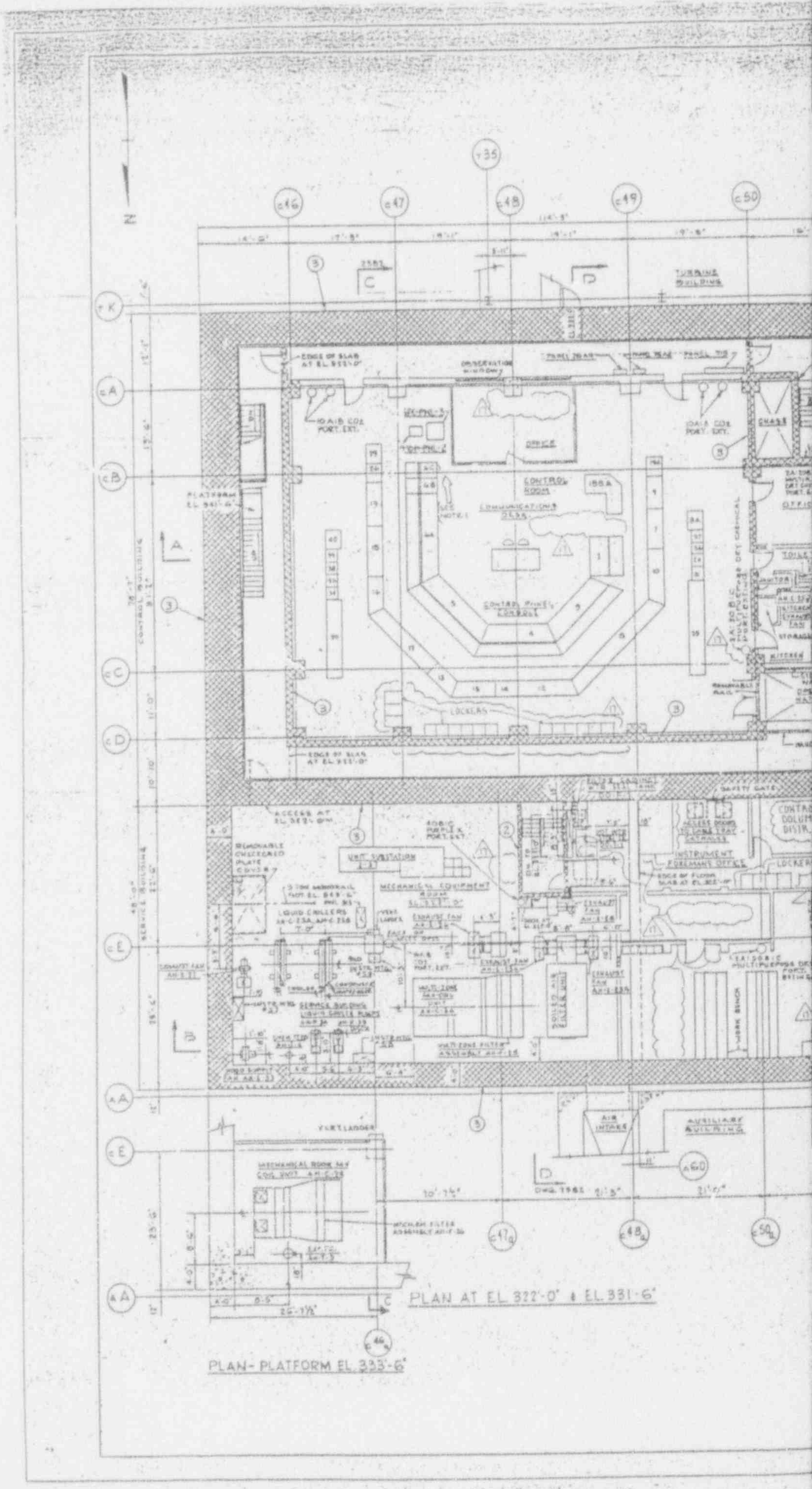
GPU Nuclear TMI-2

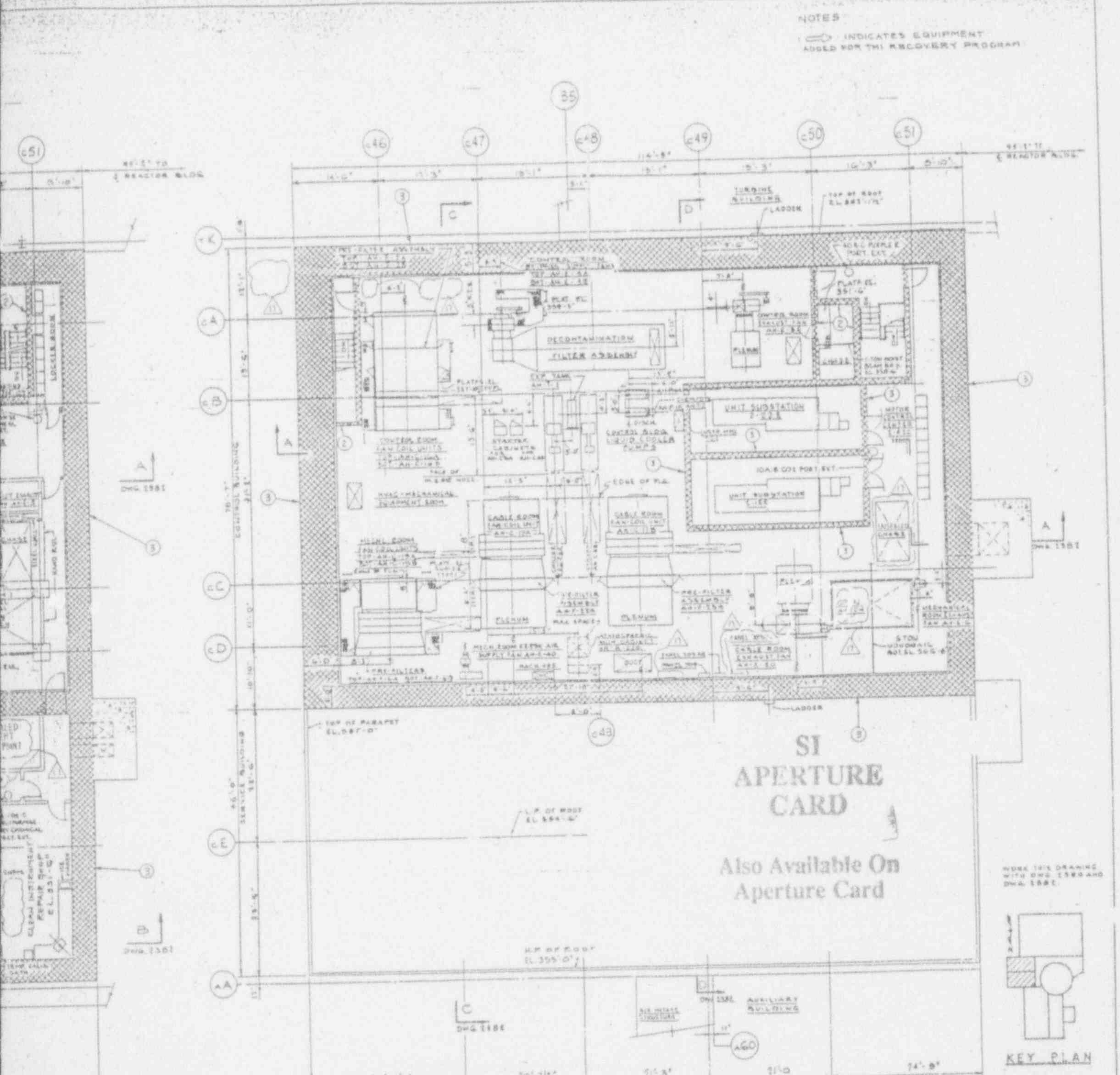
CONTROL & SERVICE BUILDING
LOWER FLOOR PLANS
EL 280'-6" & 305'-0"

PDMS SAR B&R DWG NO. 2380

FIGURE: 1.2 - 17 PAGE: 1.2 - 21

9401070221-12


PLAN AT EL. 322'-0" & EL. 331'-6"
PLAN- PLATFORM EL. 333'-6"
TURBINE BUILDING
CONTROL ROOM
COMMUNICATIONS DESK
CONTROL PANEL CONSOLE
OFFICE
LOCKERS
MECHANICAL EQUIPMENT
UNIT SUBSTATION
LIQUID CHILLERS
INSTRUMENT FOREMAN'S OFFICE
AUXILIARY BUILDING
AIR INTAKE
CONTROL BUILDING
SERVICE BUILDING
VERT. LADDER



SI APERTURE CARD

Also Available On Aperture Card

Amendment 20

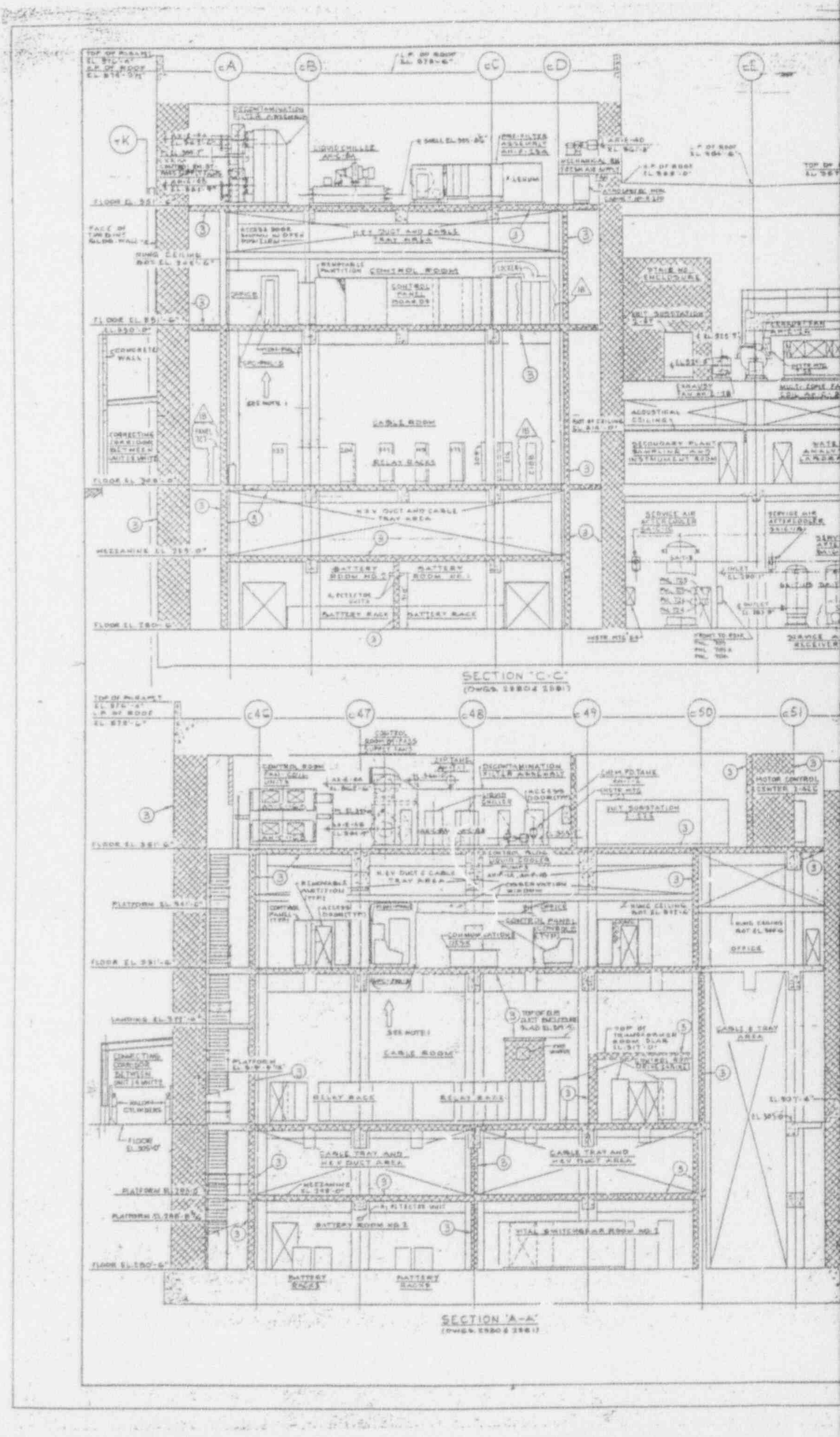
GPU Nuclear TMI-2

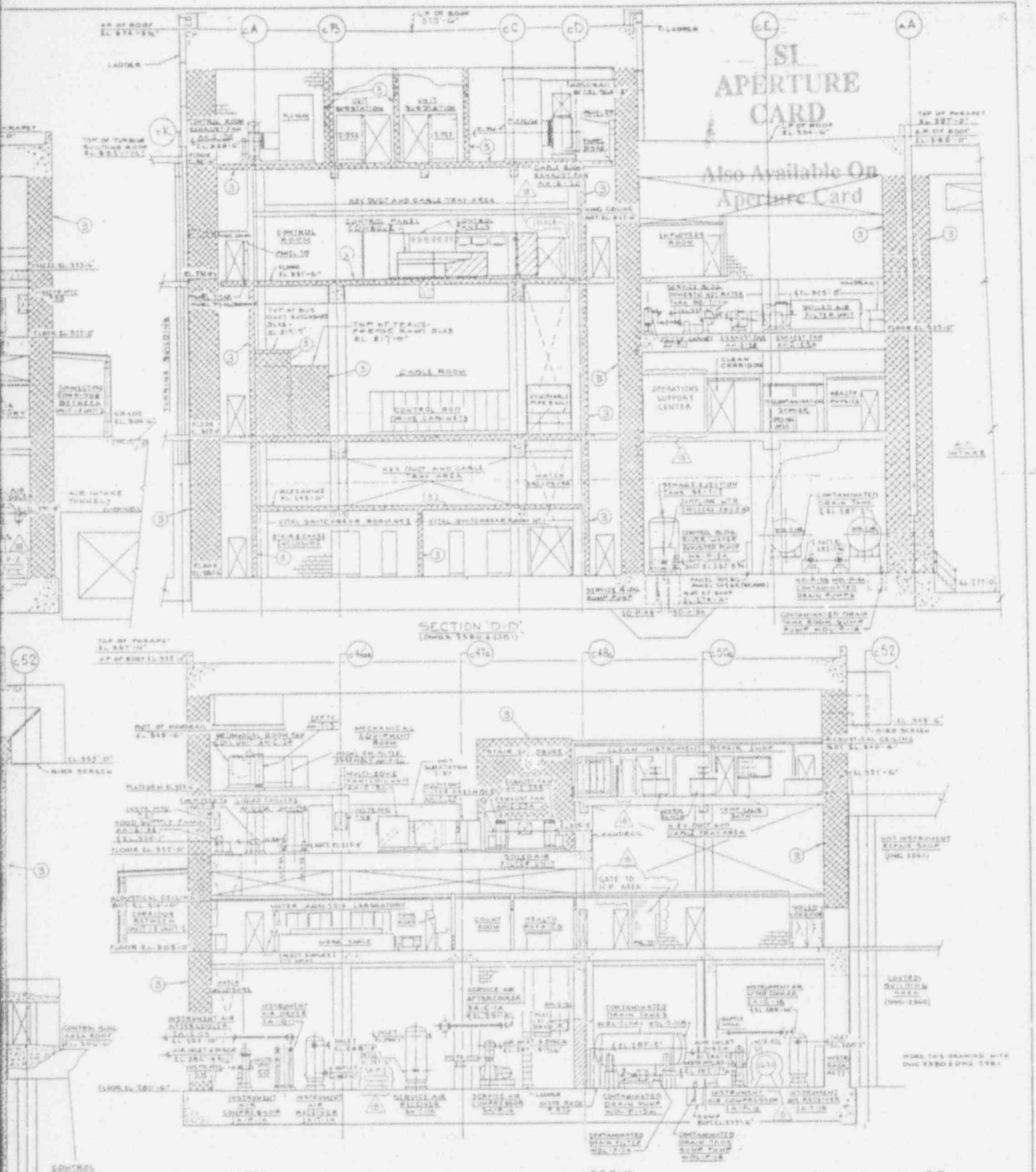
CONTROL & SERVICE BUILDING UPPER FLOOR PLANS EL 331'-6" & 351'-6"

PDMS SAR B&R DWG NO: 2381

FIGURE: 1.2 - 18 PAGE: 1.2 - 22

9401070221-13


CONTROL ROOM
CABLE ROOM
RELAY RACKS
BATTERY ROOM NO. 1
BATTERY RACK
SECTION "C-C"
CABLE ROOM
RELAY RACK
OFFICE
CABLE TRAY AND
H&V DUCT AREA
BATTERY ROOM NO. 2
VITAL SWITCHGEAR ROOM NO. 1
SECTION 'A-A'



SECTION "B-B"

NOTES

INDICATES EQUIPMENT ADDED FOR TMI RECOVERY PROGRAM

LEGEND

Amendment 20

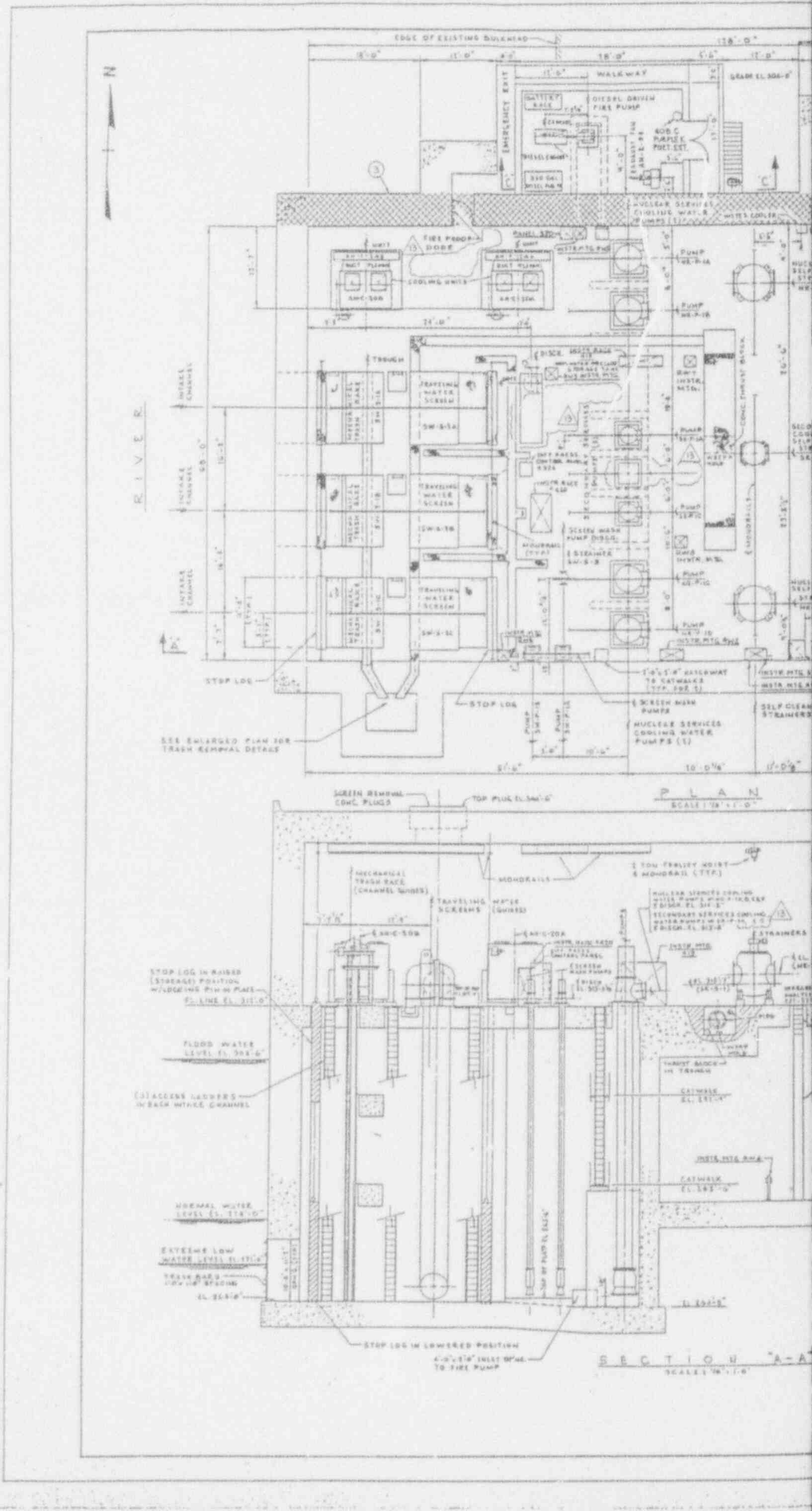
GPU Nuclear TMI-2

CONTROL & SERVICE BUILDING SECTIONS A-A, B-B, C-C, & D-D

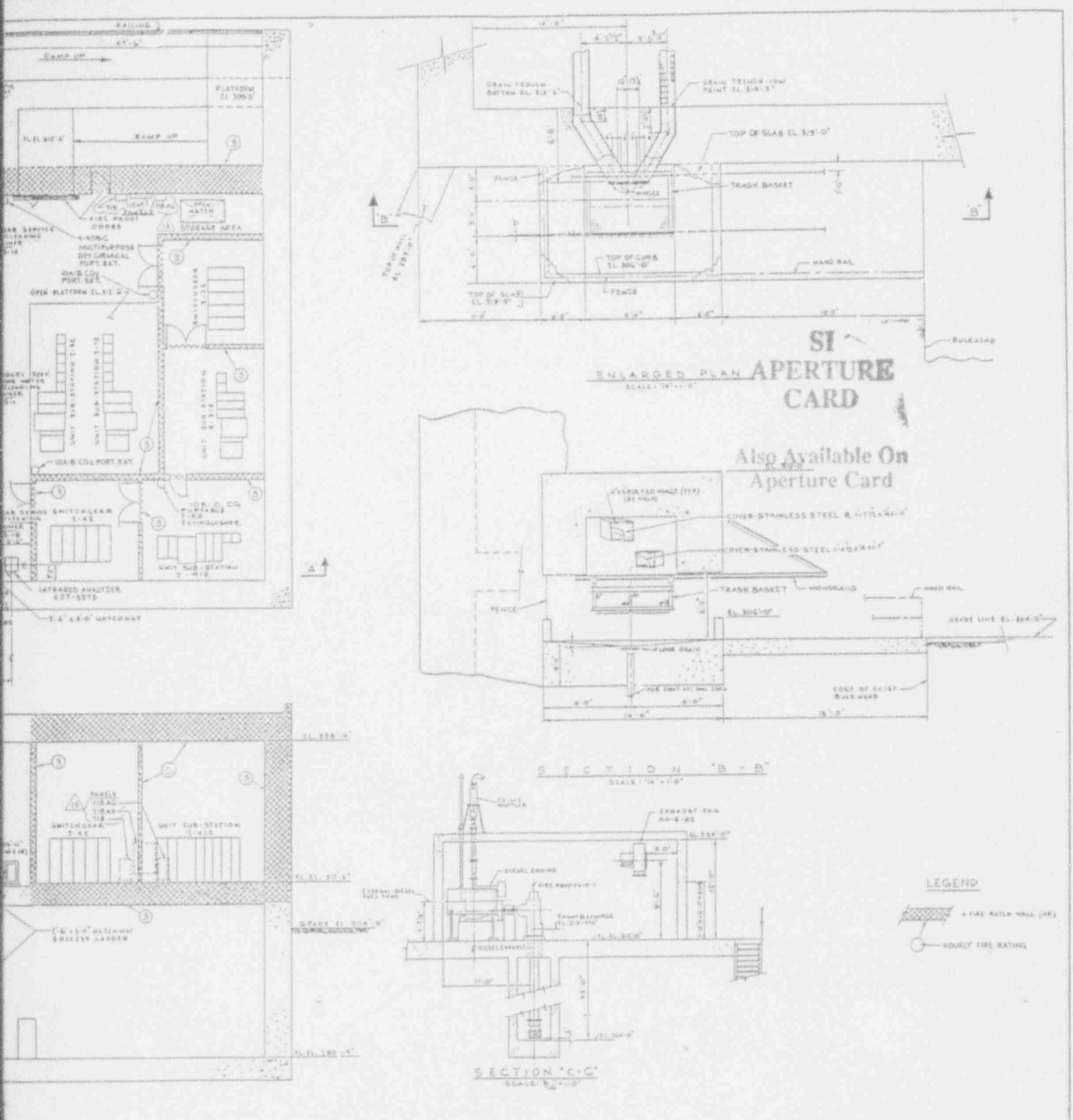
PDMS SAR B&R DWG NO. 2382

FIGURE: 1.2 - 19 PAGE: 1.2 - 23

9401070221-14



EDGE OF EXISTING BULKHEAD
WALKWAY
DIESEL DRIVEN FIRE PUMP
EMERGENCY EXIT
NUCLEAR SERVICES COOLING WATER PUMPS (1)
FIRE PROOF DOOR
COOLING UNITS
TROUGH
RIVER
INTAKE CHANNEL
TRAVELING WATER SCREEN
MECHANICAL TRASH RAKE
STOP LOG
SEE ENLARGED PLAN FOR TRASH REMOVAL DETAILS
SCREEN WASH PUMPS
NUCLEAR SERVICES COOLING WATER PUMPS (1)
SELF CLEANING STRAINERS
PLAN
SCREEN REMOVAL CONC. PLUGS
MONORAILS
MECHANICAL TRASH RAKE (CHANNEL GUIDES)
TRAVELING WATER SCREENS (GUIDES)
STOP LOG IN RAISED (STORAGE) POSITION W/LOCKING PIN IN PLACE
FLOOD WATER LEVEL
(3) ACCESS LADDERS IN EACH INTAKE CHANNEL
NORMAL WATER LEVEL
EXTREME LOW WATER LEVEL
TRASH BARS
STOP LOG IN LOWERED POSITION
TO FIRE PUMP
STRAINERS
CATWALK
SECTION "A-A"



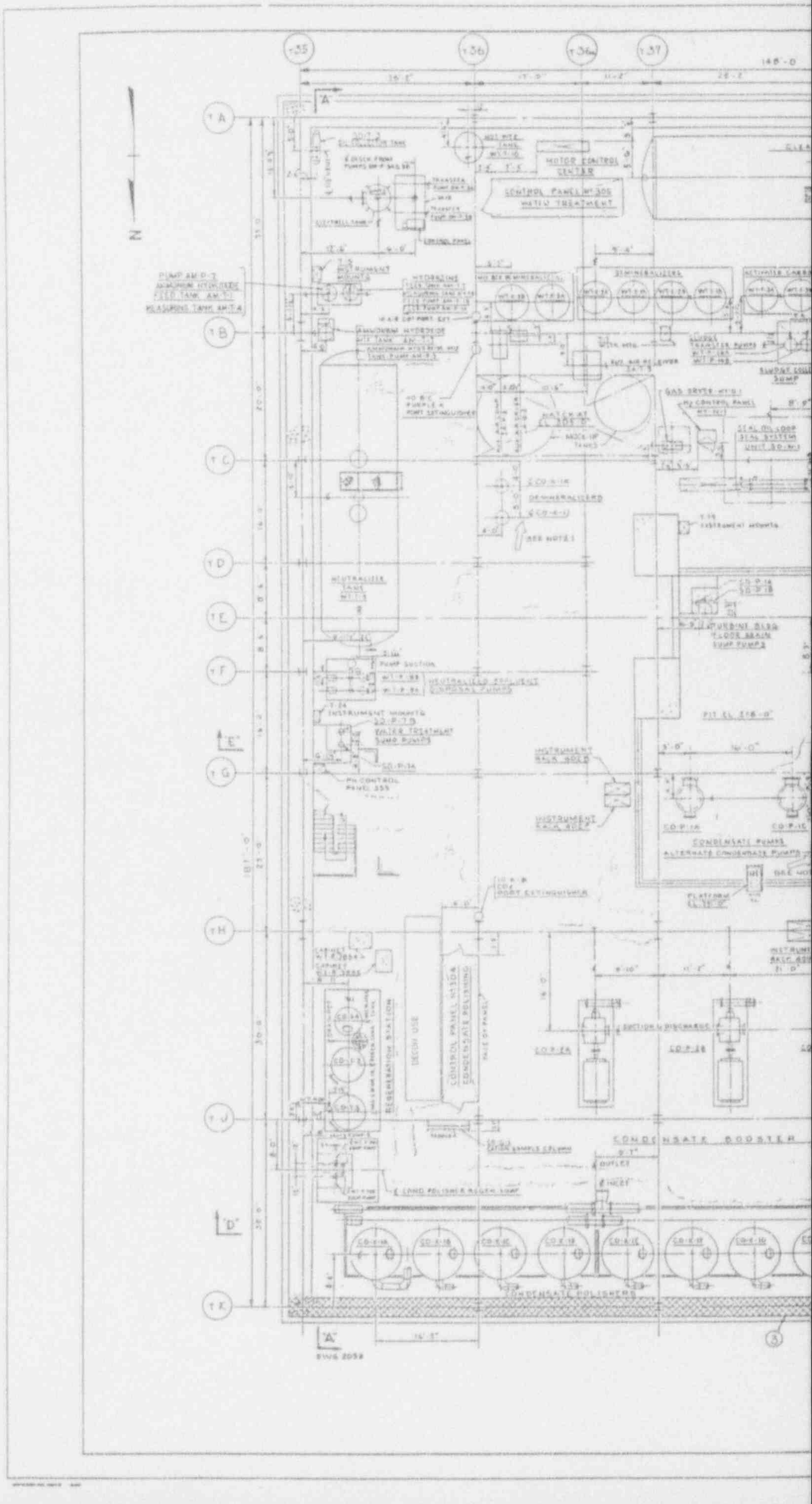
Amendment 20

GPU Nuclear TMI-2

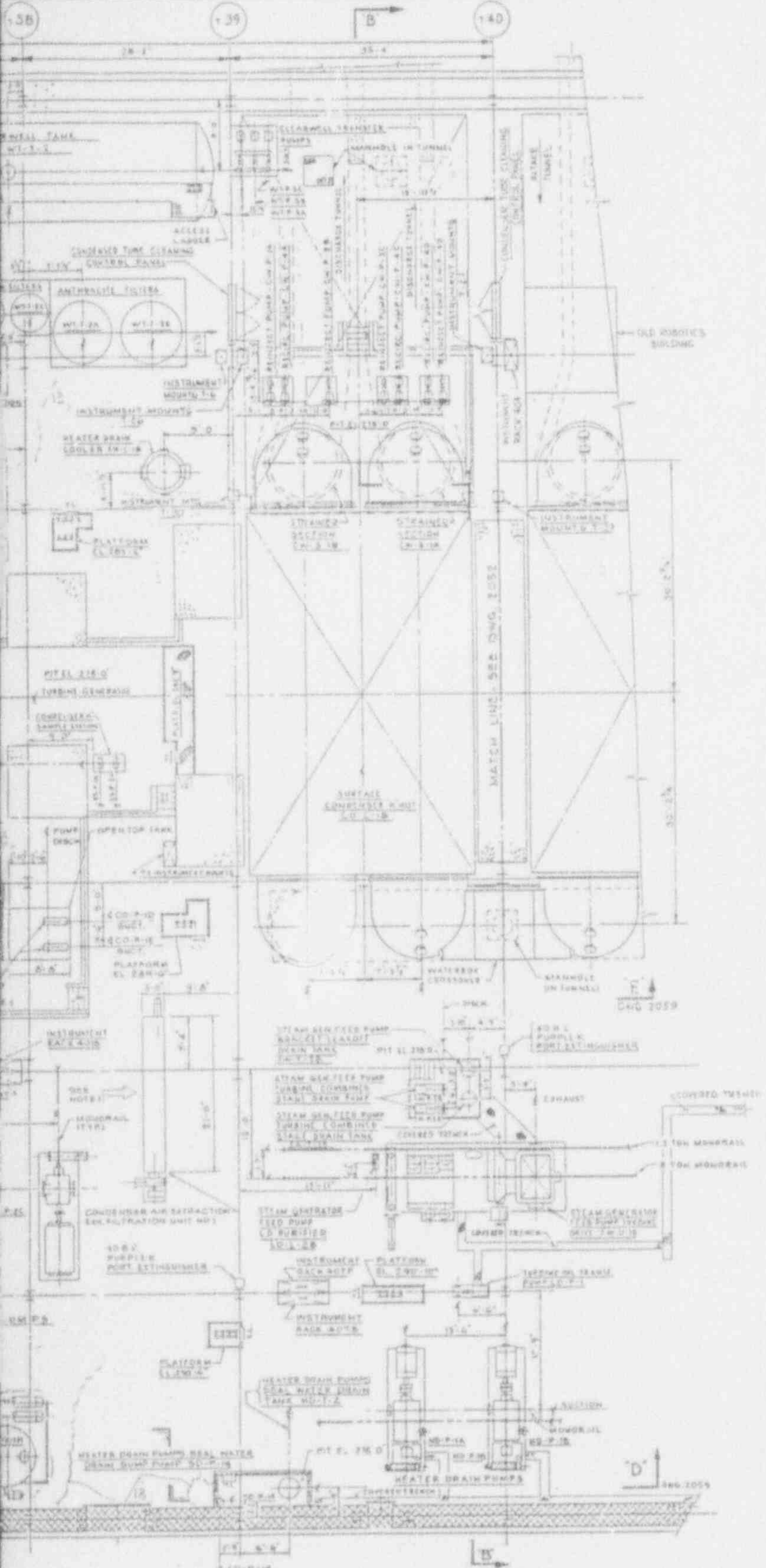
RIVER WATER
PUMP HOUSE

PDMS SAR B&R DWG NO: 2336

FIGURE: 1.2 - 20 PAGE: 1.2 - 24



MOTOR CONTROL CENTER
CONTROL PANEL No 305 WATER TREATMENT
NEUTRALIZER TANK
CONDENSATE PUMPS
CONDENSATE BOOSTER
CONDENSATE POLISHERS
REGENERATION STATION
DWG 2053



NOTES:
1. ⇨ INDICATES EQUIPMENT ADDED FOR TMI RECOVERY PROGRAM

SI APERTURE CARD

Also Available On Aperture Card

LEGEND

FIRE RATED WALL

HOURLY FIRE RATING

KEY PLAN

Amendment 20

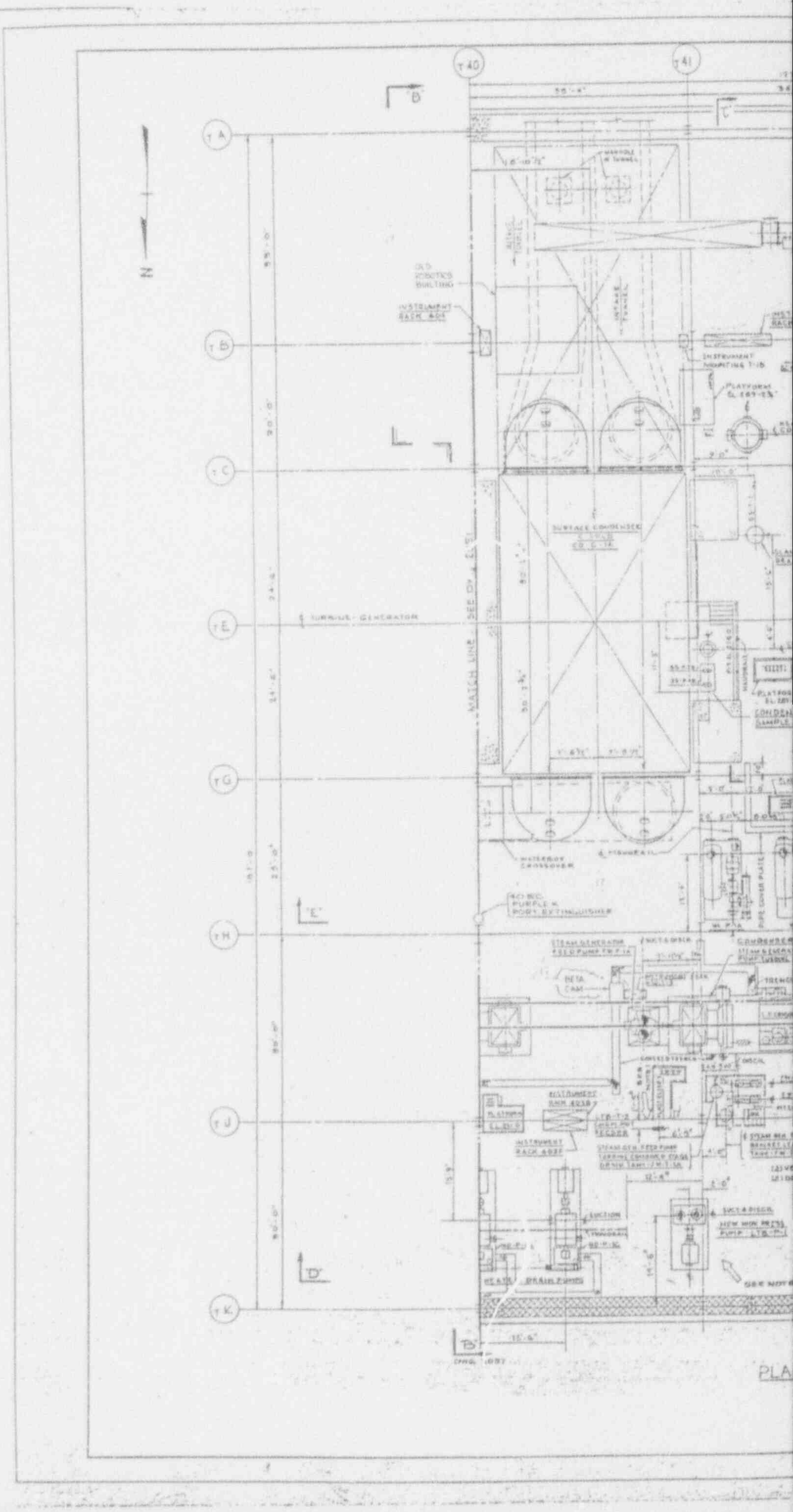
GPU Nuclear TMI-2

TURBINE BUILDING BASEMENT PLAN EAST SIDE

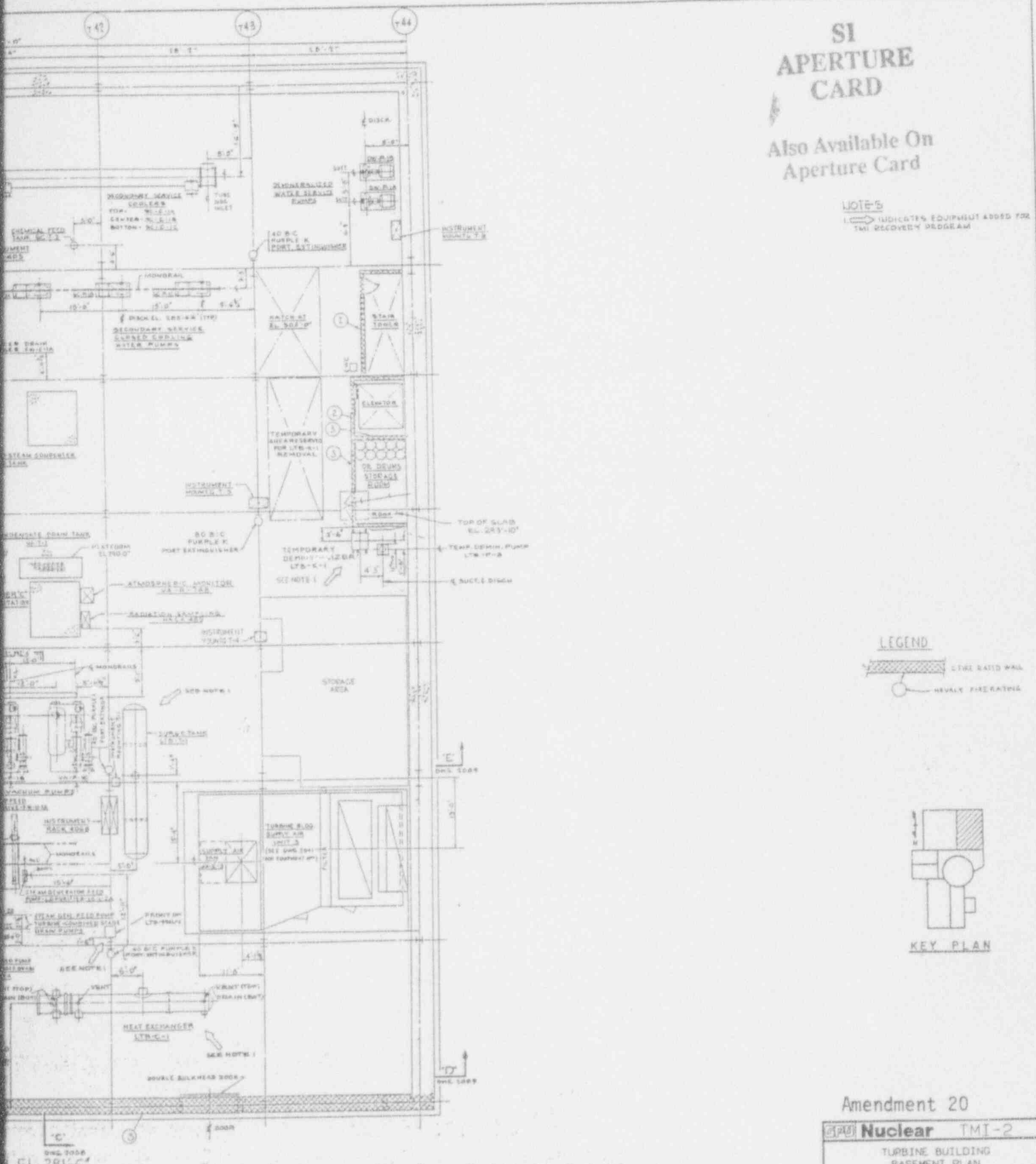
PDMS SAR B&R DWG NO: 2051

FIGURE: 1.2 - 22 PAGE: 1.2 - 26

9401070221-16



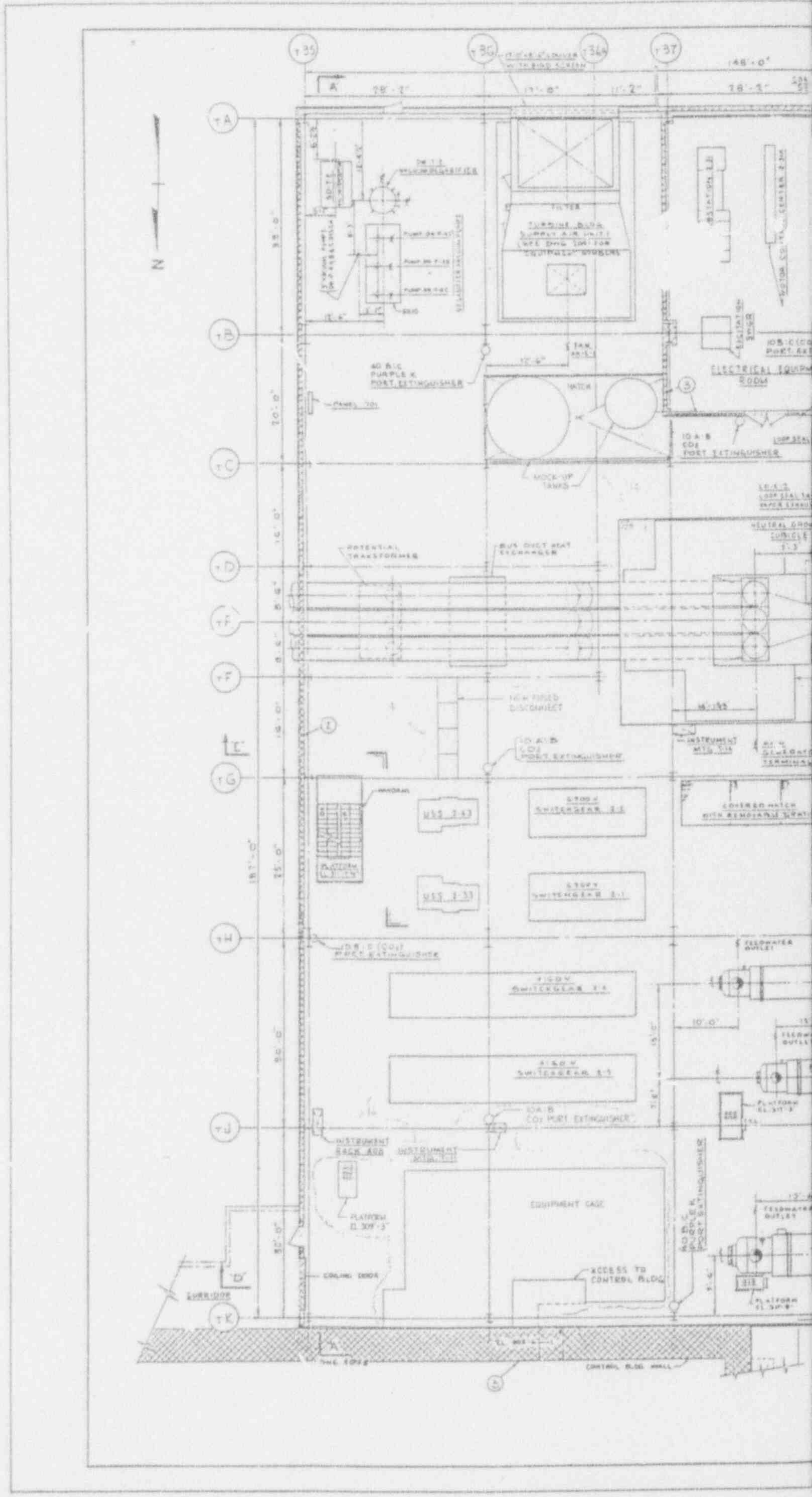
T 40
T 41
T A
T B
T C
T E
T G
T H
T J
T K
N
OLD ROBOTICS BUILDING
INSTRUMENT RACK 404
SURFACE CONDENSER
TURBINE - GENERATOR
MATCH LINE
WATERBOX CROSSOVER
PURPLE K PORT. EXTINGUISHER
STEAM GENERATOR FEED PUMP
CONDENSER
INSTRUMENT RACK
SUCTION
DRAIN PUMPS
SEE NOTE
PLA

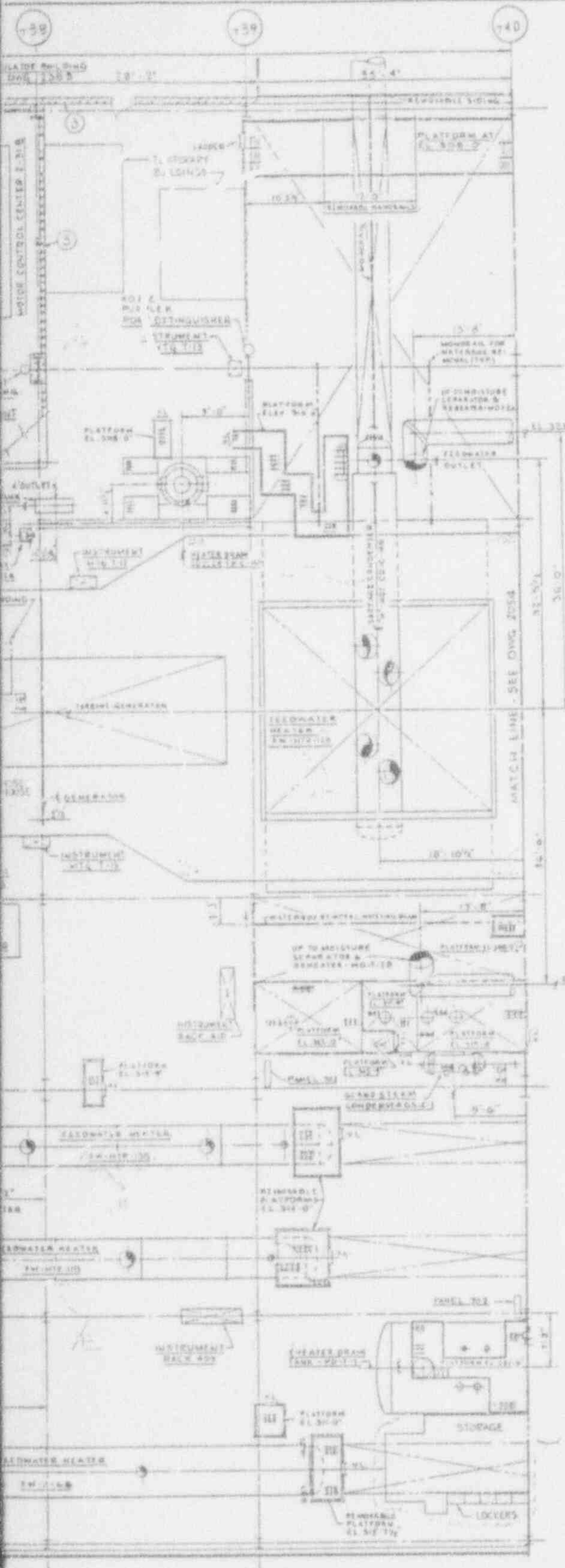


Amendment 20

GPU Nuclear	TMI-2
TURBINE BUILDING BASEMENT PLAN WEST SIDE	
PDMS SAR	B&R DWG NO. 2052
FIGURE: 1.2 - 23	PAGE: 1.2 - 27

9401070221-17

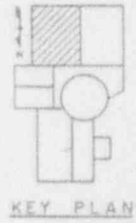

N
TURBINE BLDG. SUPPLY AIR UNIT
ELECTRICAL EQUIPMENT ROOM
MOCK-UP TANKS
POTENTIAL TRANSFORMER
BUS DUCT HEAT EXCHANGER
NEW FUSED DISCONNECT
10 A:B CO2 PORT EXTINGUISHER
USS 2-43
USS 2-33
4160V SWITCHGEAR
EQUIPMENT CAGE
ACCESS TO CONTROL BLDG
CORRIDOR
CONTROL BLDG WALL
COVERED HATCH
FEEDWATER OUTLET



LEGEND

FIRE RATED WALL

HOURLY FIRE RATING



KEY PLAN

Amendment 20

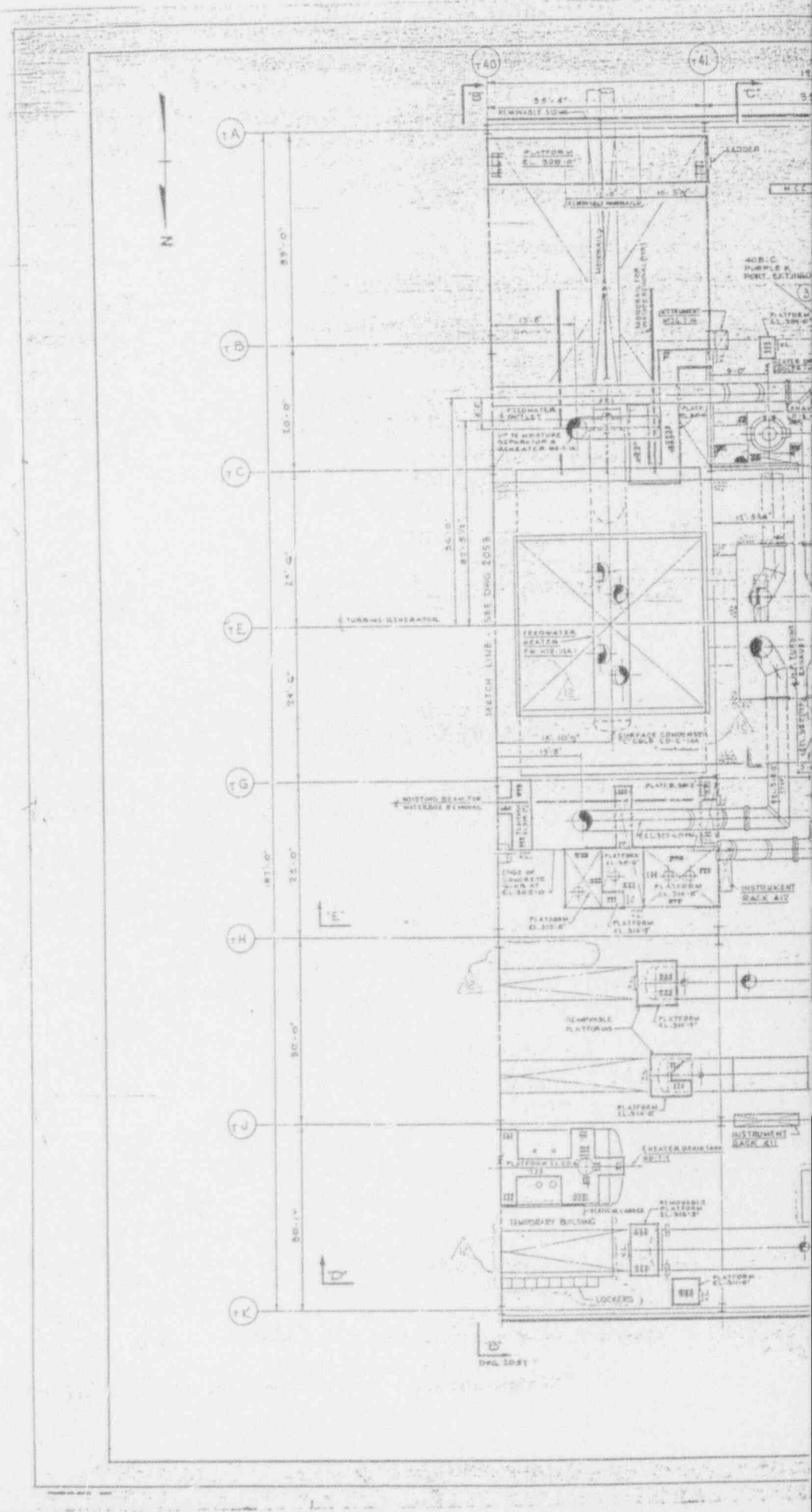
GPU Nuclear TMI-2

TURBINE BUILDING
GROUND FLOOR PLAN
EAST SIDE

PDMS SAR | B&R DWG NO: 2053

FIGURE: 1.2 - 24 PAGE: 1.2 - 28

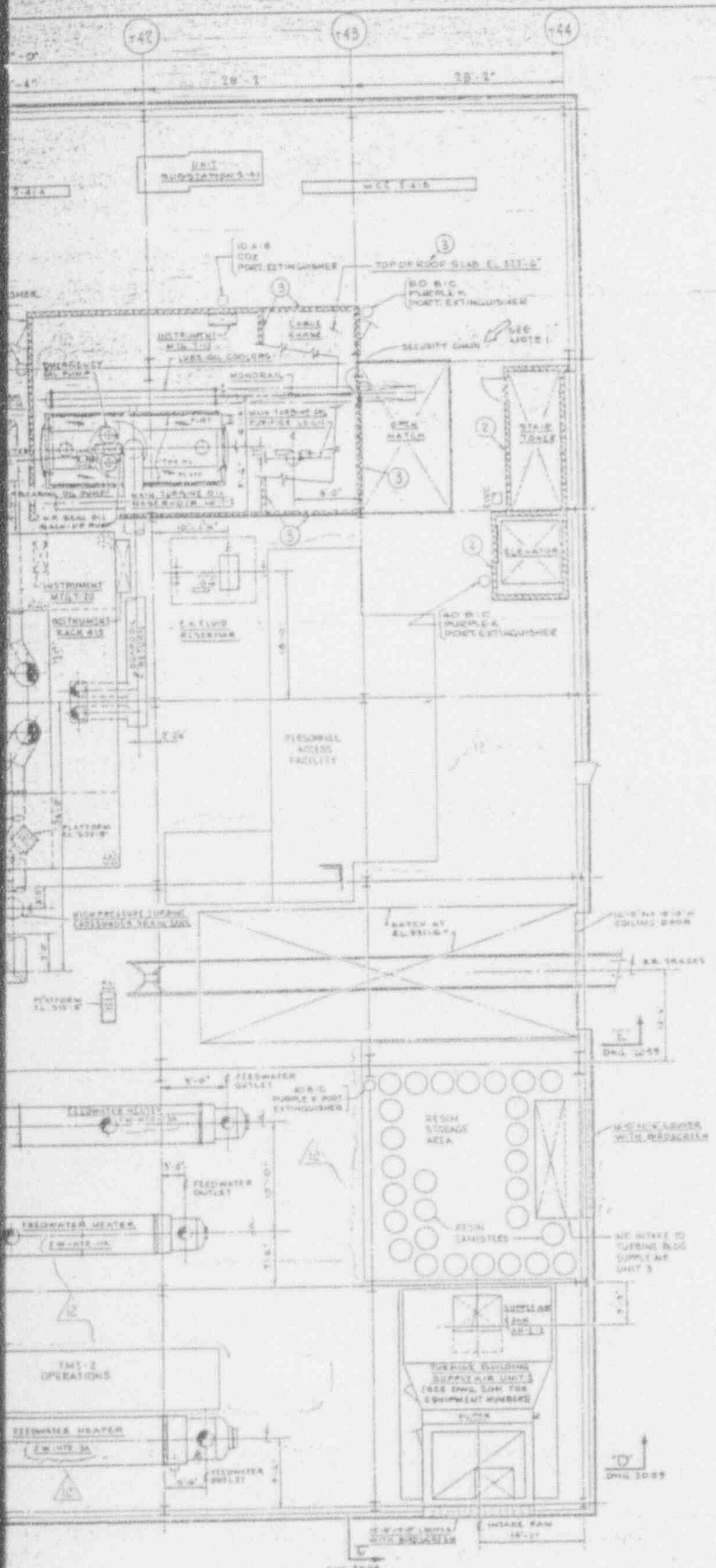
9401070221-18



T40
T41
TA
TB
TC
TE
TG
TH
TJ
TK
N
PLATFORM EL. 300'-0"
LADDER
MATCH LINE - SEE DWG 2058
TURBINE GENERATOR
FEEDWATER HEATER
INSTRUMENT RACK 412
INSTRUMENT RACK 411
REMOVABLE PLATFORMS
TEMPORARY BUILDING
LOCKERS
"E"
"D"
"B"
DWG. 2051

NOTES

1. ⇨ INDICATES EQUIPMENT ADDED FOR TMI RECOVERY PROGRAM



SI APERTURE CARD

Also Available On Aperture Card

LEGEND

FIRE RATED WALL

HOURLY FIRE RATING

KEY PLAN

Amendment 20

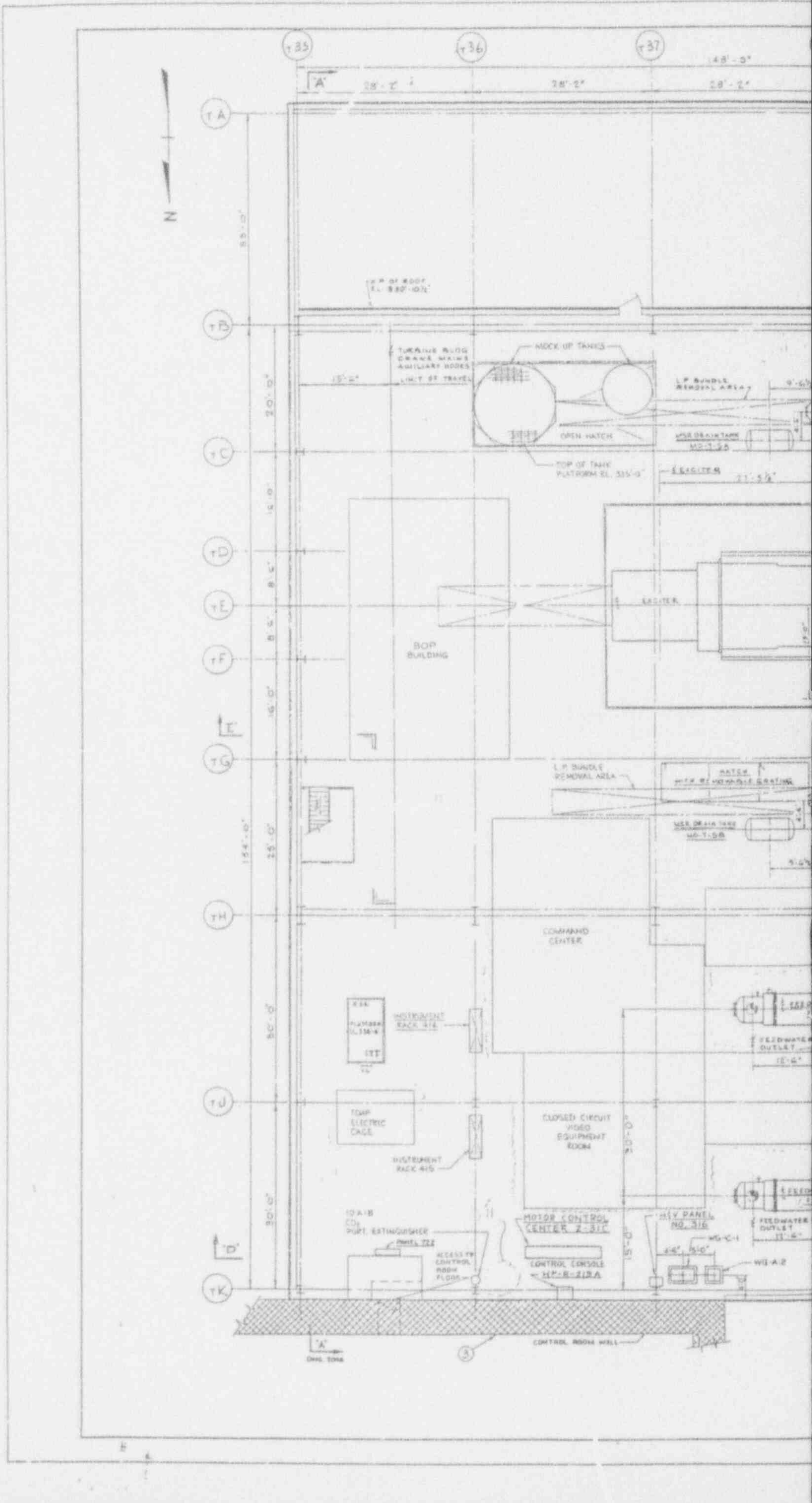
GPU Nuclear TMI-2

TURBINE BUILDING
GROUND FLOOR PLAN
WEST SIDE

PDMS SAR | B&R DWG NO. 2054

FIGURE: 1.2 - 25 PAGE: 1.2 - 29

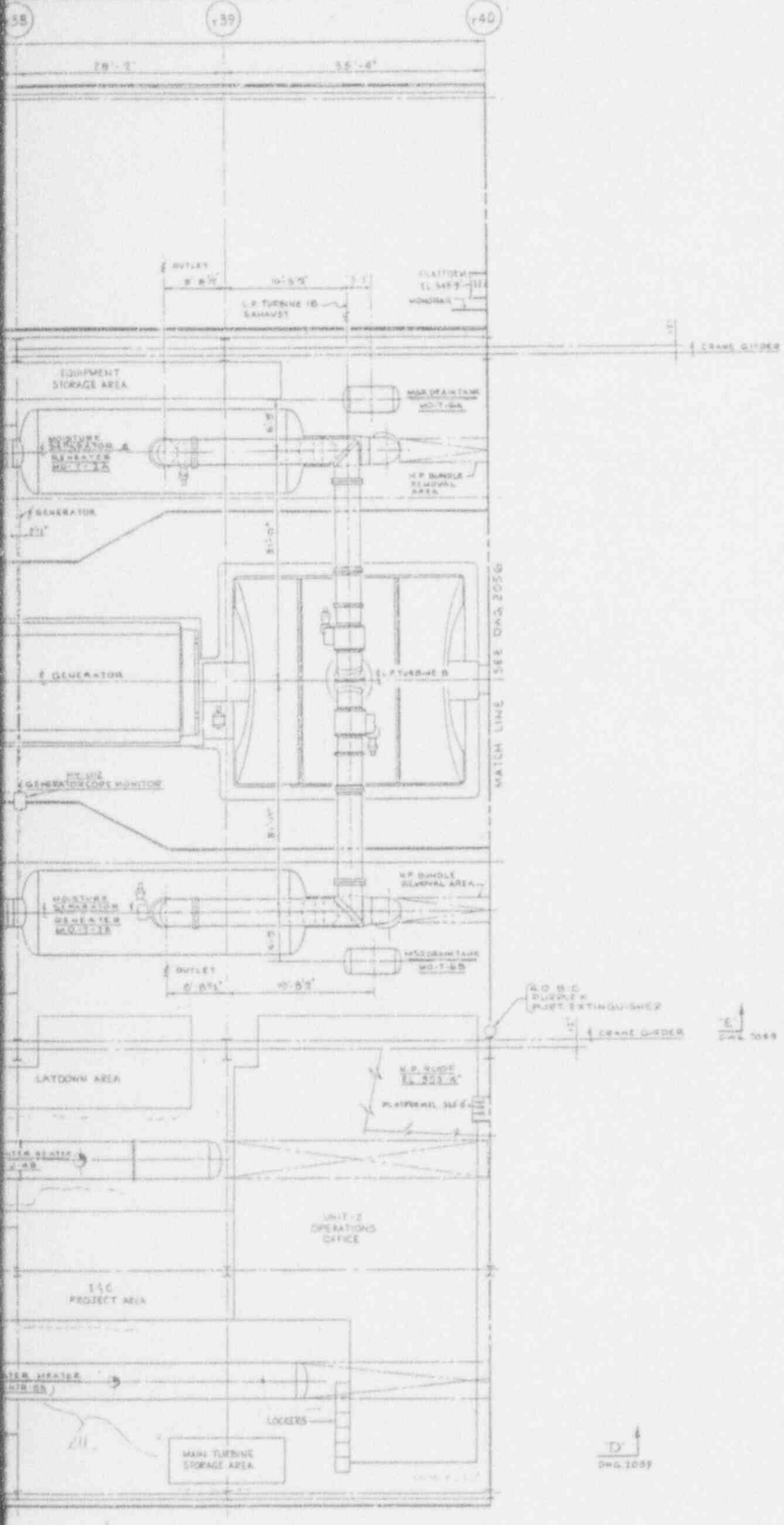
9401070221-19



MOCK UP TANKS
TURBINE BLDG CRANE MAINS AUXILIARY HOOKS LIMIT OF TRAVEL
OPEN HATCH
TOP OF TANK PLATFORM EL. 335'-0"
L.P. BUNDLE REMOVAL AREA
EXCITER
BOP BUILDING
COMMAND CENTER
INSTRUMENT RACK 416
TEMP ELECTRIC CAGE
CLOSED CIRCUIT VIDEO EQUIPMENT ROOM
INSTRUMENT RACK 415
PORT. EXTINGUISHER
ACCESS TO CONTROL ROOM FLOOR
MOTOR CONTROL CENTER 2-31C
CONTROL CONSOLE
H&V PANEL NO. 316
FEEDWATER OUTLET
CONTROL ROOM WALL

SI
APERTURE
CARD

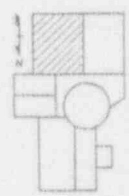
Also Available On
Aperture Card



LEGEND

FIRE RATED WALLS

HOURLY FIRE RATING



KEY PLAN

Amendment 20

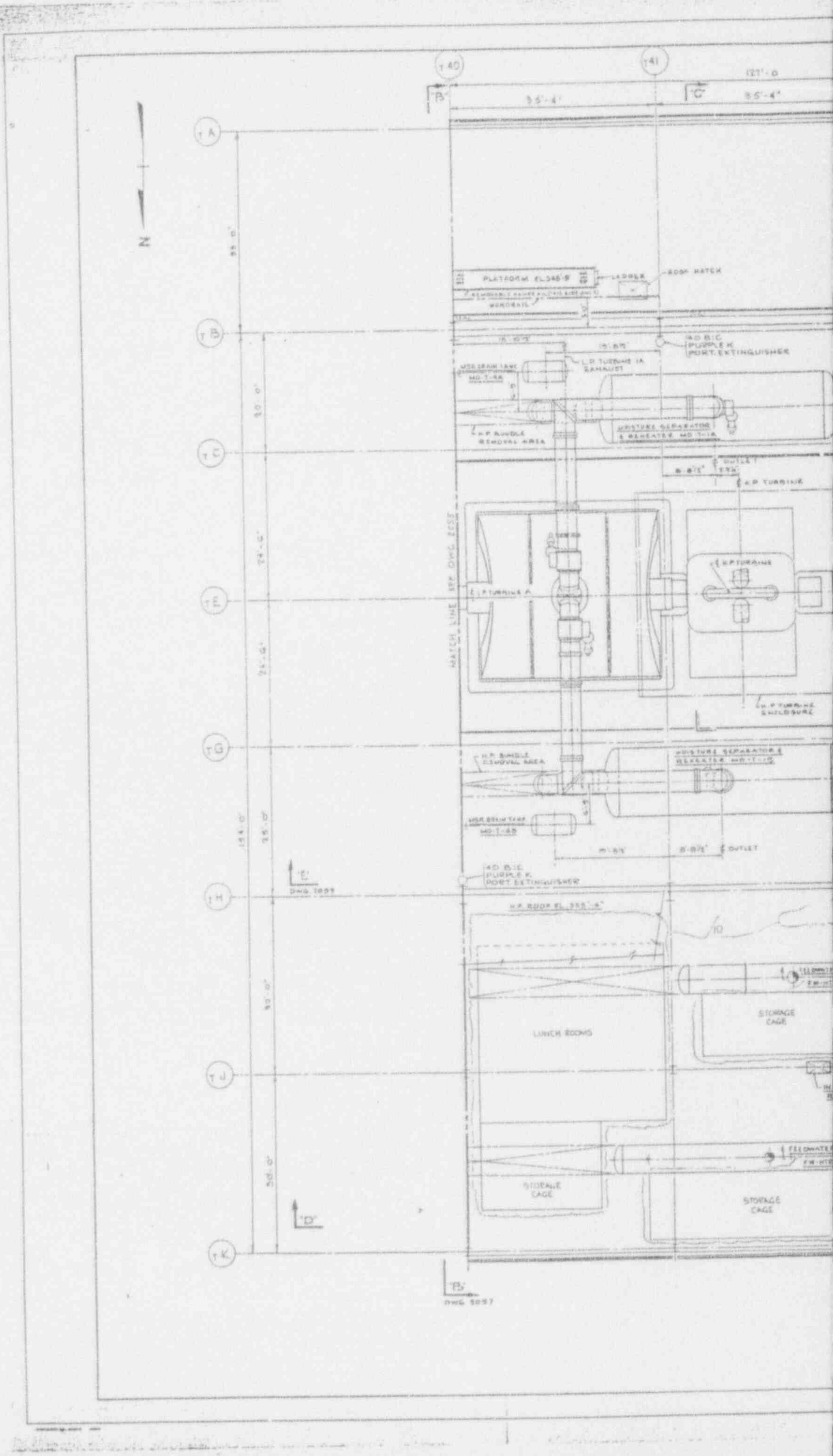
GPU Nuclear TMI-2

TURBINE BUILDING
OPERATING FLOOR
EAST SIDE

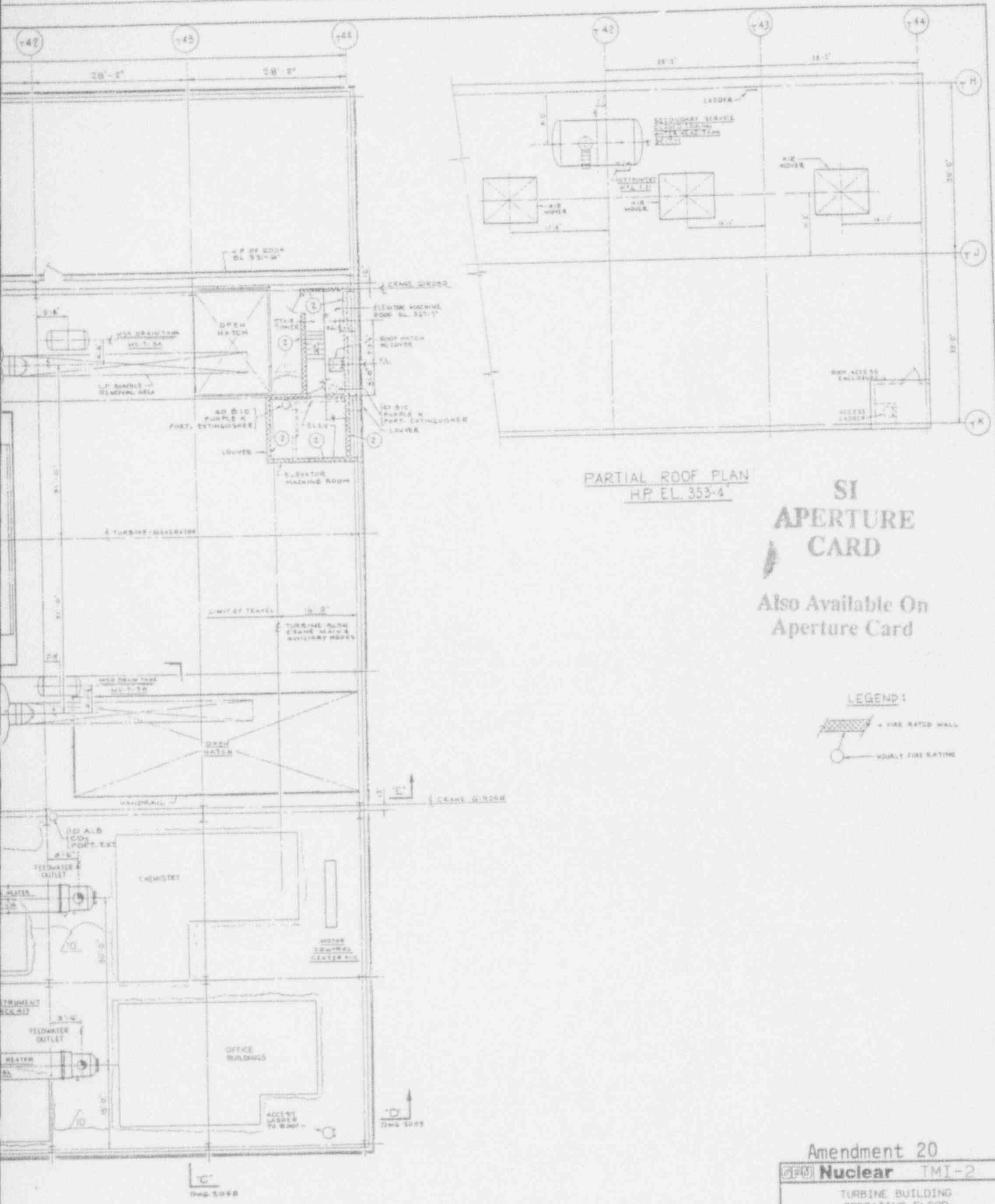
PDMS SAR | B&R DWG NO: 2055

FIGURE: 1.2 - 26 | PAGE: 1.2 - 30

9401070221-20



N
PLATFORM EL.348'-9"
LADDER
ROOF HATCH
MONORAIL
40 B:C
PURPLE K
PORT. EXTINGUISHER
L.P. TURBINE 1A EXHAUST
MOISTURE SEPARATOR & REHEATER MD-T-1A
H.P. BUNDLE REMOVAL AREA
OUTLET
H.P. TURBINE
MATCH LINE SEE DWG 2052
H.P. TURBINE
H.P. TURBINE ENCLOSURE
MOISTURE SEPARATOR & REHEATER MD-T-1B
H.P. BUNDLE REMOVAL AREA
MSR DRAIN TANK MD-T-4B
OUTLET
H.P. ROOF EL. 355'-4"
LUNCH ROOMS
STORAGE CAGE
STORAGE CAGE
STORAGE CAGE
DWG 2057



SI APERTURE CARD

Also Available On Aperture Card

Amendment 20

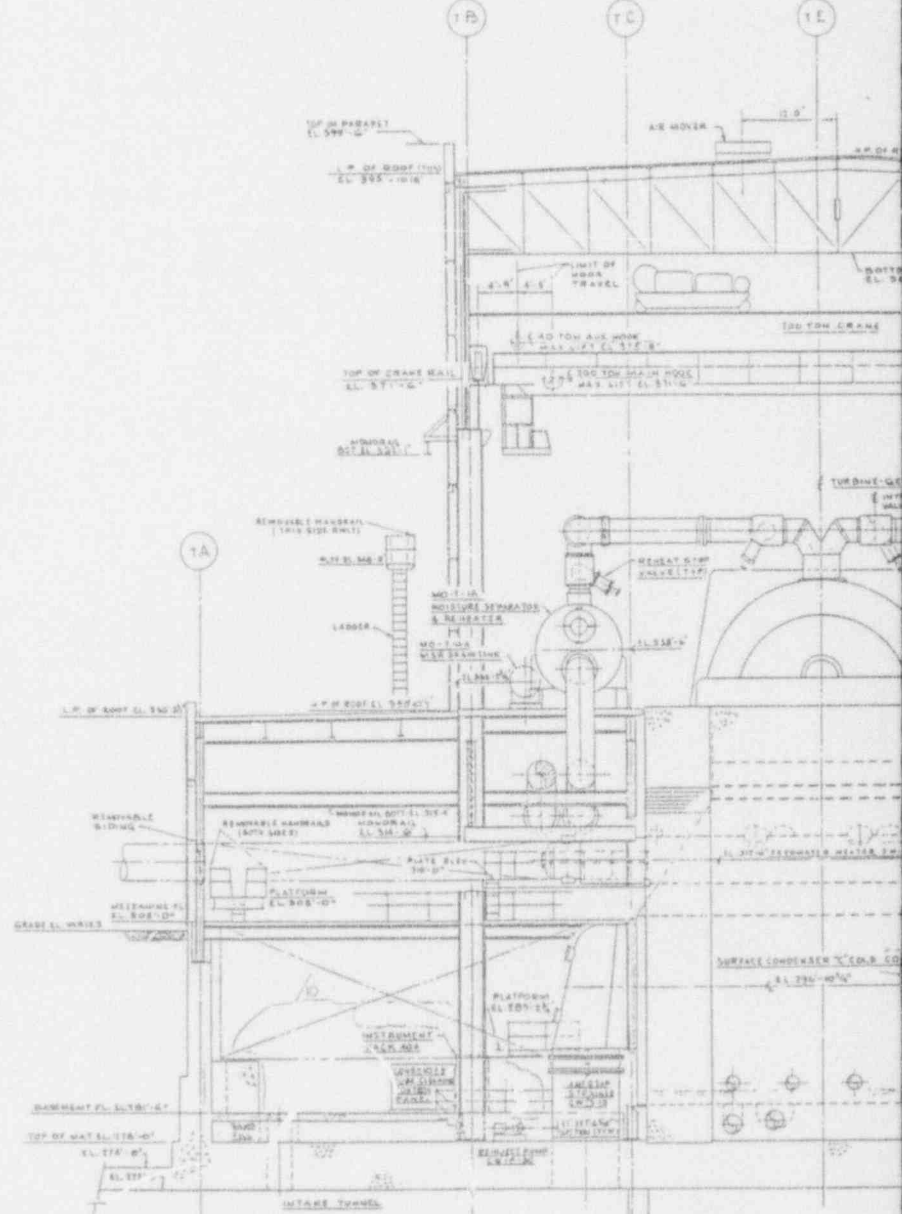
GPU Nuclear TMI-2

TURBINE BUILDING
OPERATING FLOOR
WEST SIDE

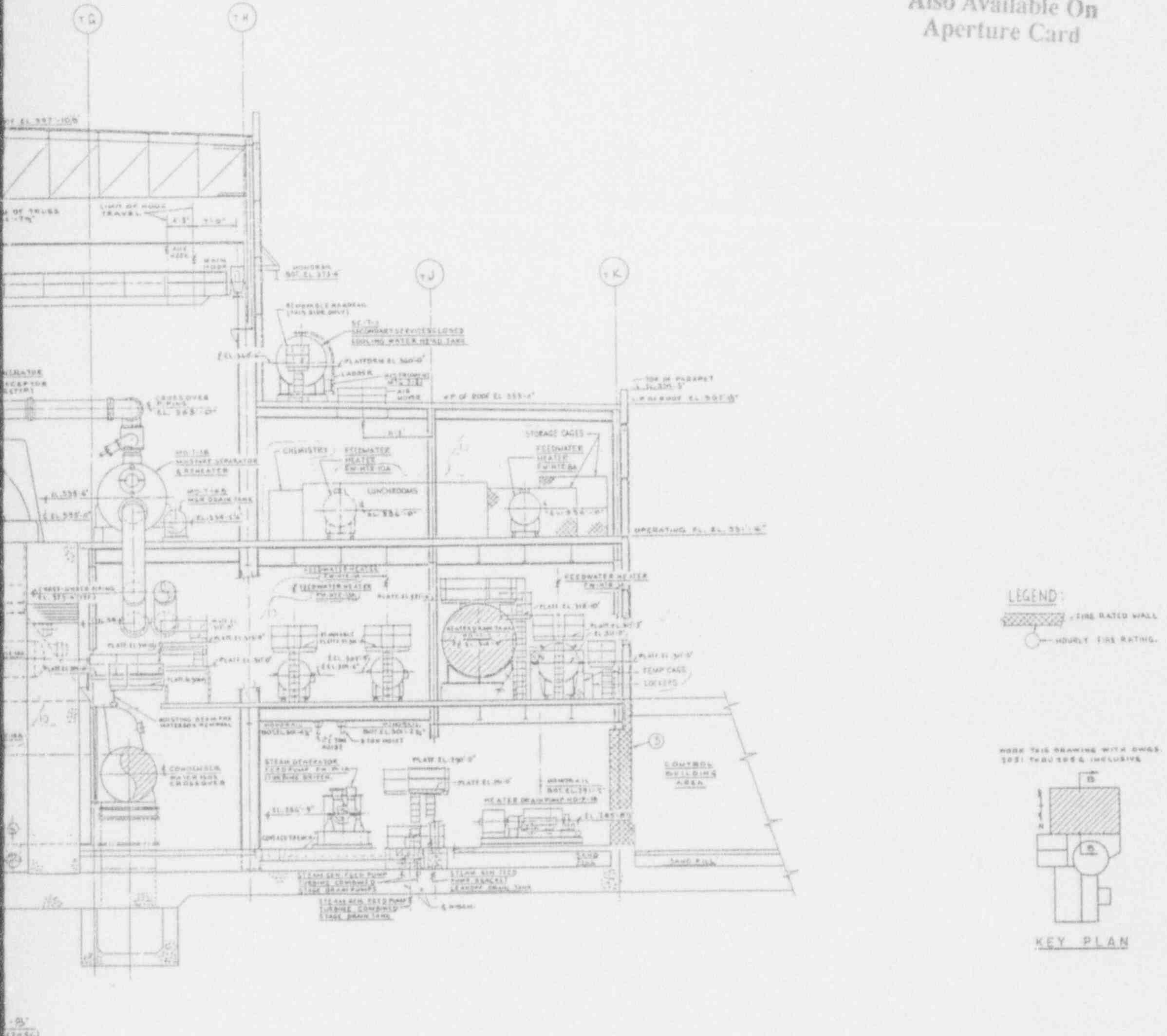
PDMS SAR B&R DWG NO: 2056

FIGURE: 1.2 - 27 PAGE: 1.2 - 31

9401070221-21



SECTION "E



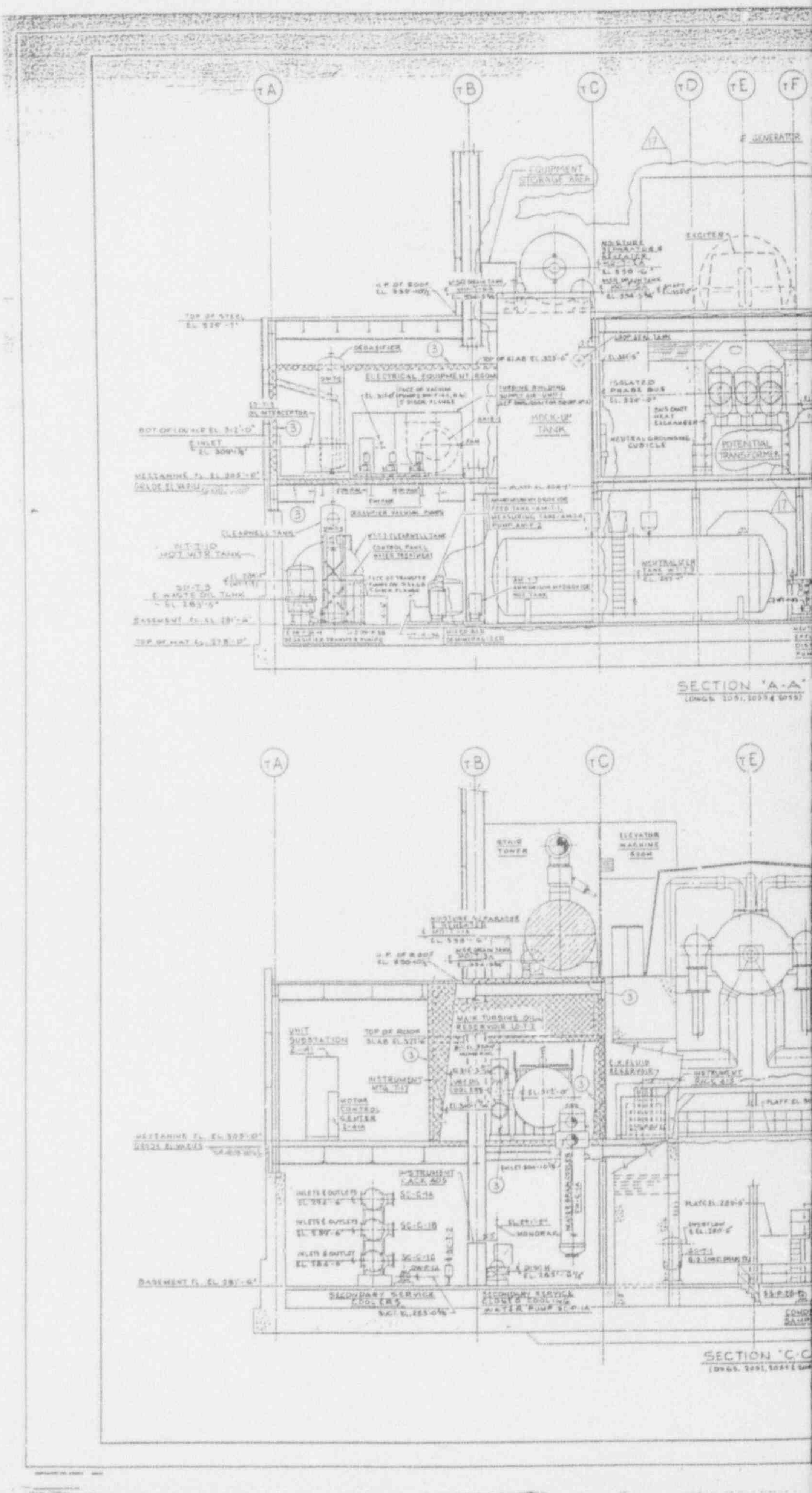
SI
APERTURE
CARD

Also Available On
Aperture Card

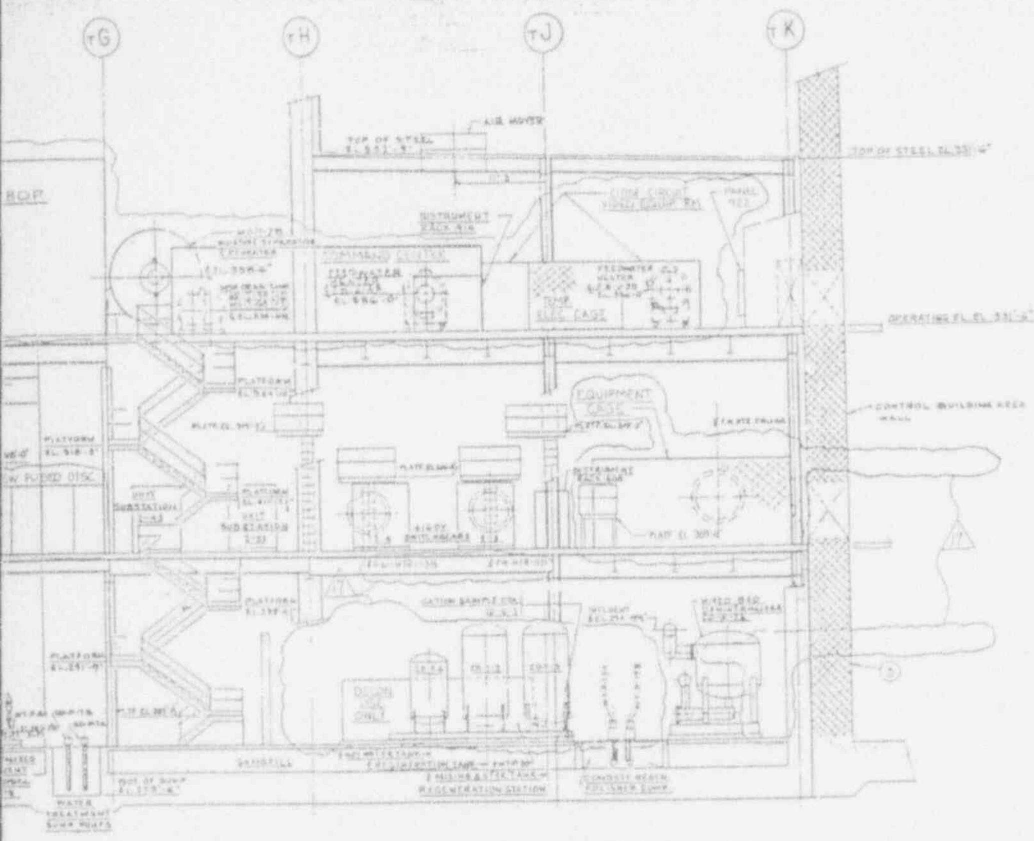
Amendment 20

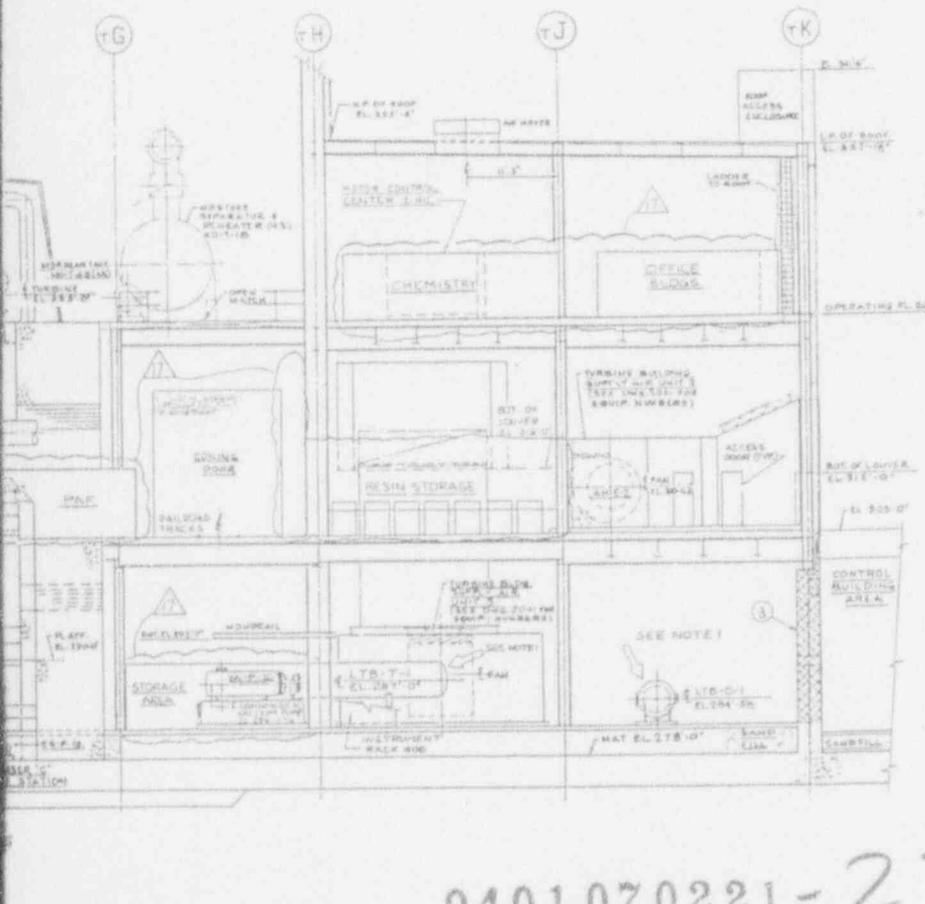
Nuclear	TMI-2
TURBINE BUILDING SECTION B-B	
PDMS SAR	B&R DWG NO: 2057
FIGURE: 1.2 - 28	PAGE: 1.2 - 32

9401070221 -22



TA
TB
TC
TD
TE
TF
GENERATOR
EQUIPMENT STORAGE AREA
EXCITER
DEGASIFIER
ELECTRICAL EQUIPMENT ROOM
ISOLATED PHASE BUS
MAKE-UP TANK
POTENTIAL TRANSFORMER
NEUTRAL GROUNDING CUBICLE
CLEARWELL TANK
HOT WTR TANK
SECTION 'A-A'
STAIR TOWER
ELEVATOR MACHINE ROOM
UNIT SUBSTATION
MOTOR CONTROL CENTER
INSTRUMENT
MAIN TURBINE OIL RESERVOIR
SECONDARY SERVICE COOLERS
SECTION 'C-C'





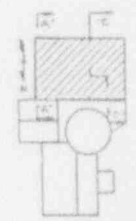
SI APERTURE CARD

Also Available On Aperture Card

NOTES

1. ⇨ INDICATES EQUIPMENT ADDED FOR TMI RECOVERY PROGRAM

LEGEND



KEY PLAN

Amendment 20

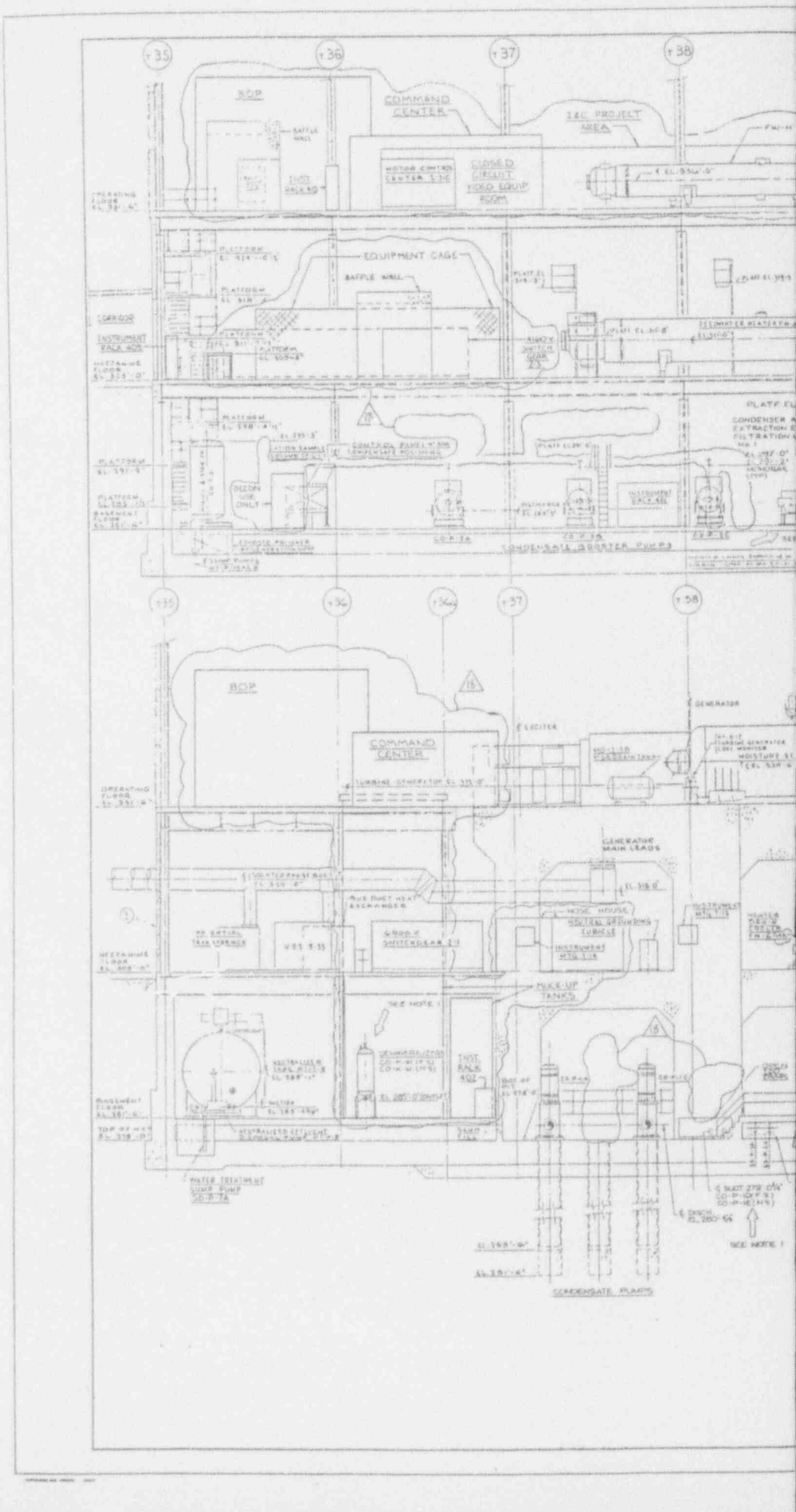
GPU Nuclear TMI-2

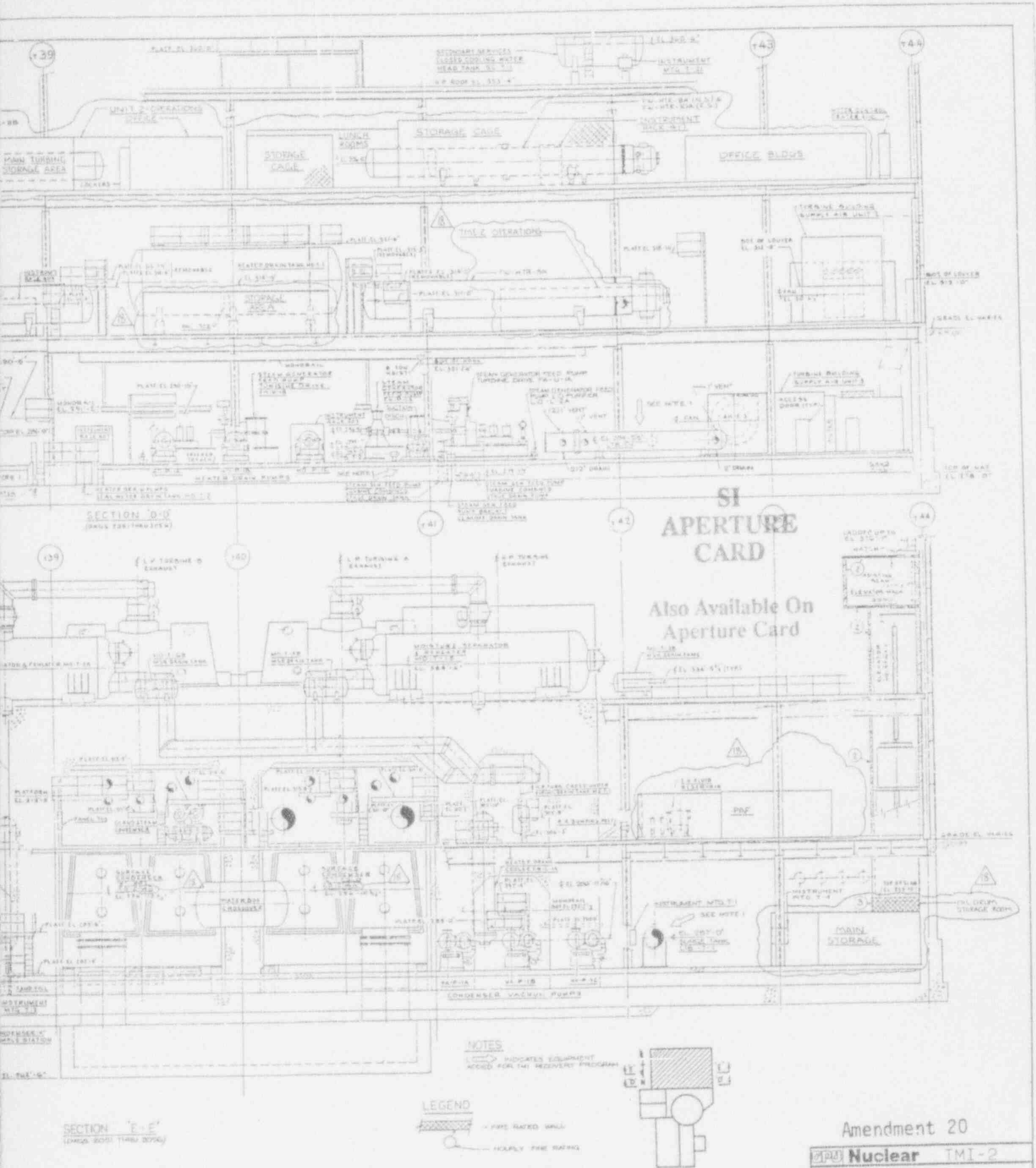
TURBINE BUILDING SECTIONS A-A & C-C

PDMS SAR B&R DWG NO. 2058

FIGURE: 1.2 - 29 PAGE: 1.2 - 33

9401070221-23


T35
T36
T37
T38
BOP
COMMAND CENTER
I&C PROJECT AREA
CLOSED CIRCUIT VIDEO EQUIP ROOM
EQUIPMENT CAGE
BAFFLE WALL
CORRIDOR
INSTRUMENT RACK 405
OPERATING FLOOR
MEZZANINE FLOOR
BASEMENT FLOOR
PLATFORM
DECON USE ONLY
CONDENSATE BOOSTER PUMPS
GENERATOR
EXCITER
GENERATOR MAIN LEADS
NEUTRAL GROUNDING CUBICLE
MAKE-UP TANKS
SEE NOTE 1
INST. RACK 402
WATER TREATMENT SUMP PUMP
CONDENSATE PUMPS



SI APERTURE CARD

Also Available On Aperture Card

Amendment 20

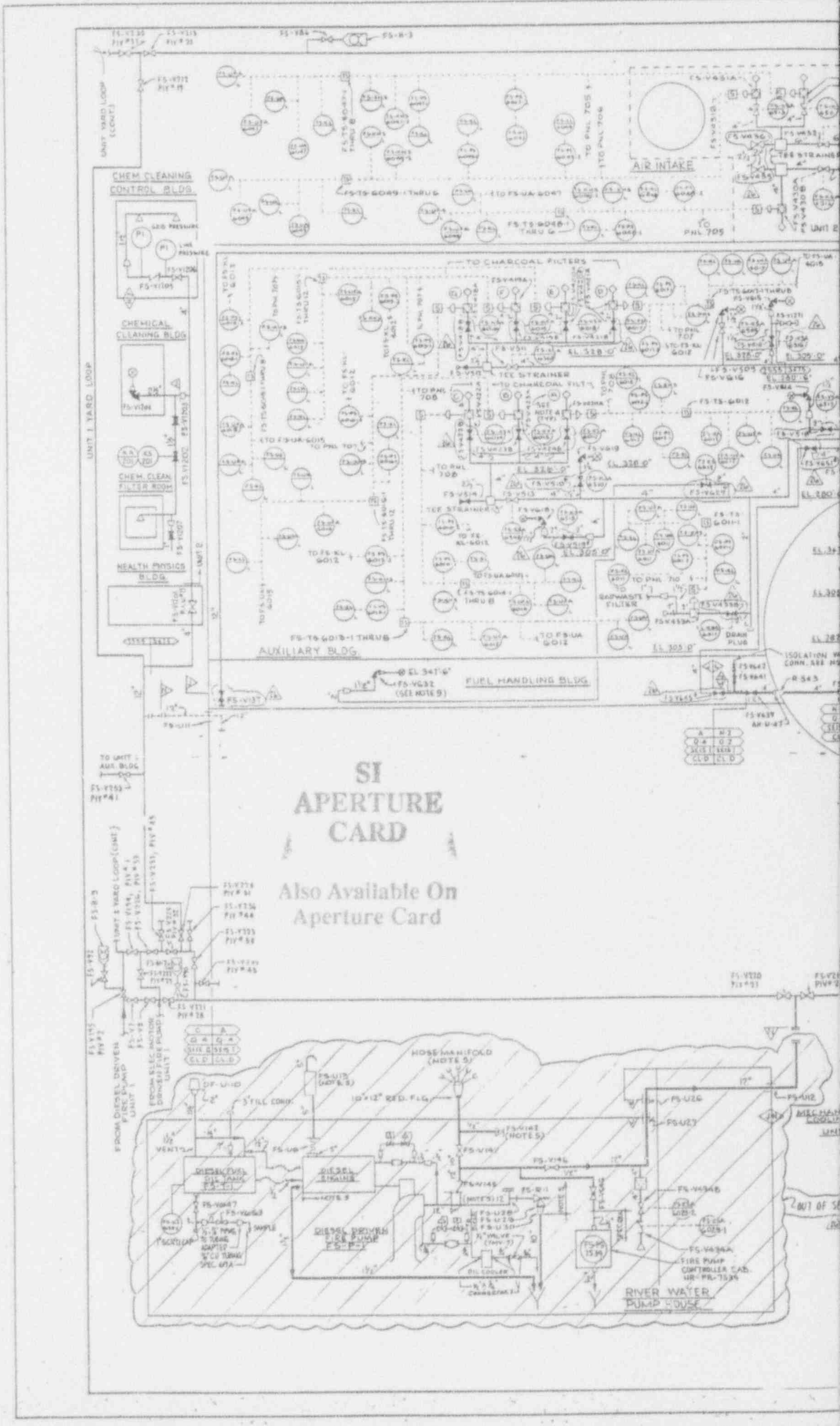
GPU Nuclear TMI-2

TURBINE BUILDING SECTIONS D-D & E-E

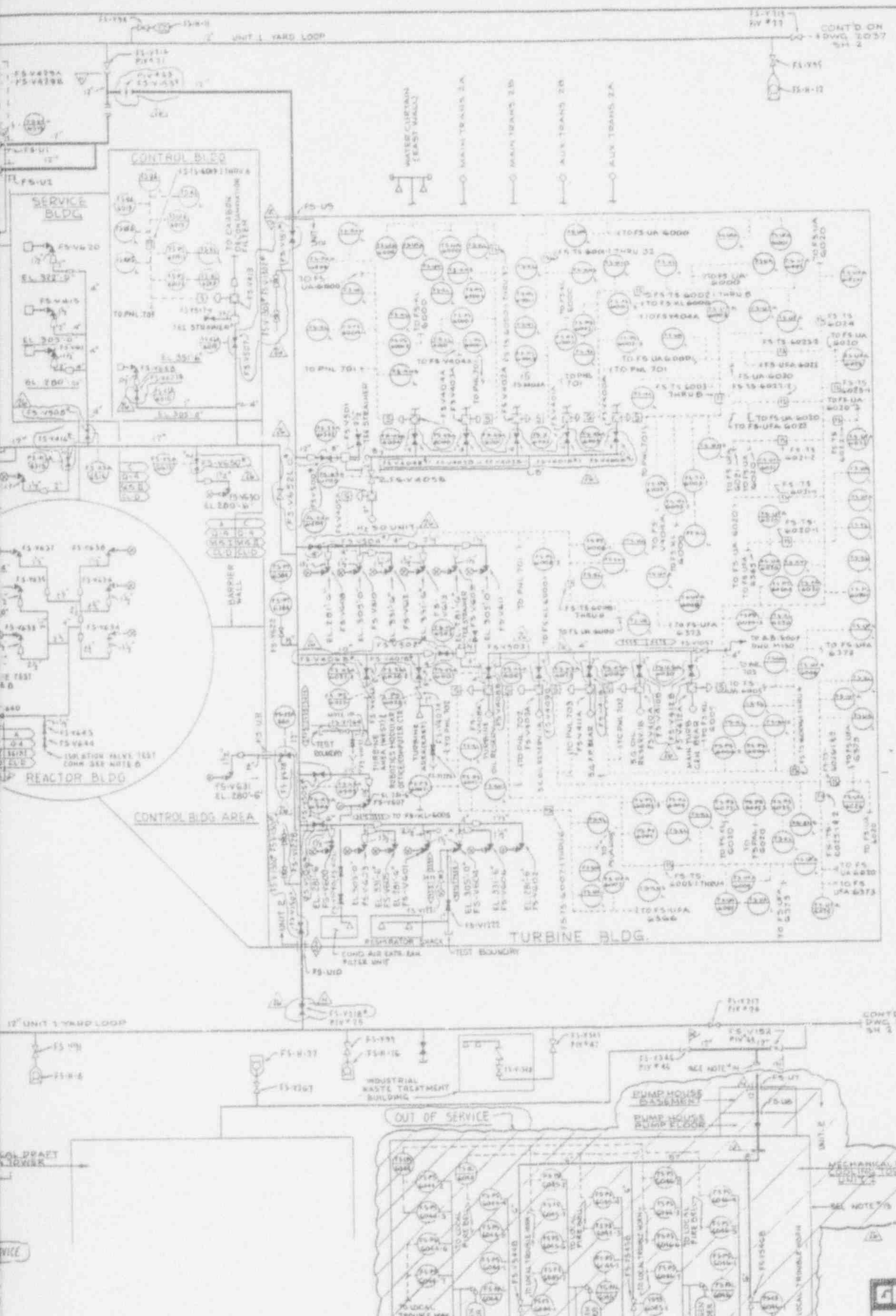
PDMS SAR — B&R DWG NO. 2059

FIGURE: 1.2 - 30 — PAGE: 1.2 - 34

9401070221-24



SI
APERTURE
CARD
Also Available On
Aperture Card
AIR INTAKE
CHEM CLEANING CONTROL BLDG
CHEMICAL CLEANING BLDG
CHEM. CLEAN FILTER ROOM
HEALTH PHYSICS BLDG
UNIT 1 YARD LOOP
TO CHARCOAL FILTERS
TEE STRAINER
AUXILIARY BLDG.
FUEL HANDLING BLDG
RIVER WATER PUMP HOUSE
DIESEL DRIVEN FIRE PUMP FS-P-1
DIESEL ENGINE
HOSE MANIFOLD (NOTE 5)
FROM DIESEL DRIVEN FIRE PUMP UNIT 1



GENERAL NOTES

1. GILBERT ASSOCIATES INC. UNDER THE UNIT 1 CONTRACT FURNISHED AND INSTALLED ALL YARD PIPING SHOWN THUS ——— INCLUDING THE RELATED VALVES HAVING NO NUMBERS ON THIS DRAWING.
2. GRINNELL FIRE PROTECTION SYSTEMS CO INC SHALL DESIGN, FURNISH AND INSTALL PIPING AND RELATED COMPONENTS UNDER B&R SPECIFICATION 2555-72 OR GILBERT ASSOCIATES INC. SP 5572.1 SP 5436 SHOWN THUS ——— INSIDE THE FOLLOWING BUILDINGS:
   a. TURBINE BUILDING
   b. CONTROL BUILDING
   c. SERVICE BUILDING
   d. AUXILIARY BUILDING
   e. DIESEL GENERATOR BUILDING
   f. FUEL HANDLING BUILDING
   g. CONTROL BUILDING AREA
   h. COOLING TOWERS
   i. RWPH EXCEPT AS INDICATED IN NOTE 5
   j. REACTOR BUILDING
3. PIPING SHOWN THUS ▬▬ TO BE FURNISHED UNDER SPEC. 2555-68 AND SPEC 2555-72
4. DELUGE STATIONS IN AUXILIARY BUILDING ARE INDICATED AS FOLLOWS:
   (A) HYDROGEN PURGE FILTER
   (B) R.B. EXH. UNIT A
   (C) R.B. EXH. UNIT B
   (D) F.H.B. EXH. UNIT A
   (E) F.H.B. EXH. UNIT B
   (F) AUX. BLDG. EXH. UNIT A
   (G) AUX. BLDG. EXH. UNIT B
5. SUPPLIED WITH DIESEL DRIVEN FIRE PUMP (FS-P-1). B&R SPECIFICATION 2555-117
6. NOTE DELETED
7. SEE FIRE SERVICE INSTRUMENT LIST FOR CONTROLS AND INSTRUMENTATION REQUIREMENTS.
8. ALL TEST NIPPLES WITH REFERENCE TO THIS NOTE TO HAVE THREADED ENDS.
9. VALVE FS-V632 SHALL BE LOCKED CLOSED WHEN FUEL IS IN THE POOL.
10. PIPING AND VALVES ADDED BY MET-ED.
11. VALVES SHOWN FILLED IN (▸◂) ARE NORMALLY CLOSED
12. NOTE DELETED
13. DELUGE VALVES, PIPING AND INSTRUMENTATION SPARED BUT LEFT INSTALLED AS PER DCN- 2037 SH 1-18-02.
14. FS-V449 REMOVED AND BLANK FLANGE INSTALLED ON UPSTREAM PIPING.

REFERENCE DWGS.

MECH. DRAWING INDEX	B&R DWG 2000
MECH. SYMBOLS & ABBREV.	B&R DWG 2001
VALVE LIST	B&R DWG 2075
PIPING SPECIALTY LIST	B&R DWG 2076
PRESS INDICATOR LIST	B&R DWG 2081
THERMOMETER LIST	B&R DWG 2082
FLOW DIAG. FILTRATION SYS. - FIRE PROTECTION & DRAINS	W.O. 5415 B&R DWG M150

ENGINEERED SAFETY FEATURES

NUCLEAR SAFETY RELATED

LEGEND

- DRY PIPE SPRINKLER SYSTEM AND VALVE
- 100 FT. REEL/75 FT. HOSE & SHUT-OFF VALVE
- STRAINER
- HOSE CABINET/75 FT. HOSE & SHUT-OFF VALVE
- OUTDOOR FIRE HYDRANT AND VALVE WITH HOSE HOUSE
- DELUGE WATER SPRAY ASSEMBLY & VALVE
- SPRINKLER SPRAY ASSEMBLY & VALVE
- PIPE WITH SPRINKLER HEAD
- * - PDMS POSITION SHOWN

Amendment 20

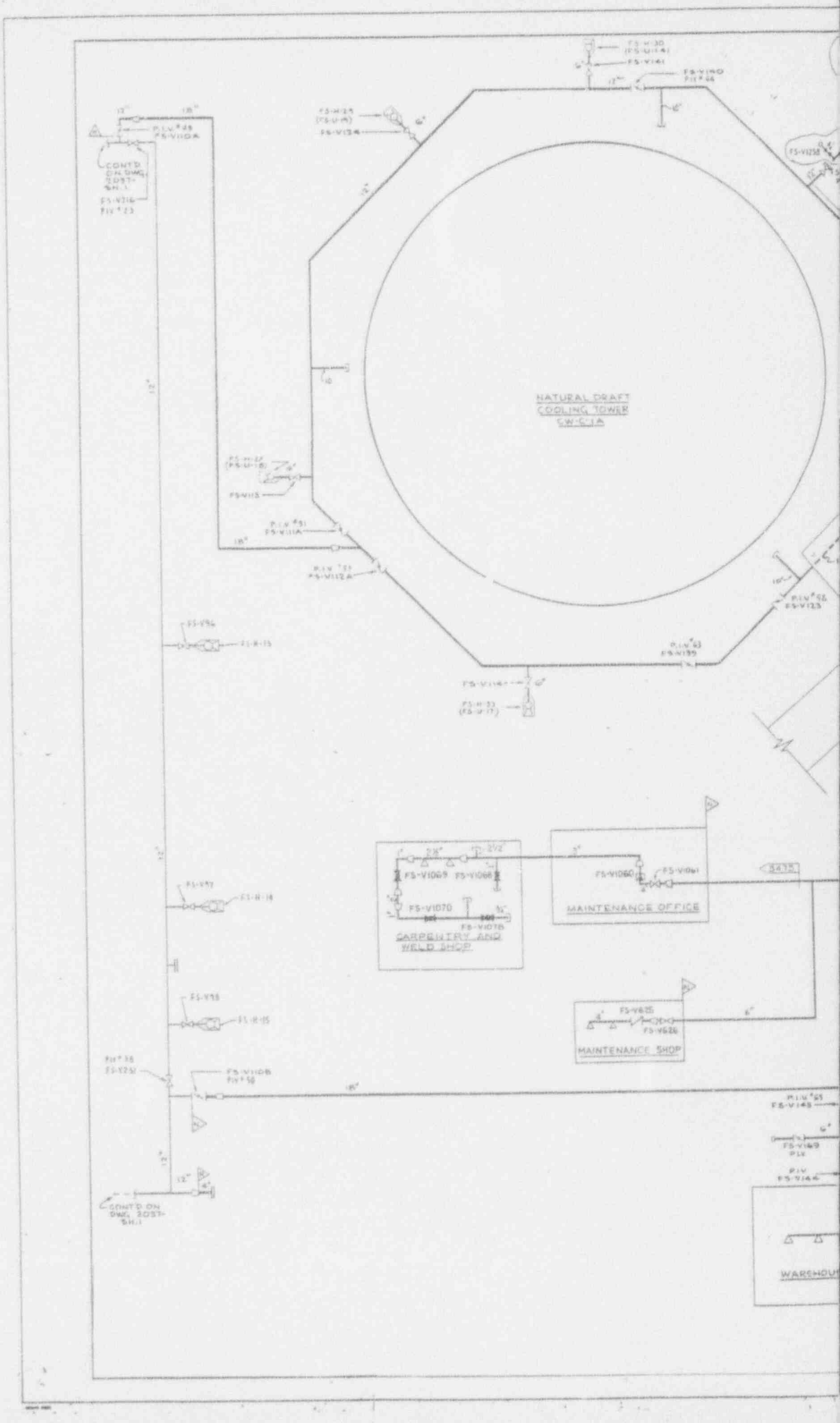
GPU Nuclear TMI-2

FIRE PROTECTION

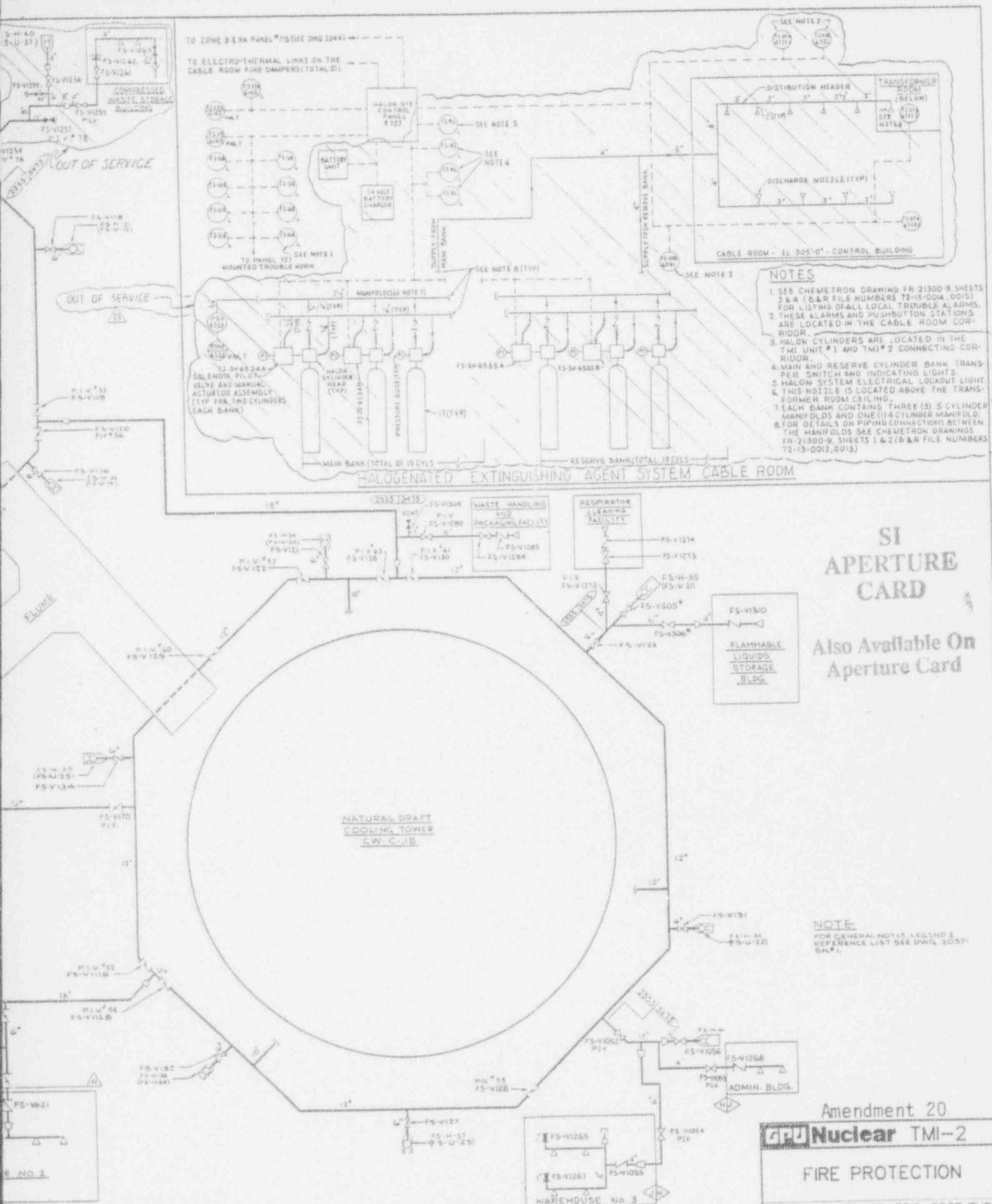
GPUN DWG. NO. 2D-3810-2037 SH 1

PDMS SAR

FIGURE: 7.2-3



NATURAL DRAFT
COOLING TOWER
CW-C-1A
CONT'D ON DWG 2037-SH.1
FS-V1069
FS-V1068
FS-V1070
FS-V1078
CARPENTRY AND
WELD SHOP
FS-V1060
FS-V1061
MAINTENANCE OFFICE
FS-V625
FS-V626
MAINTENANCE SHOP
CONT'D ON DWG 2037-SH.1



SI APERTURE CARD

Also Available On Aperture Card

Amendment 20

GPU Nuclear TMI-2

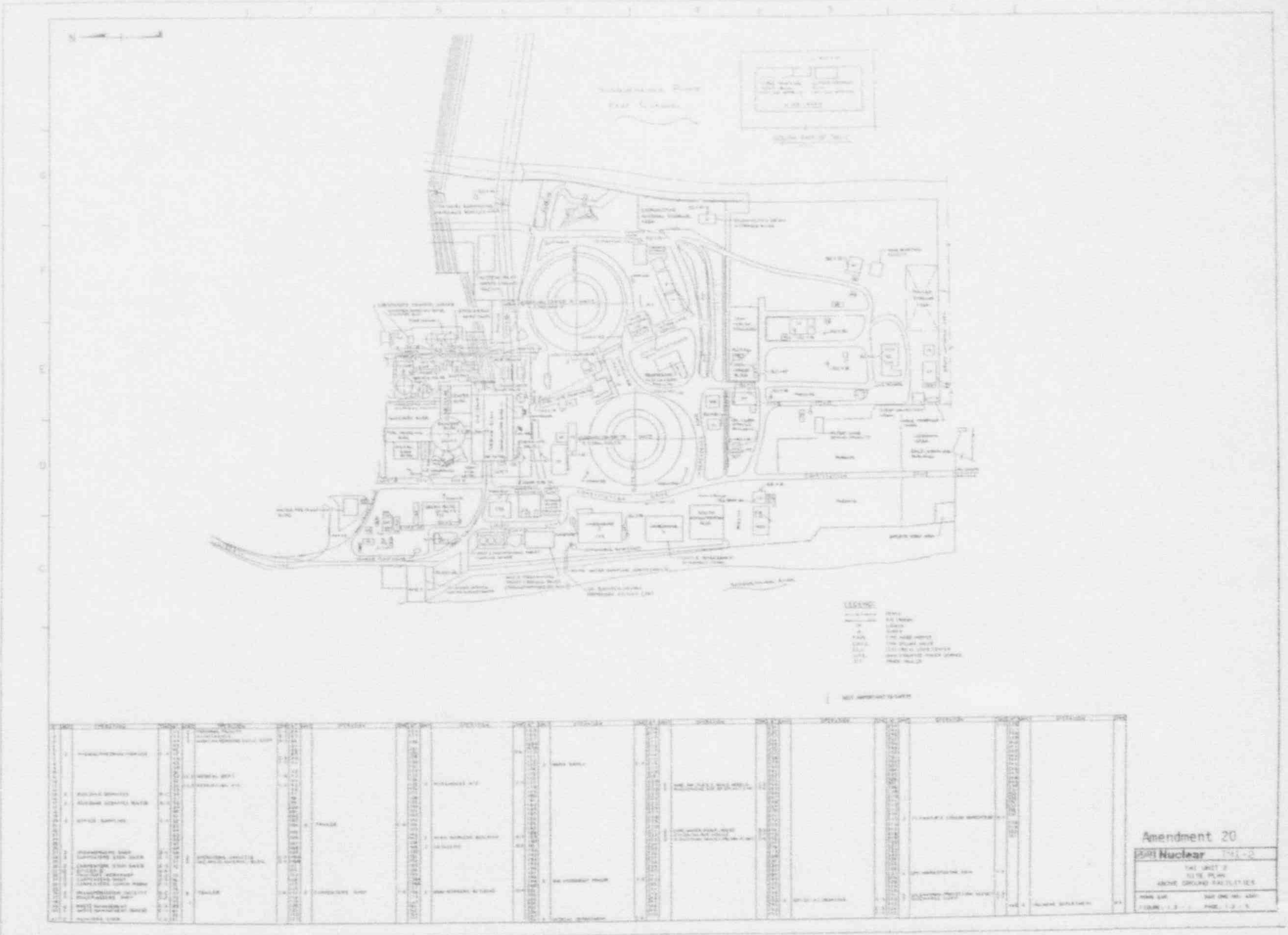
FIRE PROTECTION

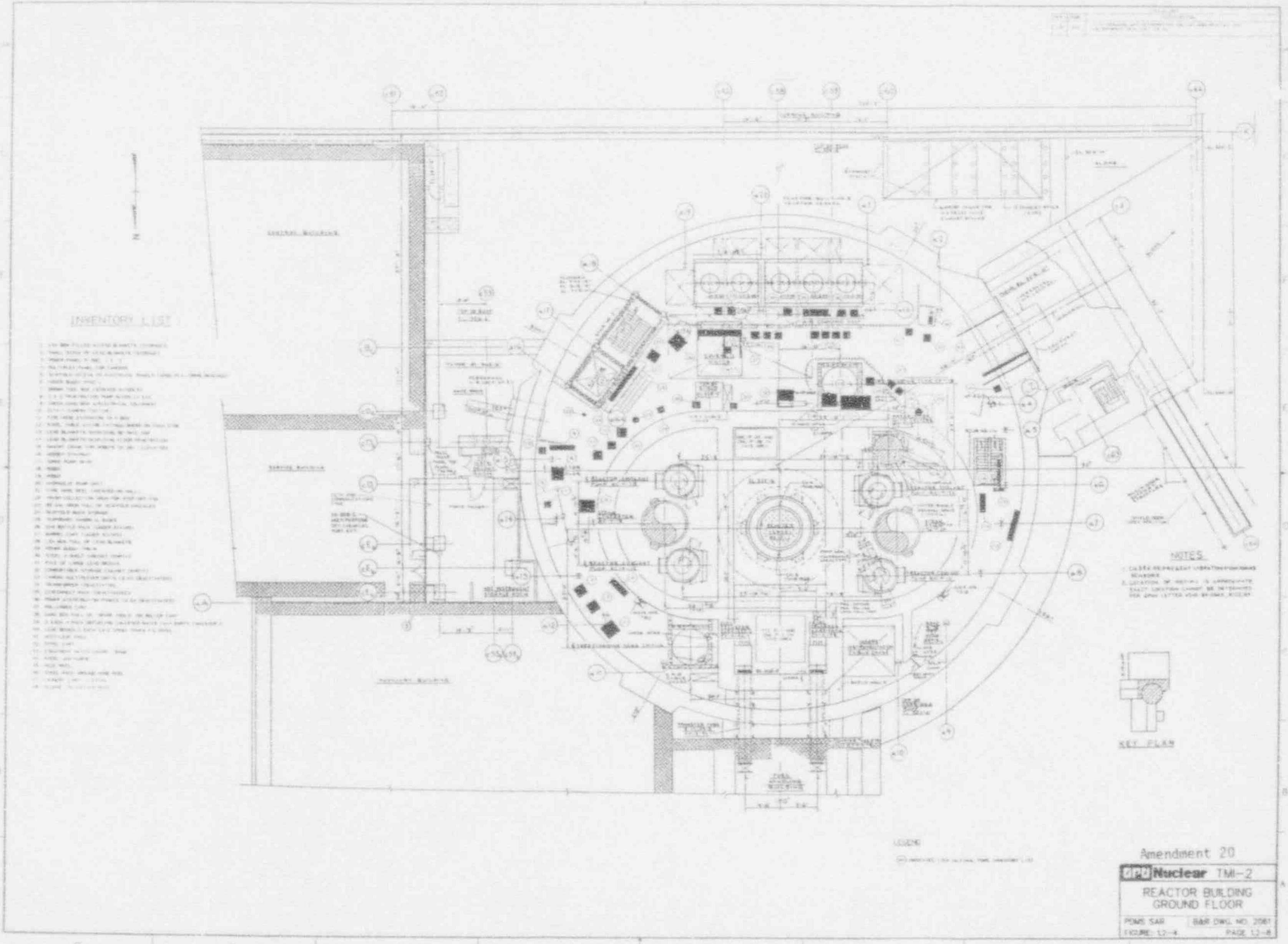
GPUN DWG. NO. 2D-3810-2037 SH2

PDMS SAR

FIGURE: 7.2-4 PAGE 7.2-43

9401070221-26


Amendment 20
Nuclear
TMI UNIT 2
SITE PLAN
ABOVE GROUND FACILITIES

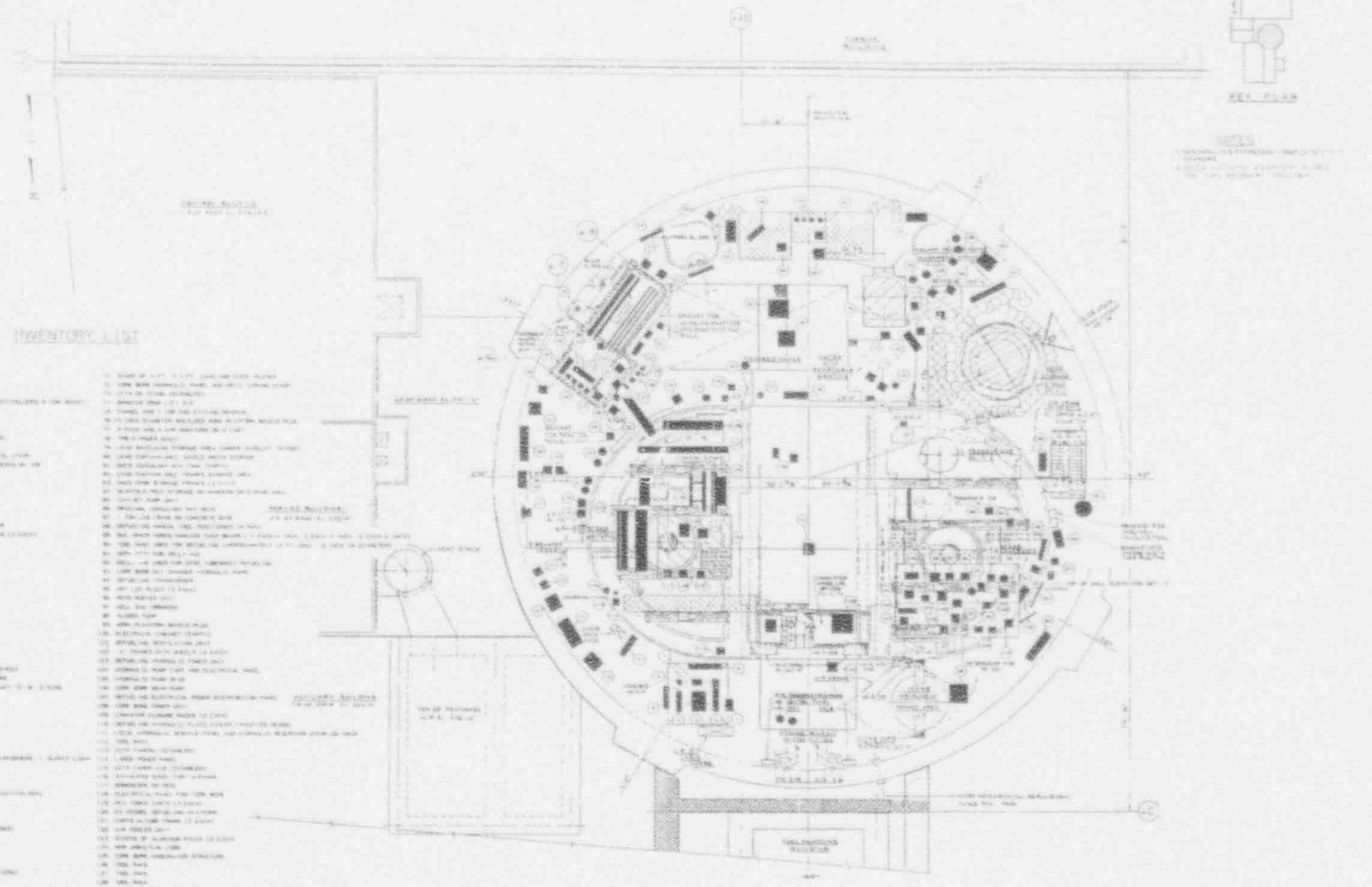


Amendment 20

GPU Nuclear TMI-2

REACTOR BUILDING
GROUND FLOOR

PDMS SAR | B&R DWG. NO. 2081
FIGURE: 12-4 | PAGE 12-8



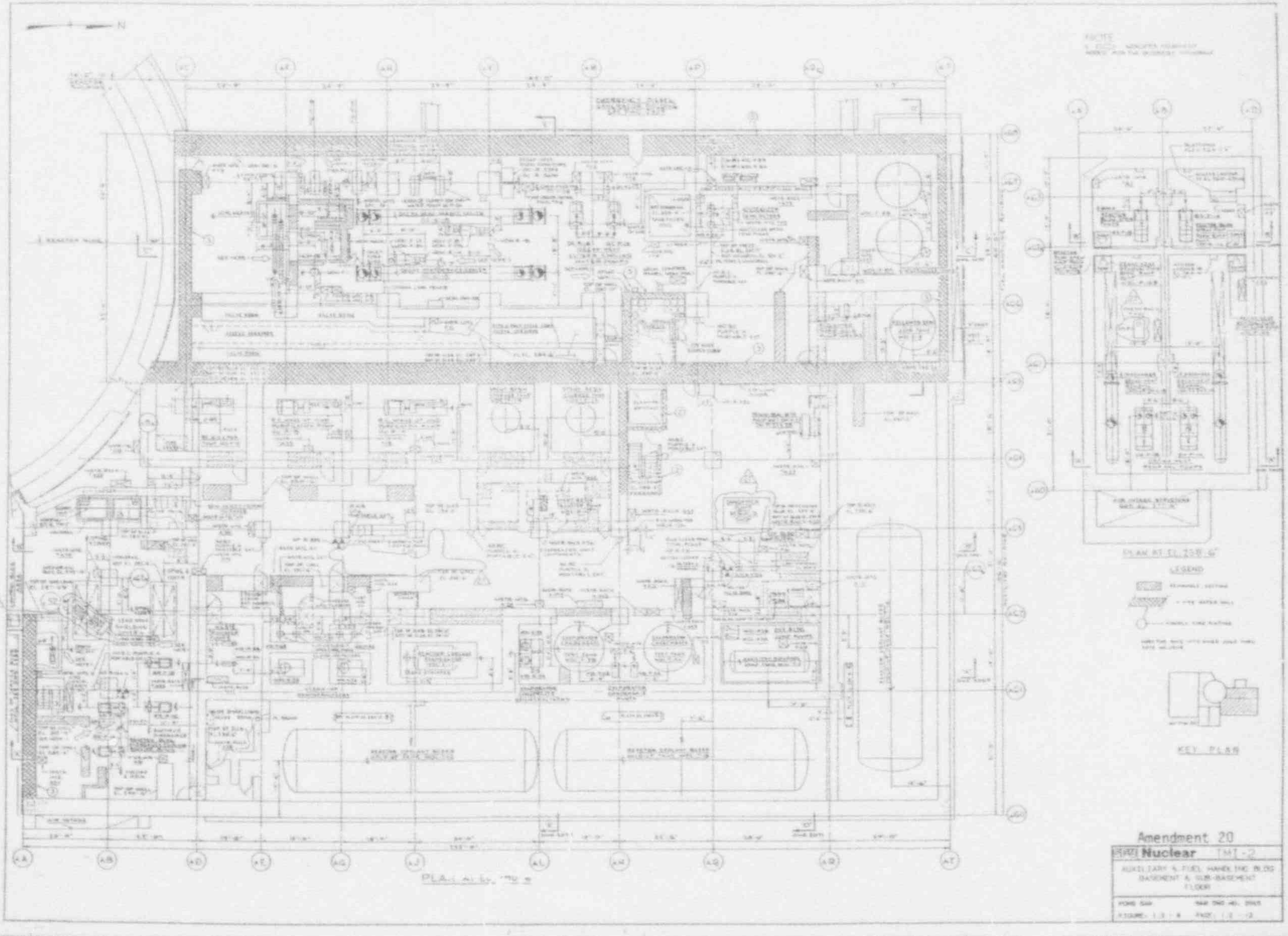
INVENTORY LIST

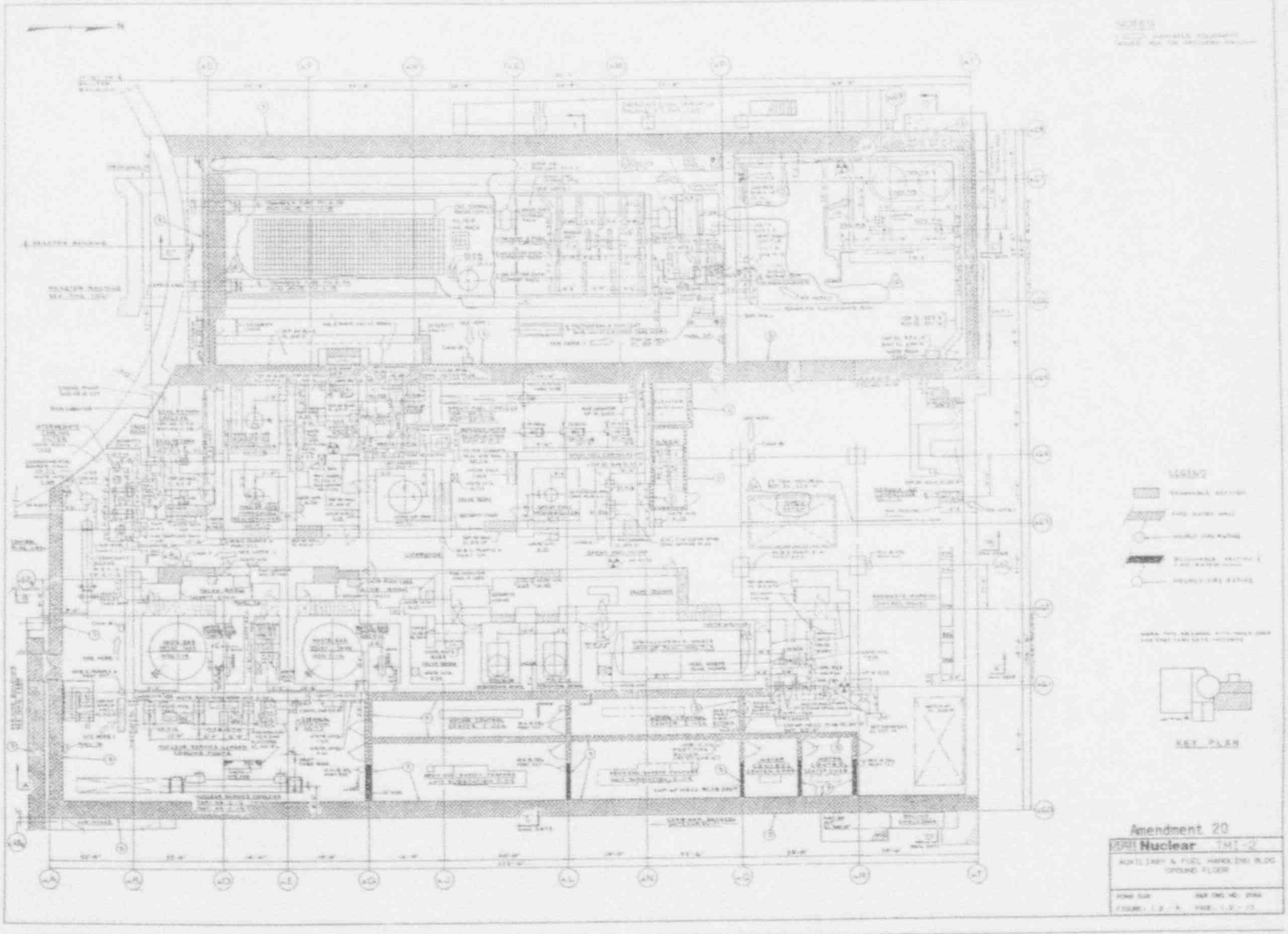
Amendment 20

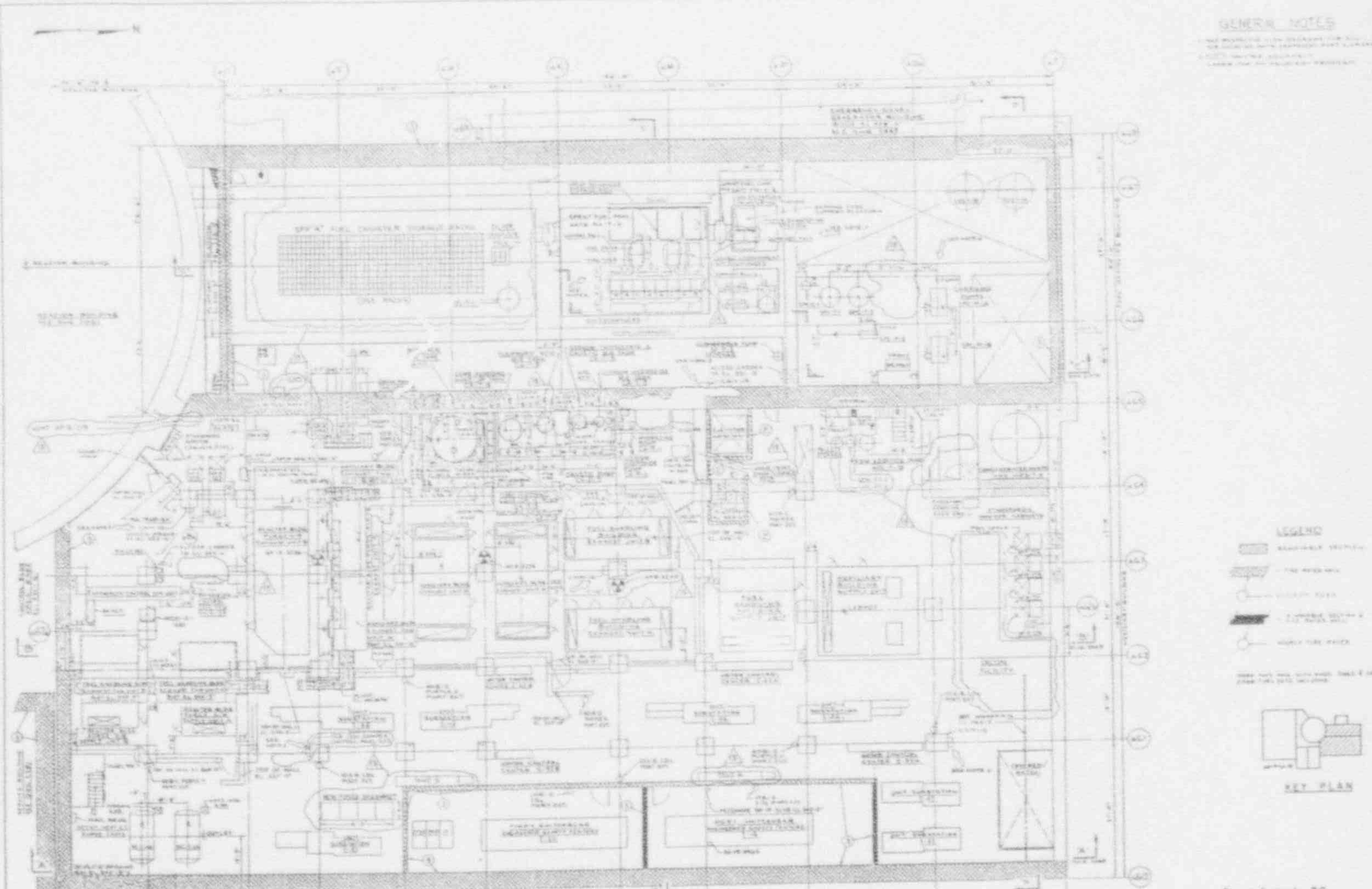
GPU Nuclear TMI-2

REACTOR BUILDING
OPERATING FLOOR

PDMS SAR | B&R DWG. NO. 2062
FIGURE 12-5 | PAGE 12-9


PLAN AT EL. 258'-6"
LEGEND
KEY PLAN
Amendment 20
Nuclear TMI-2
AUXILIARY & FUEL HANDLING BLDG
BASEMENT & SUB-BASEMENT
FLOOR
FIGURE 1.3-4

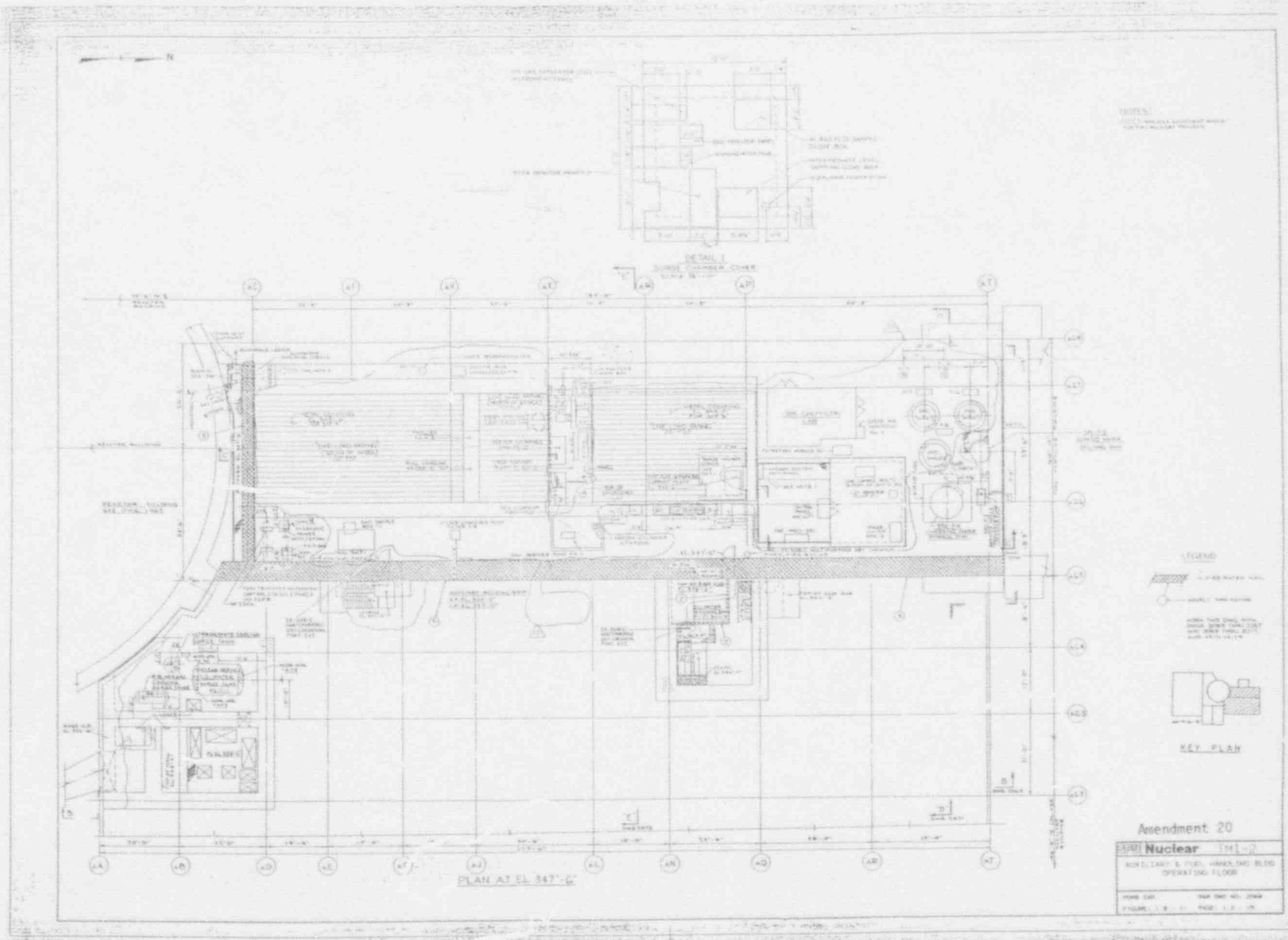

NOTES
LEGEND
KEY PLAN
Amendment 20
Nuclear TMI-2
AUXILIARY & FUEL HANDLING BLDG
GROUND FLOOR



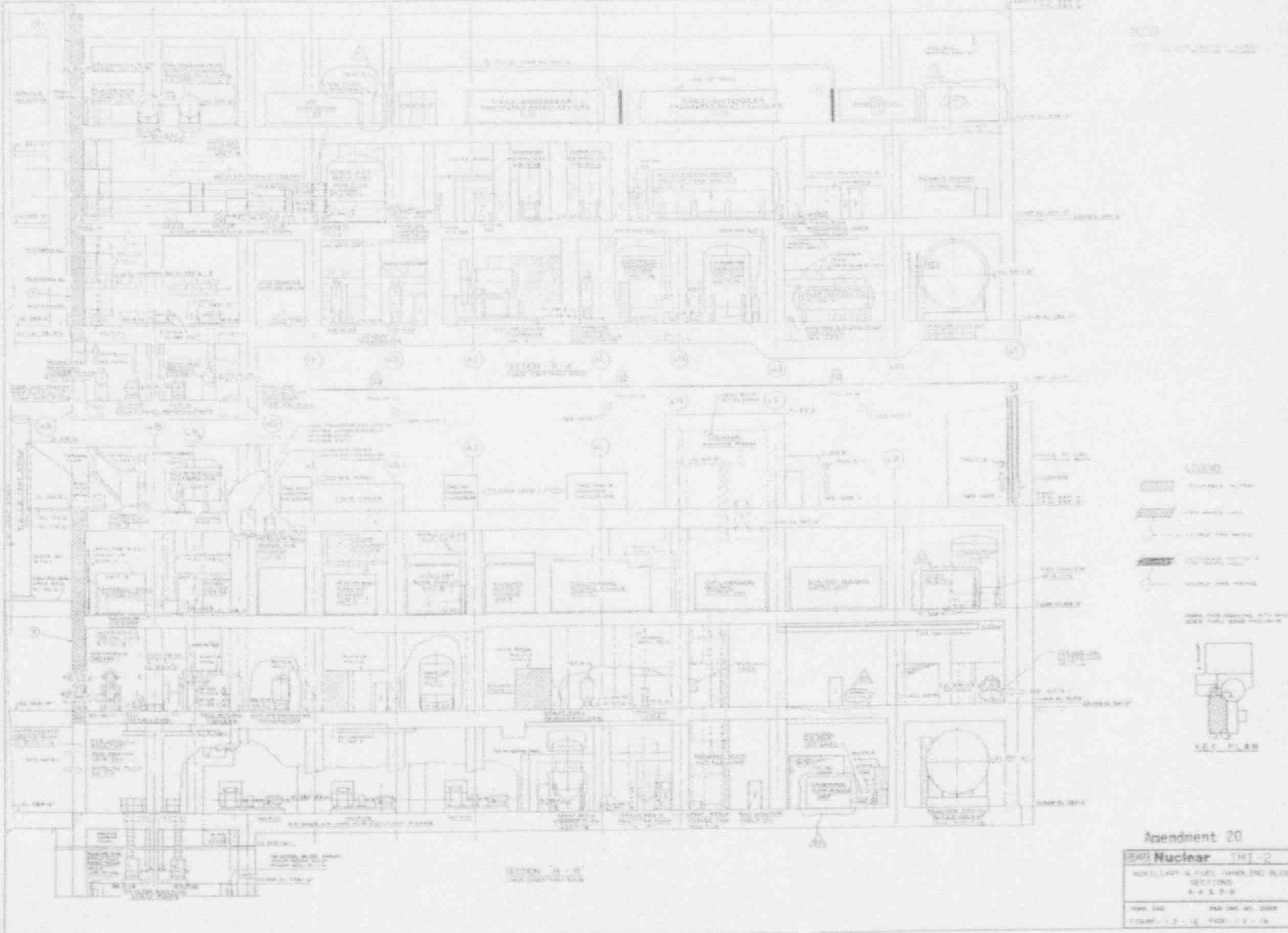
Amendment 20

Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG.
FIRST FLOOR



N
DETAIL 1
SURGE CHAMBER COVER
NOTES:
LEGEND
KEY PLAN
PLAN AT EL 347'-6"
Amendment 20
Nuclear
TMI-2
AUXILIARY & FUEL HANDLING BLDG
OPERATING FLOOR

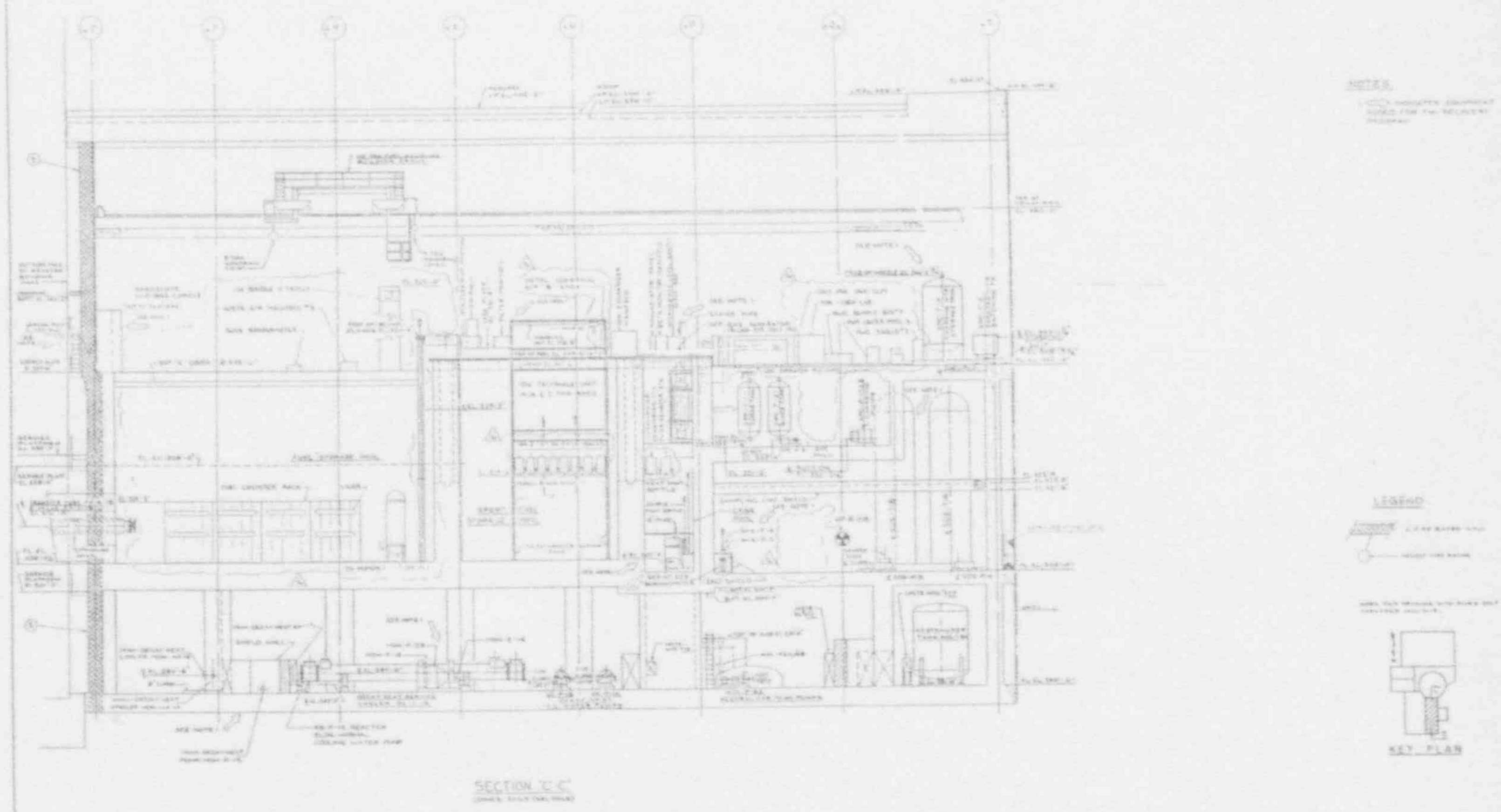


Amendment 20

GPU Nuclear — TMI-2

AUXILIARY & FUEL HANDLING BLDG
SECTIONS
A-A & B-B

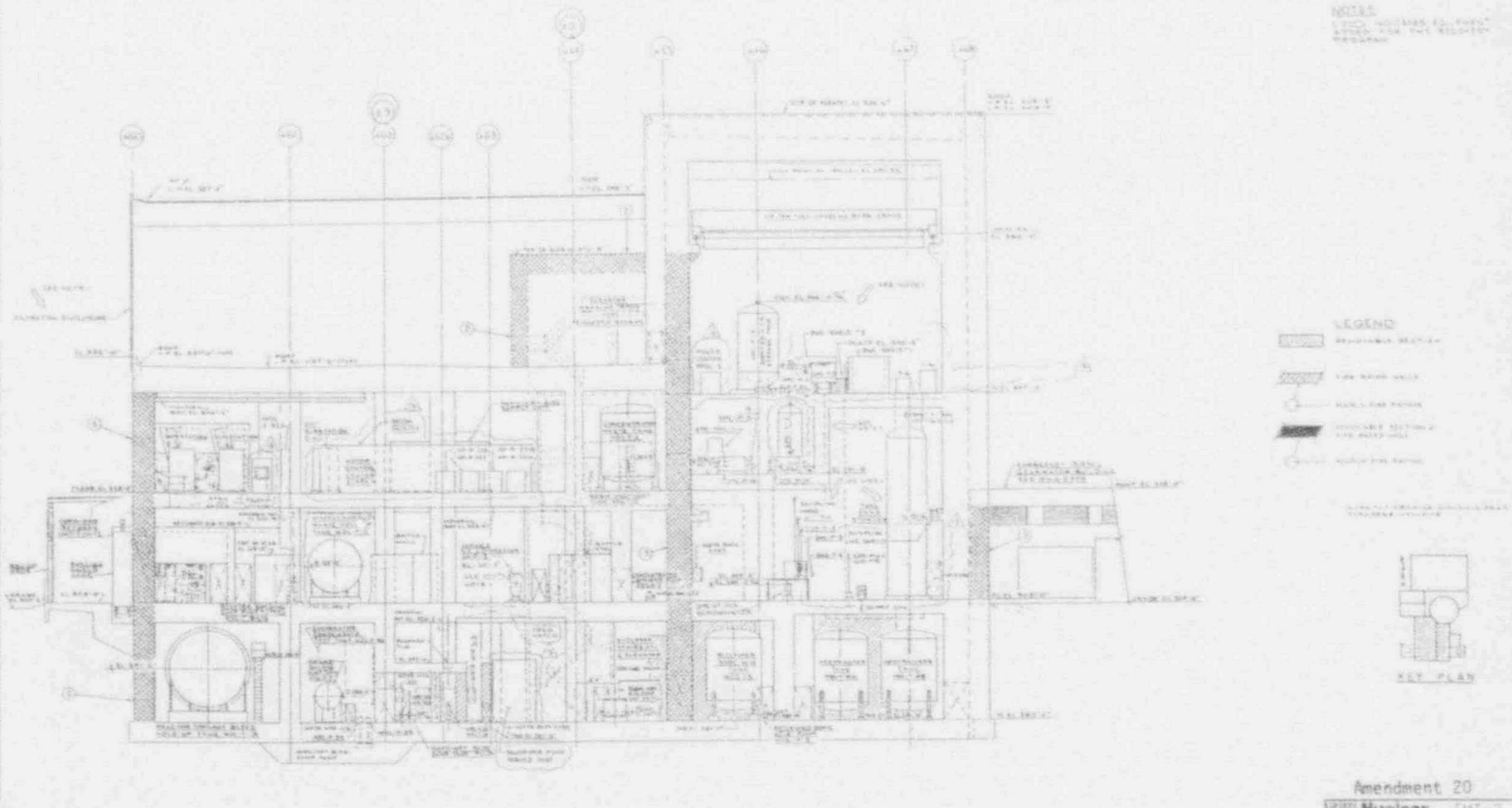
FIGURE 1.2-12 — PAGE 1.2-14



Amendment 20

Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG
SECTION C-C



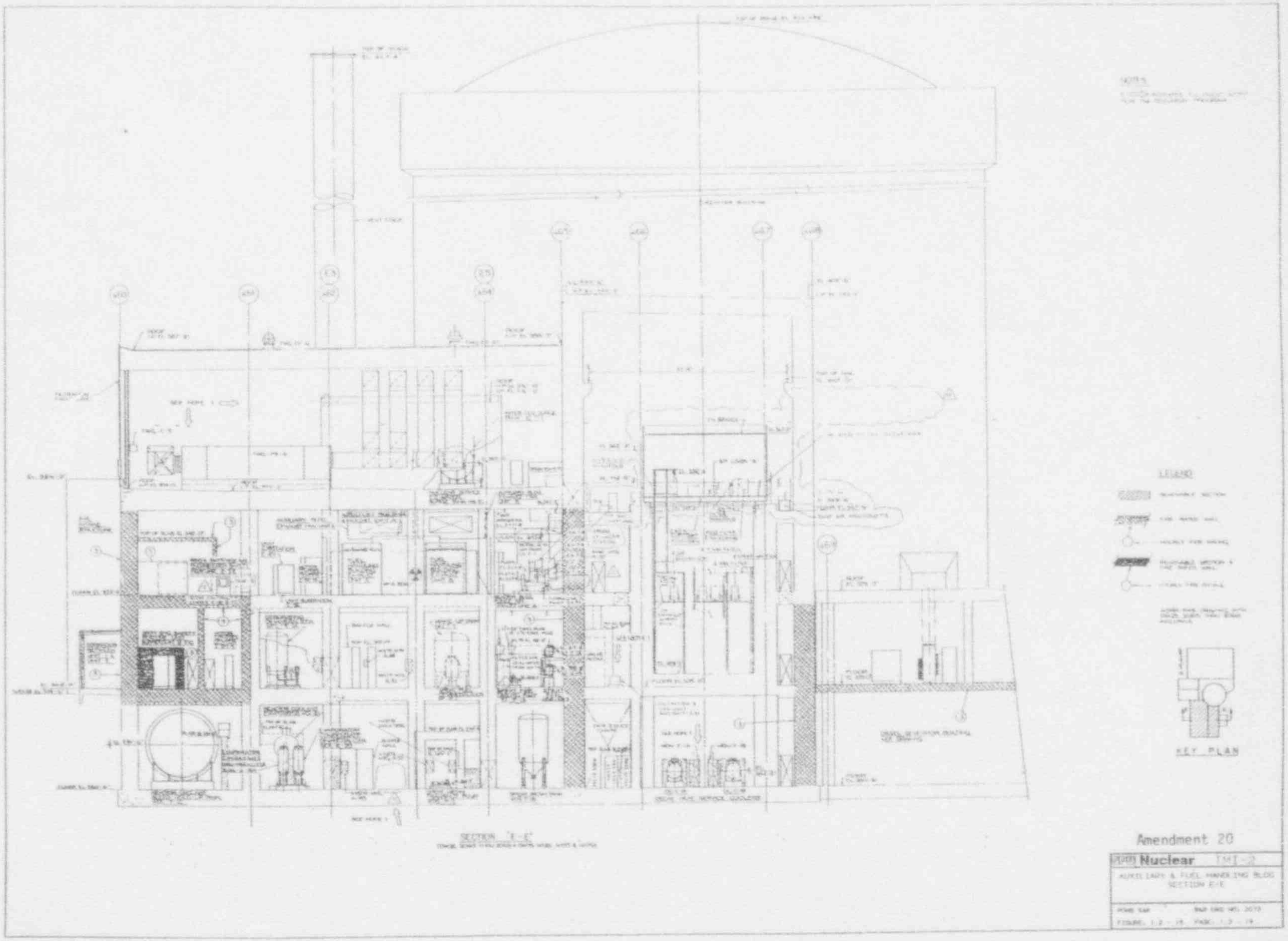
SECTION 'D-D'

Amendment 20

Nuclear TMI-2

AUXILIARY & FUEL HANDLING BLDG
SECTION D-D

FIGURE 1.2-19 PAGE 1.2-19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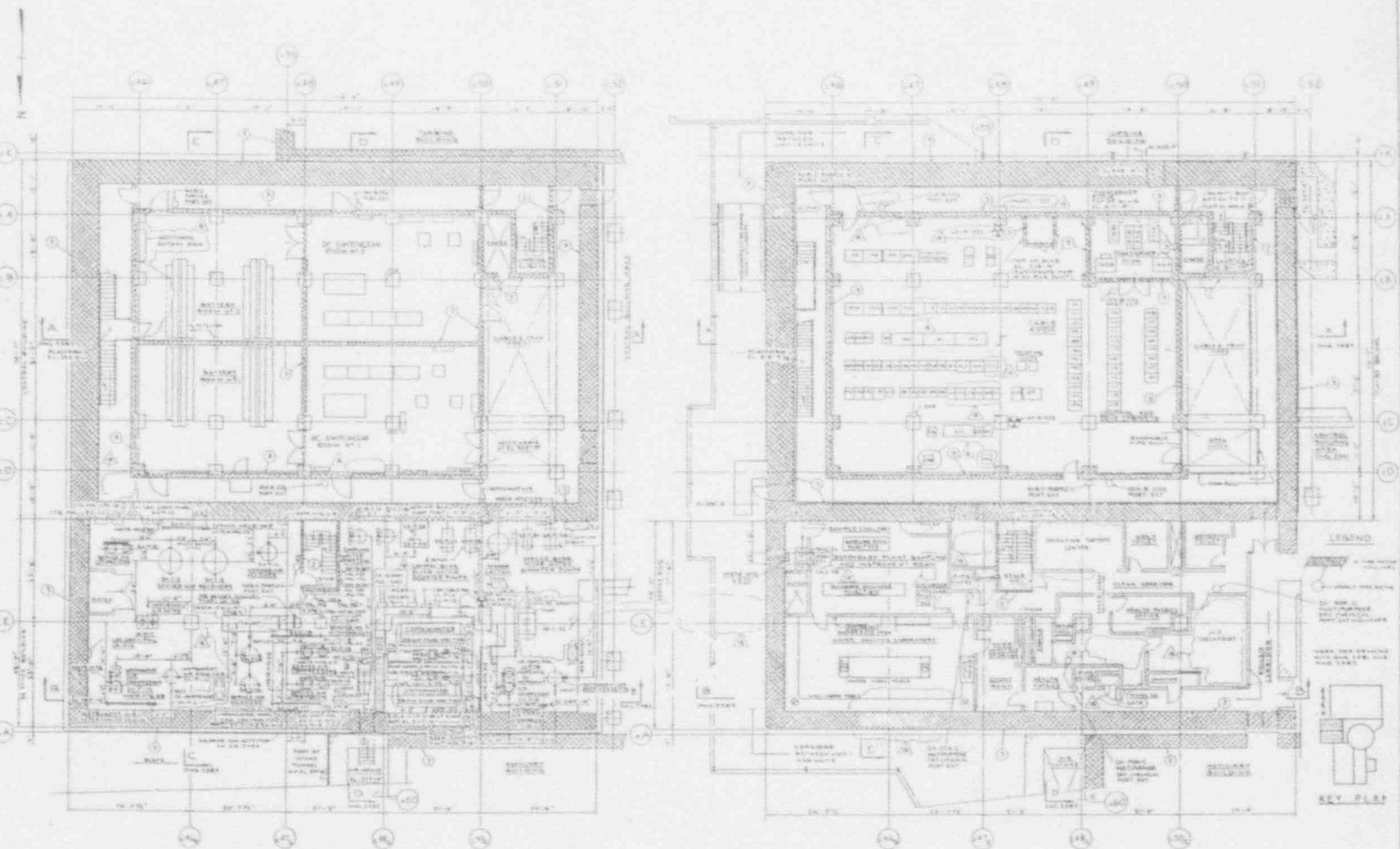
LEGEND
KEY PLAN
SECTION "E-E"
Amendment 20
Nuclear
TMI-2
AUXILIARY & FUEL HANDLING BLDG
SECTION E/E



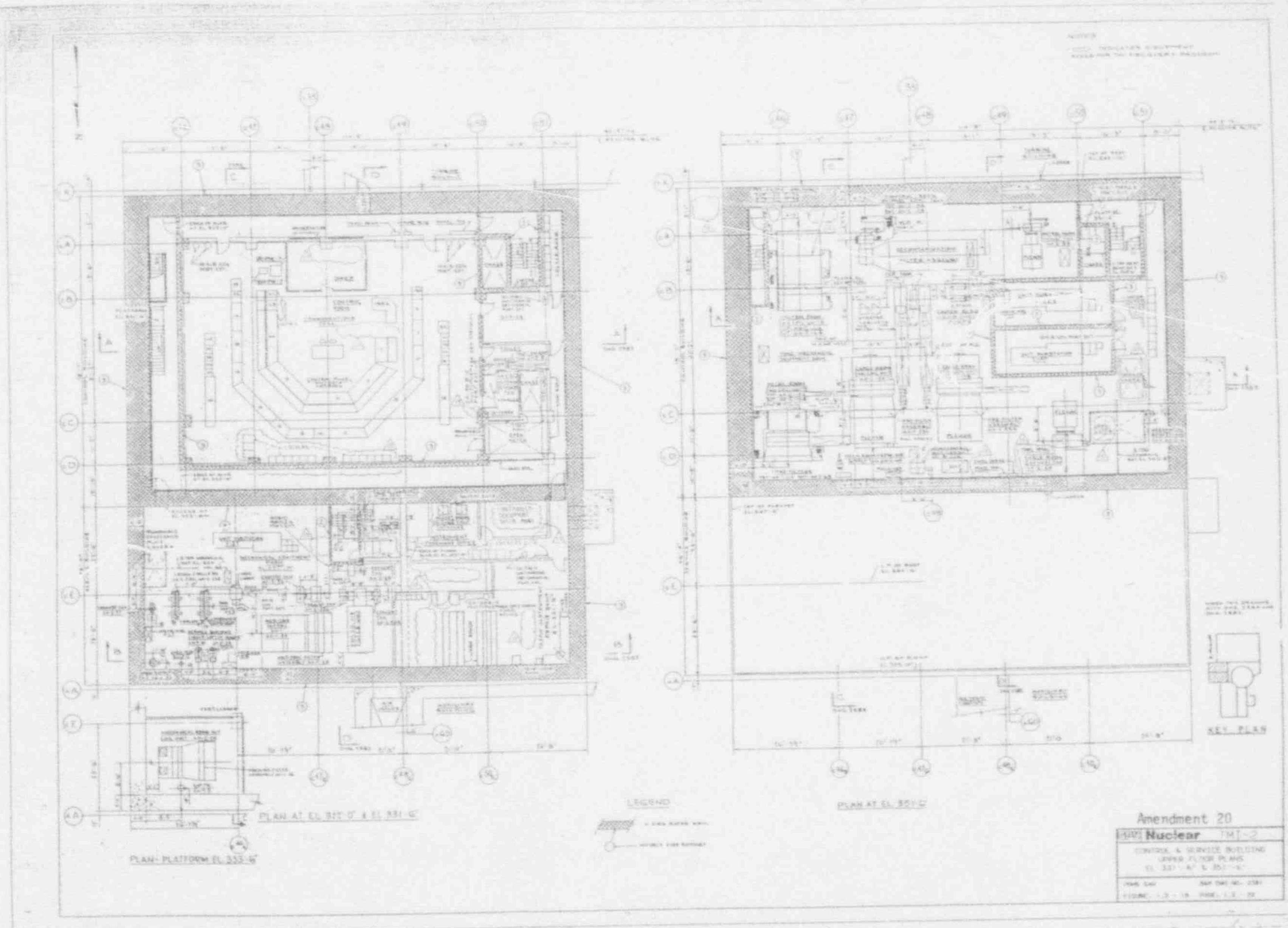
PLAN AT EL 280'-6"

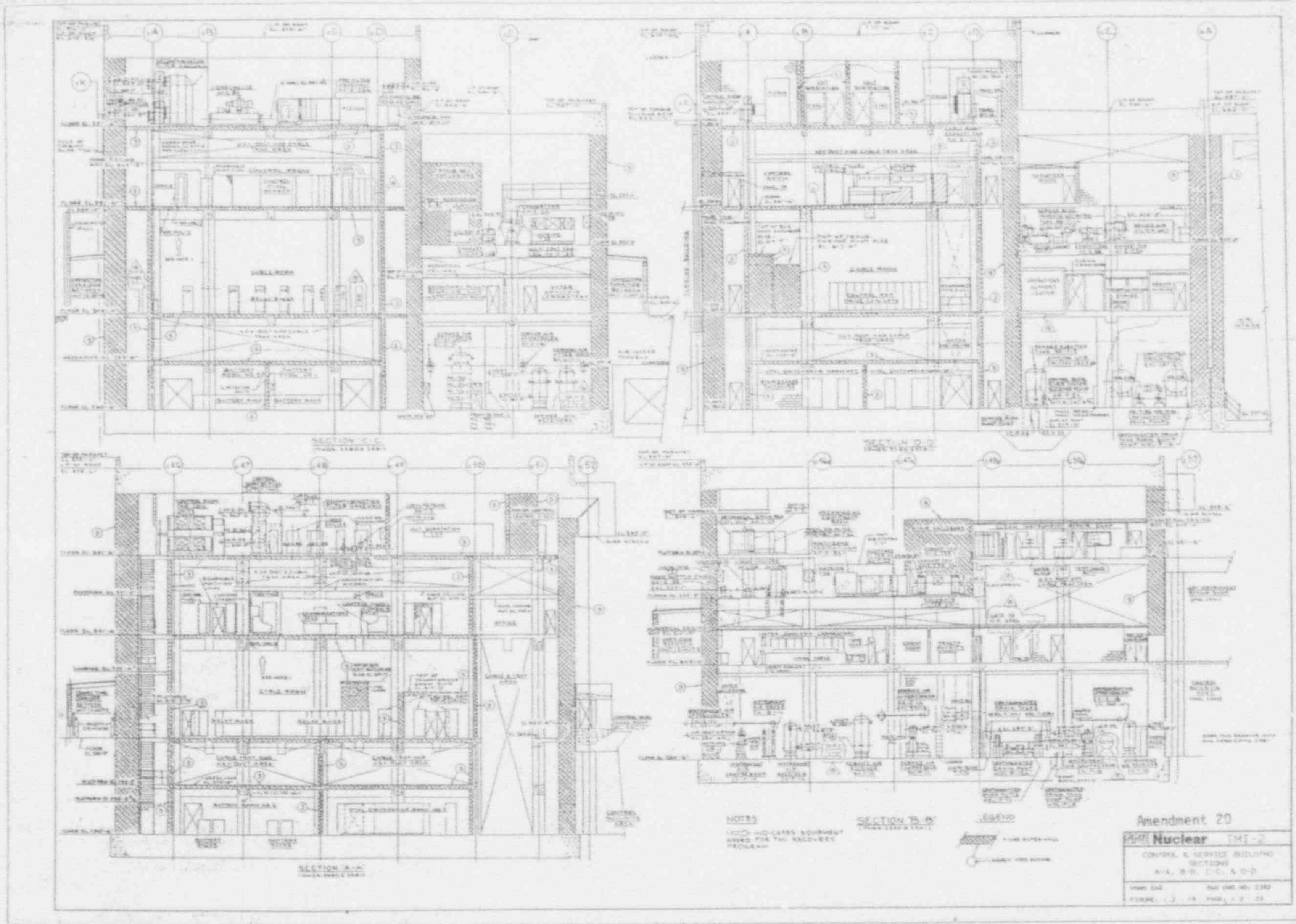
PLAN AT EL 305'-0"

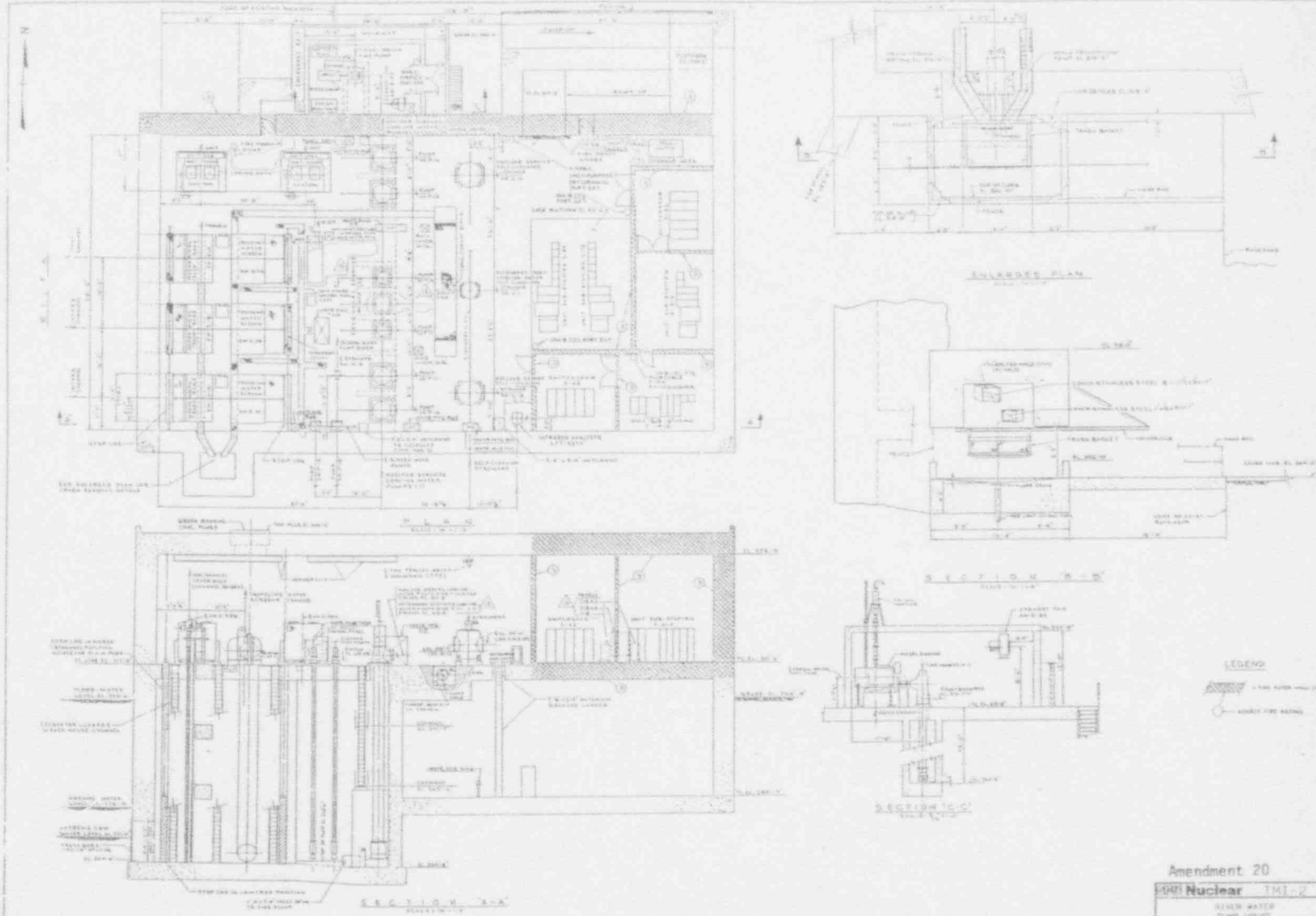
Amendment 20

GPU Nuclear TMI-2

CONTROL & SERVICE BUILDING
LOWER FLOOR PLANS
EL 280'-6" & 305'-0"


PLAN AT EL. 351'-0" & EL. 331'-6"
PLAN- PLATFORM EL. 333'-6"
PLAN AT EL. 351'-0"
LEGEND
KEY PLAN
Amendment 20
Nuclear TMI-2
CONTROL & SERVICE BUILDING
UPPER FLOOR PLANS
EL. 331'-6" & 351'-6"


SECTION 'C-C'
SECTION 'D-D'
SECTION 'A-A'
SECTION 'B-B'
NOTES
LEGEND
Amendment 20
Nuclear
TMI-2
CONTROL & SERVICE BUILDING
SECTIONS
A-A, B-B, C-C, & D-D



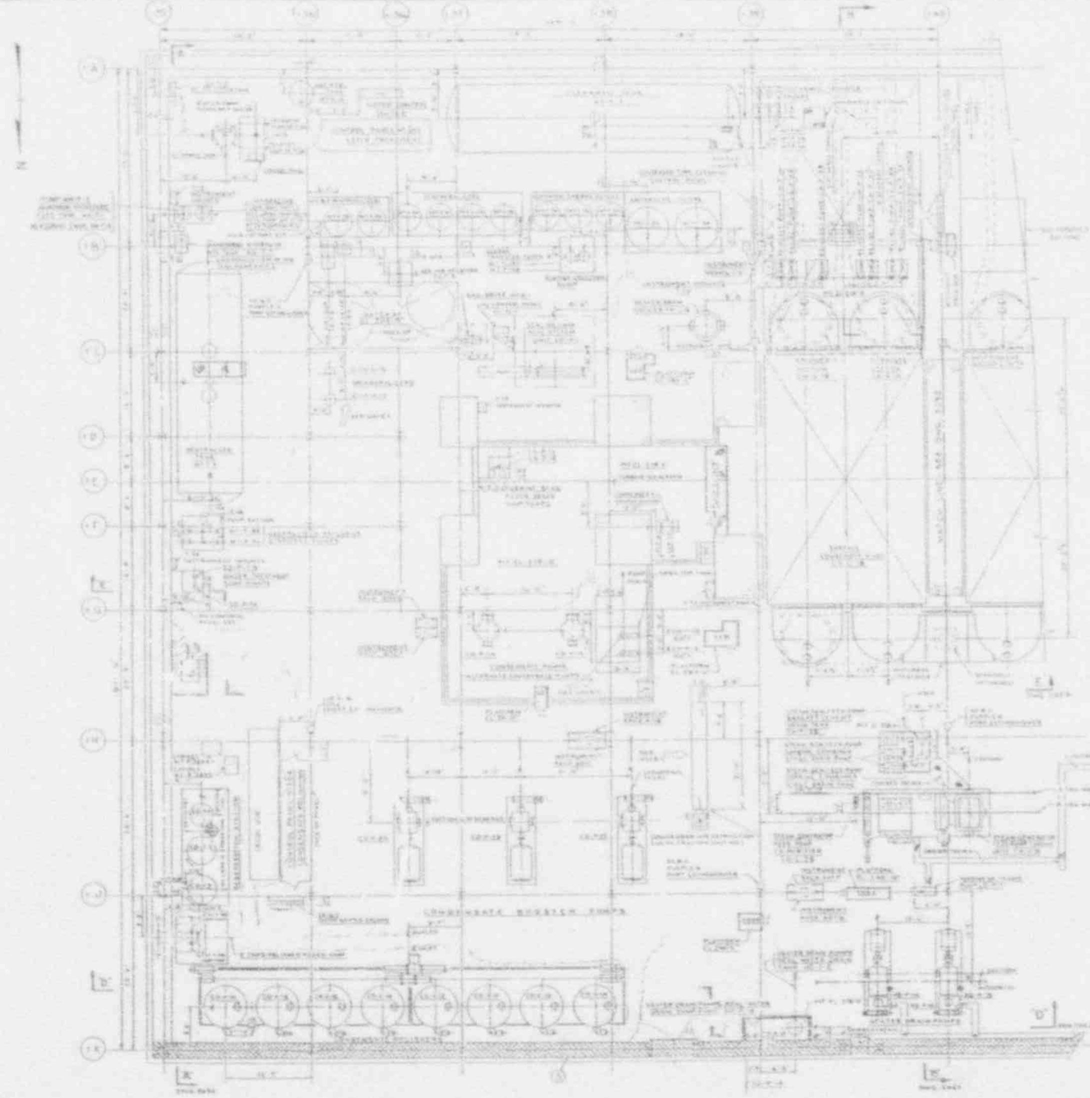
Amendment 20

GPU Nuclear TMI-2

RIVER WATER
PUMP HOUSE

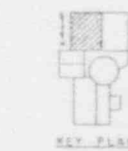
[illegible] B&R DWG NO. [illegible]

FIGURE: 1.2 - 25 PAGE: 1.2 - 26



NOTES

LEGEND



KEY PLAN

Amendment 20

Nuclear

TURBINE BUILDING
BASEMENT PLAN
EAST SIDE

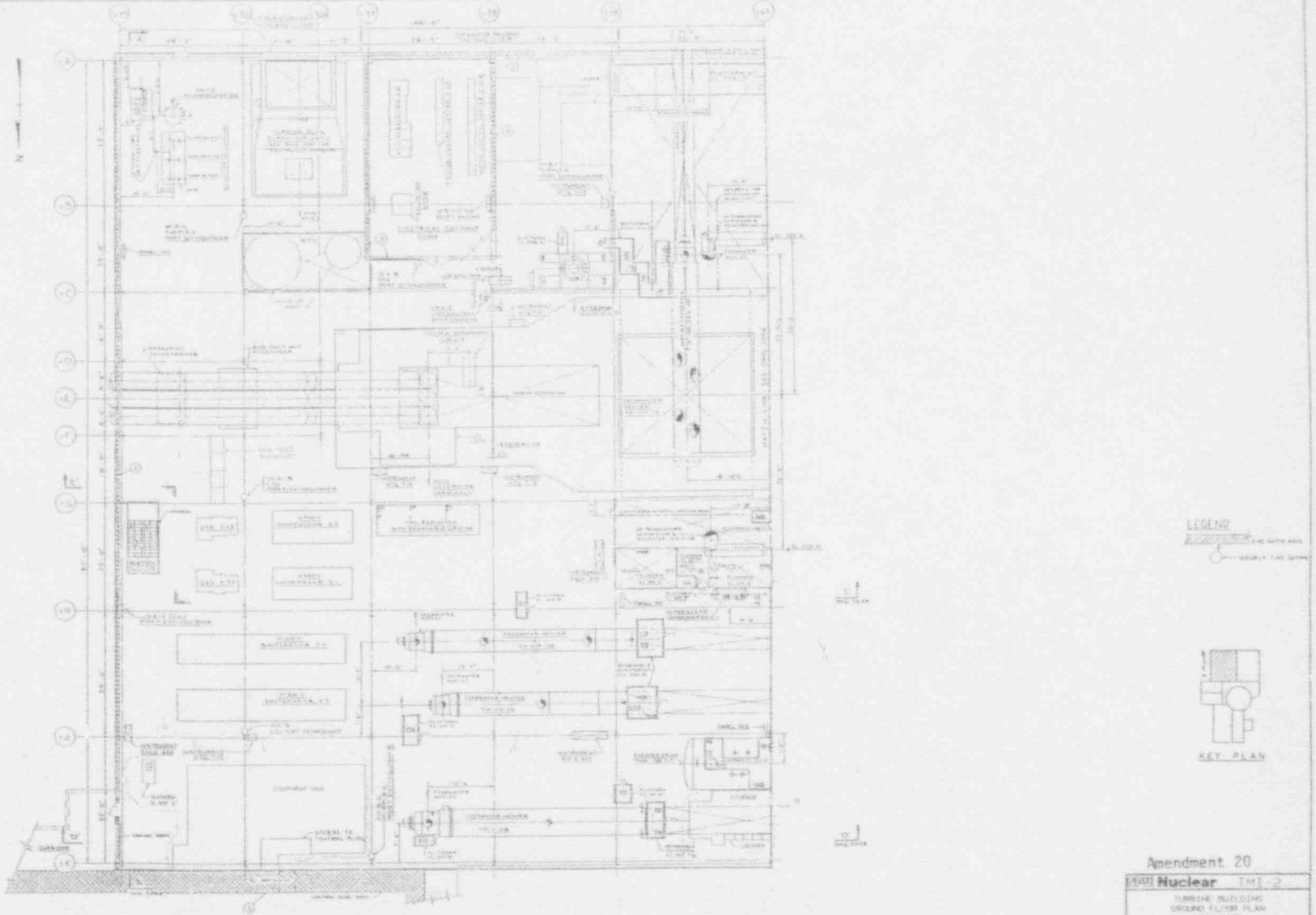
FIGURE 1.2-22

Amendment 20

GPU Nuclear TMI-2

TURBINE BUILDING
BASEMENT PLAN
WEST SIDE

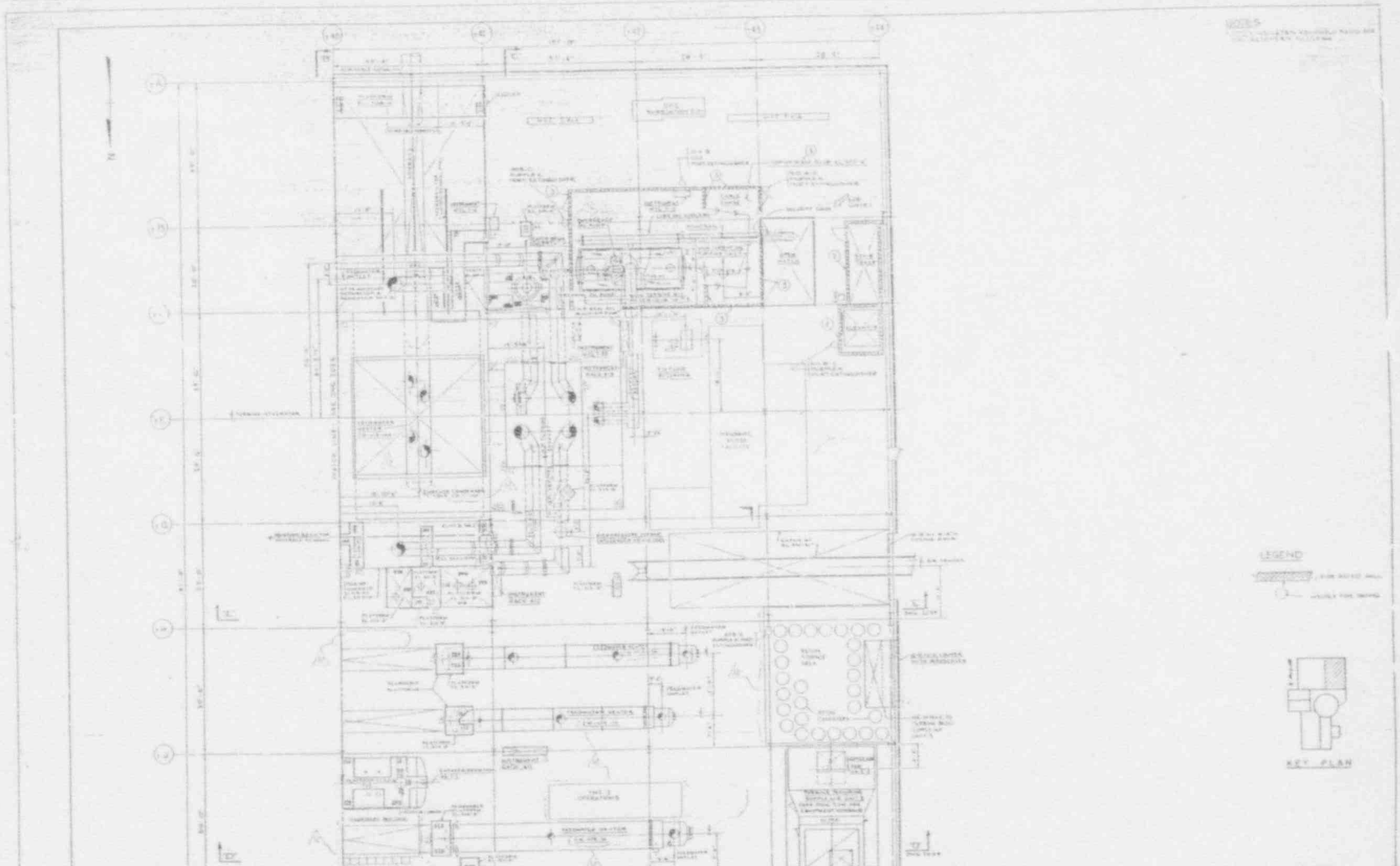
FIGURE 1.2 - 23 PAGE 1.2 - 27



Amendment 20

GPU Nuclear TMI-2

TURBINE BUILDING
GROUND FLOOR PLAN
EAST SIDE

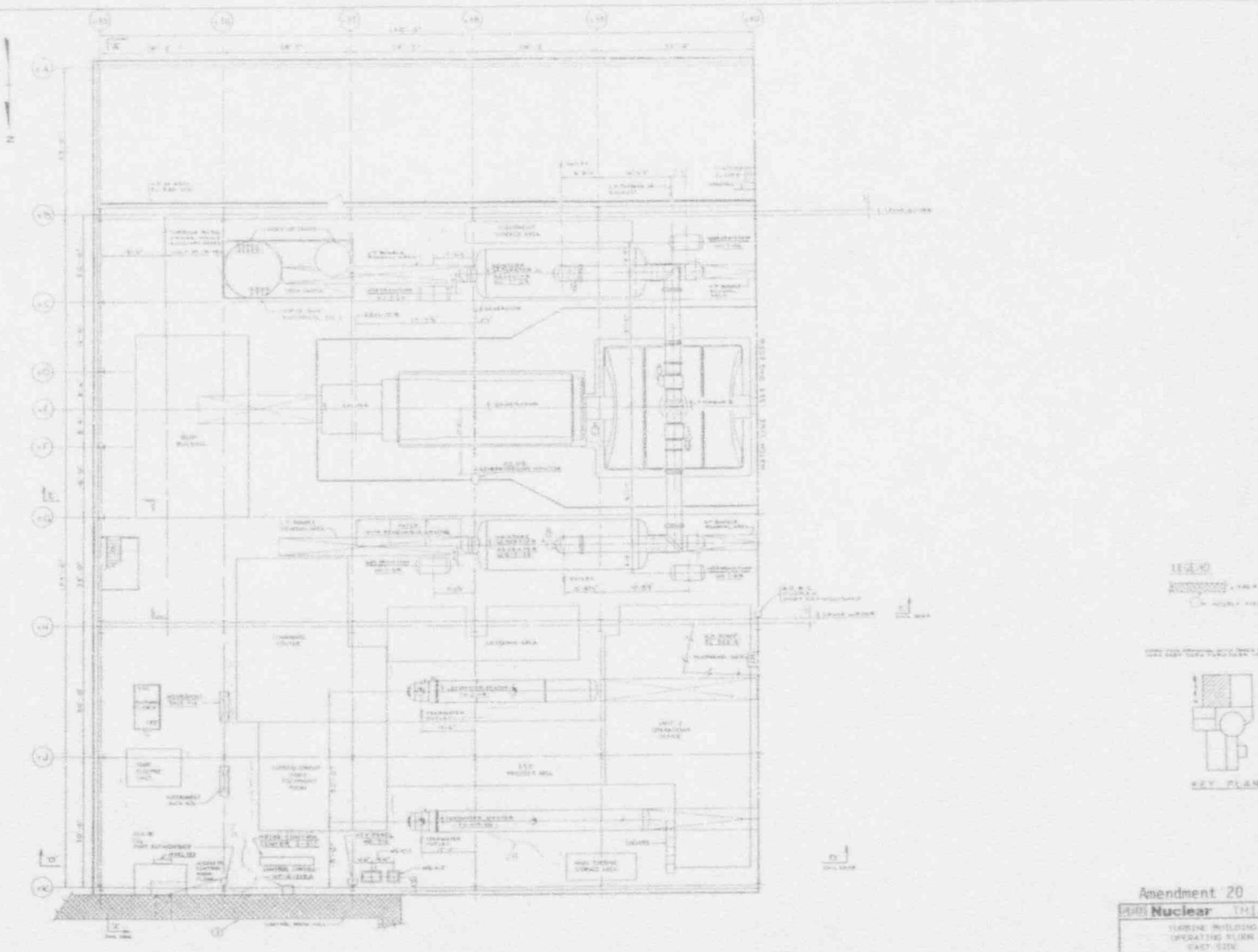


Amendment 20

GPU Nuclear TMI-2

TURBINE BUILDING
GROUND FLOOR PLAN
WEST SIDE

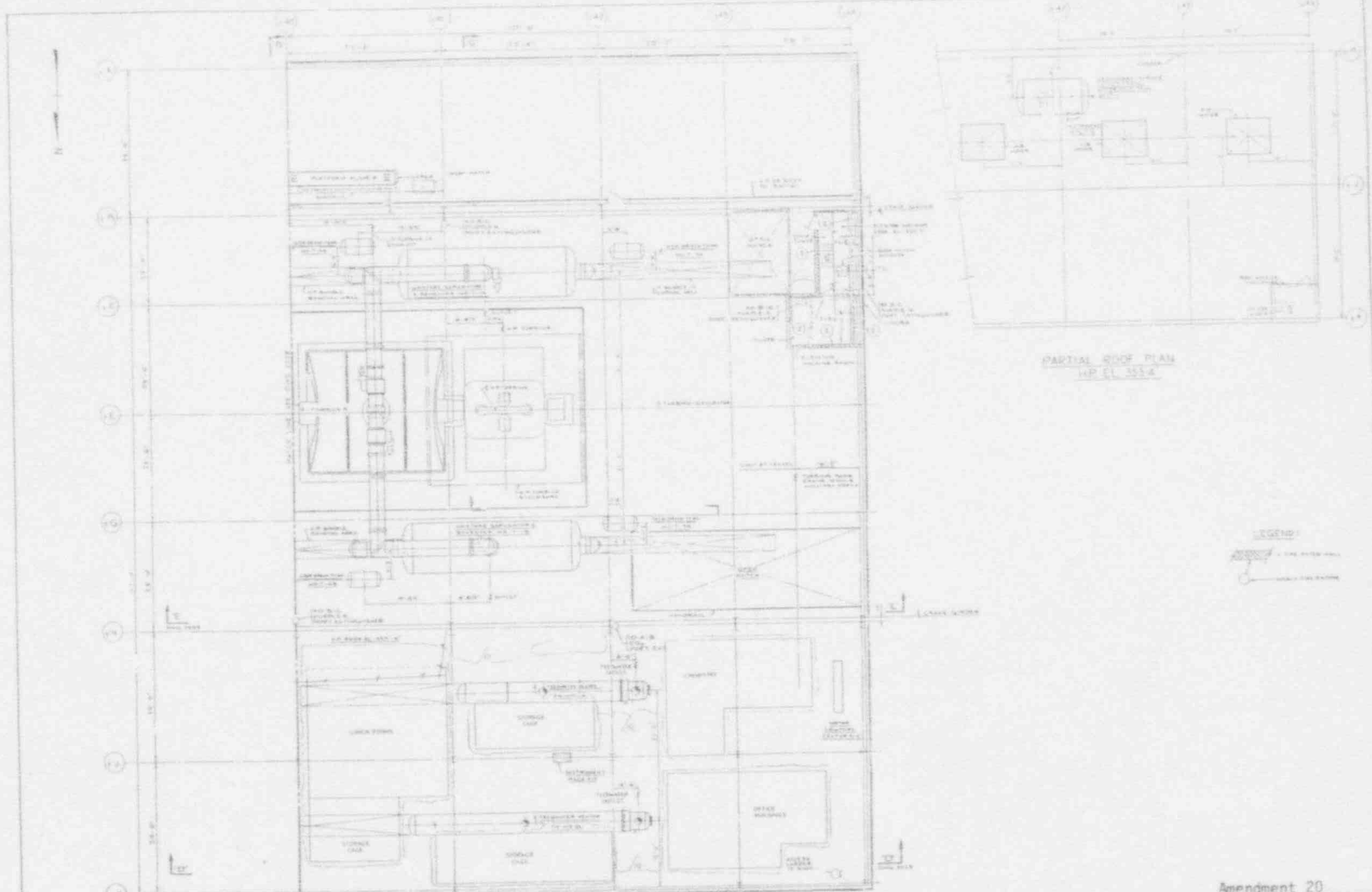
PDMS SAR | B&R DWG NO. 2054
FIGURE: 1.2 - 25 | PAGE: 1.2 - 27



Amendment 20

Nuclear TMI-2

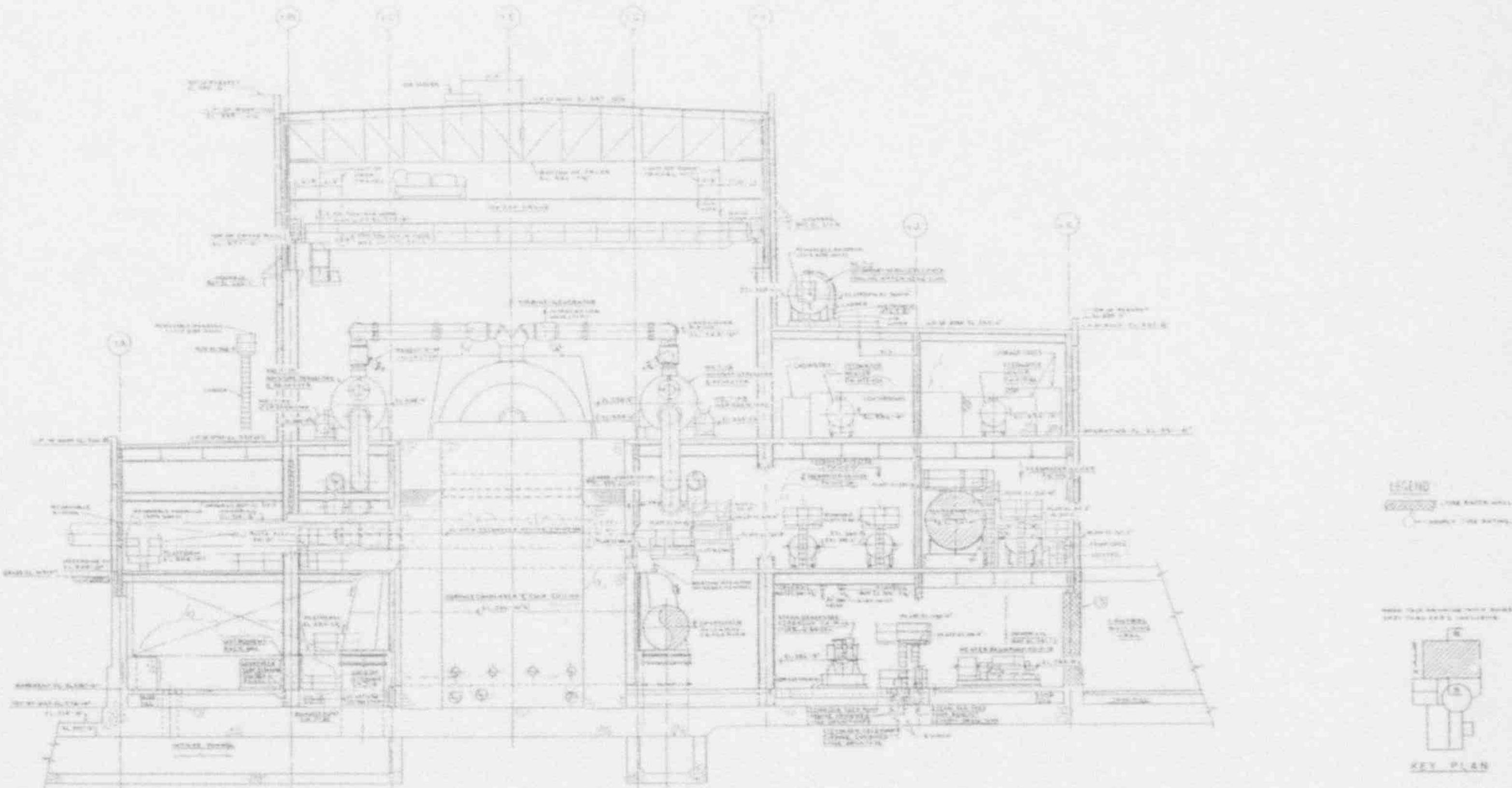
TURBINE BUILDING
OPERATING FLOOR
EAST SIDE



Amendment 20

GPU Nuclear TMI-2

TURBINE BUILDING
OPERATING FLOOR
WEST SIDE

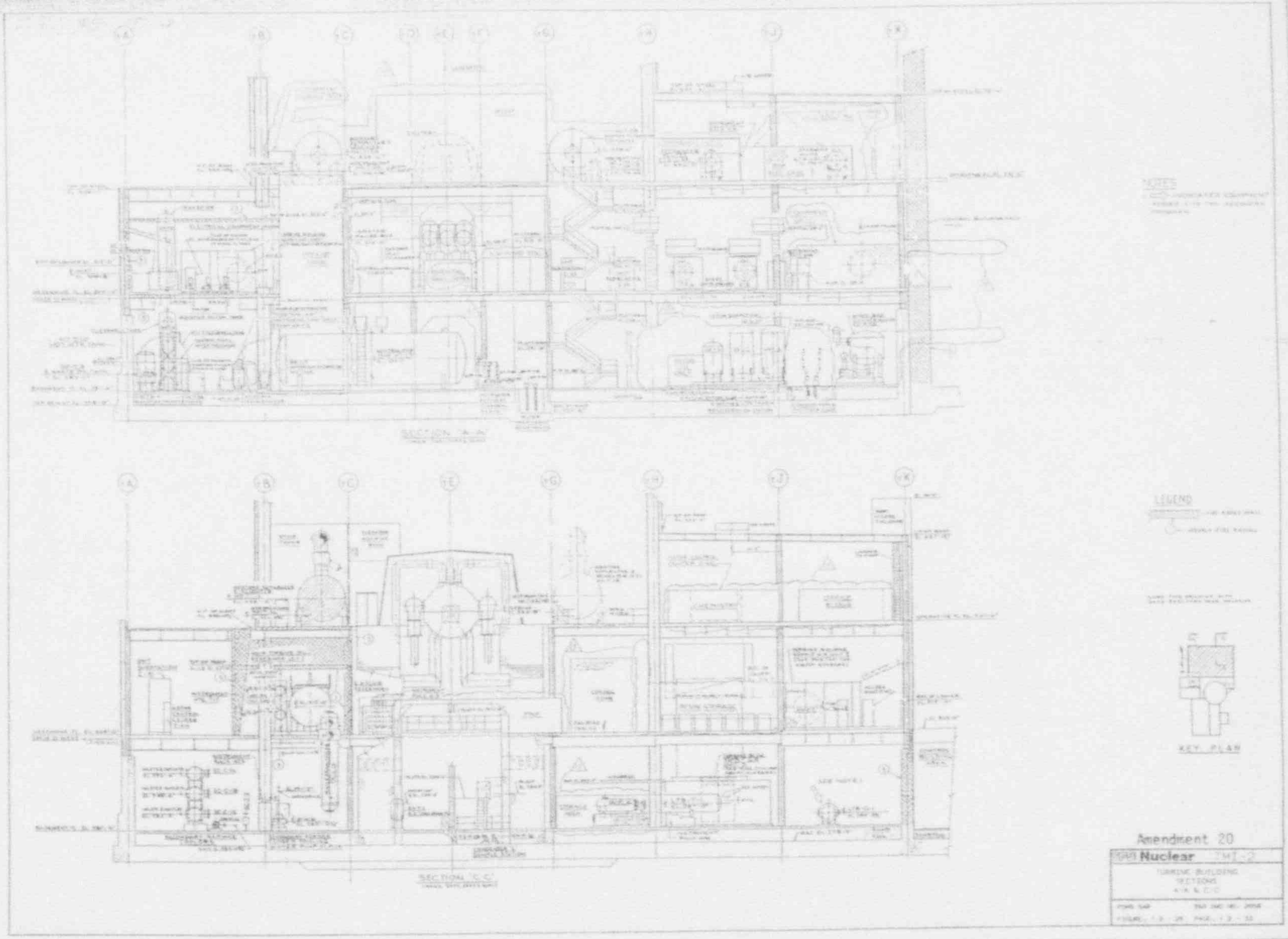


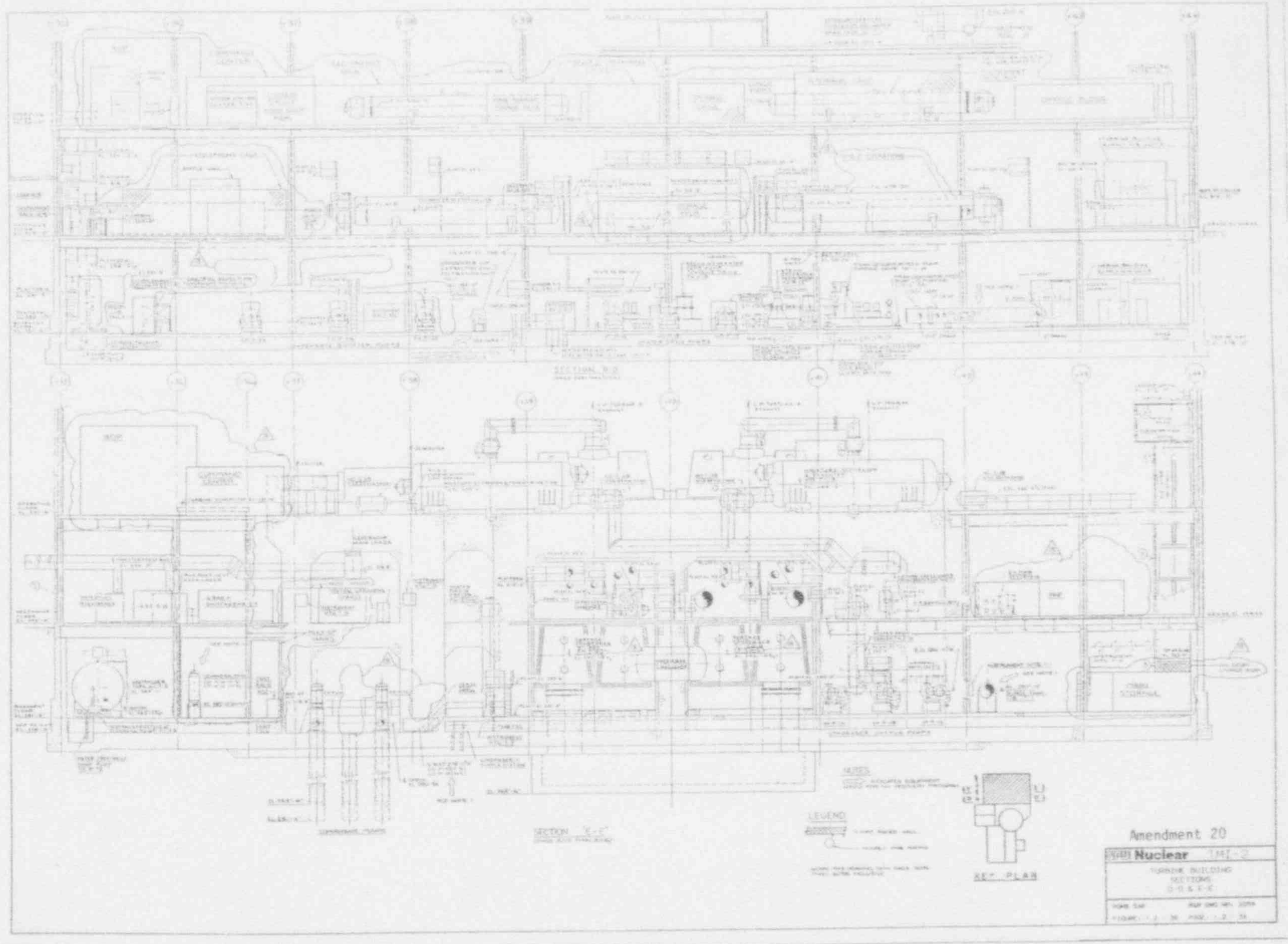
SECTION 'B-B'

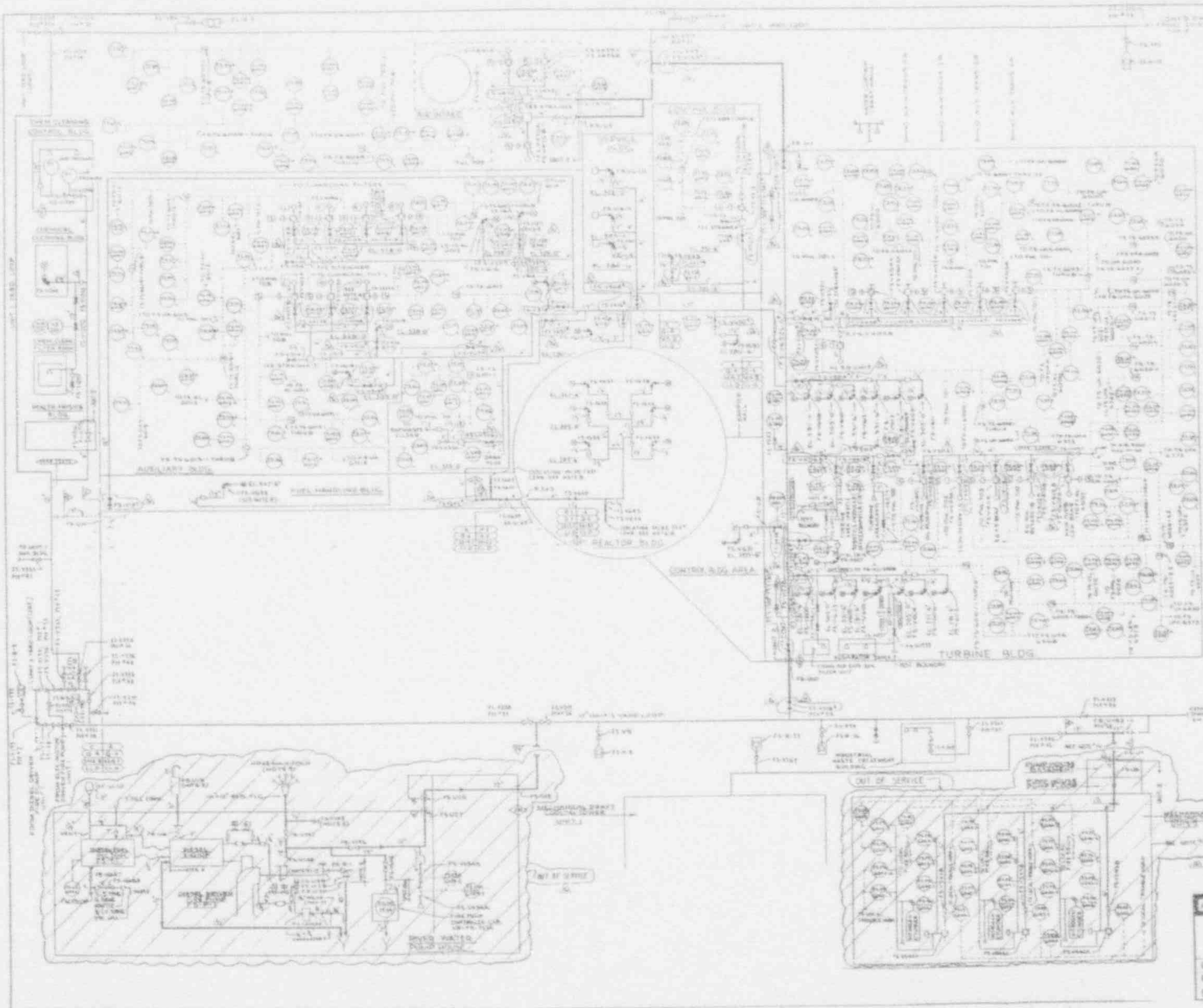
Amendment 20

Nuclear TMI-2

TURBINE BUILDING
SECTION B-B


SECTION A-A
SECTION C-C
NOTES
LEGEND
KEY PLAN
Amendment 20
Nuclear TMI-2
TURBINE BUILDING
SECTIONS
A-A & C-C


LEGEND
NOTES
KEY PLAN
Amendment 20
Nuclear
TMI-2
TURBINE BUILDING
SECTIONS



GENERAL NOTES

REFERENCE DWGS.

ENGINEERED SAFETY FEATURES

NUCLEAR SAFETY RELATED

LEGEND

Amendment 20

GPU Nuclear TMI-2

FIRE PROTECTION

GPUN DWG. NO. 2D-3810-2037 SH 1

PDMS SAR

FIGURE 7.2-3 PAGE 7.2-42

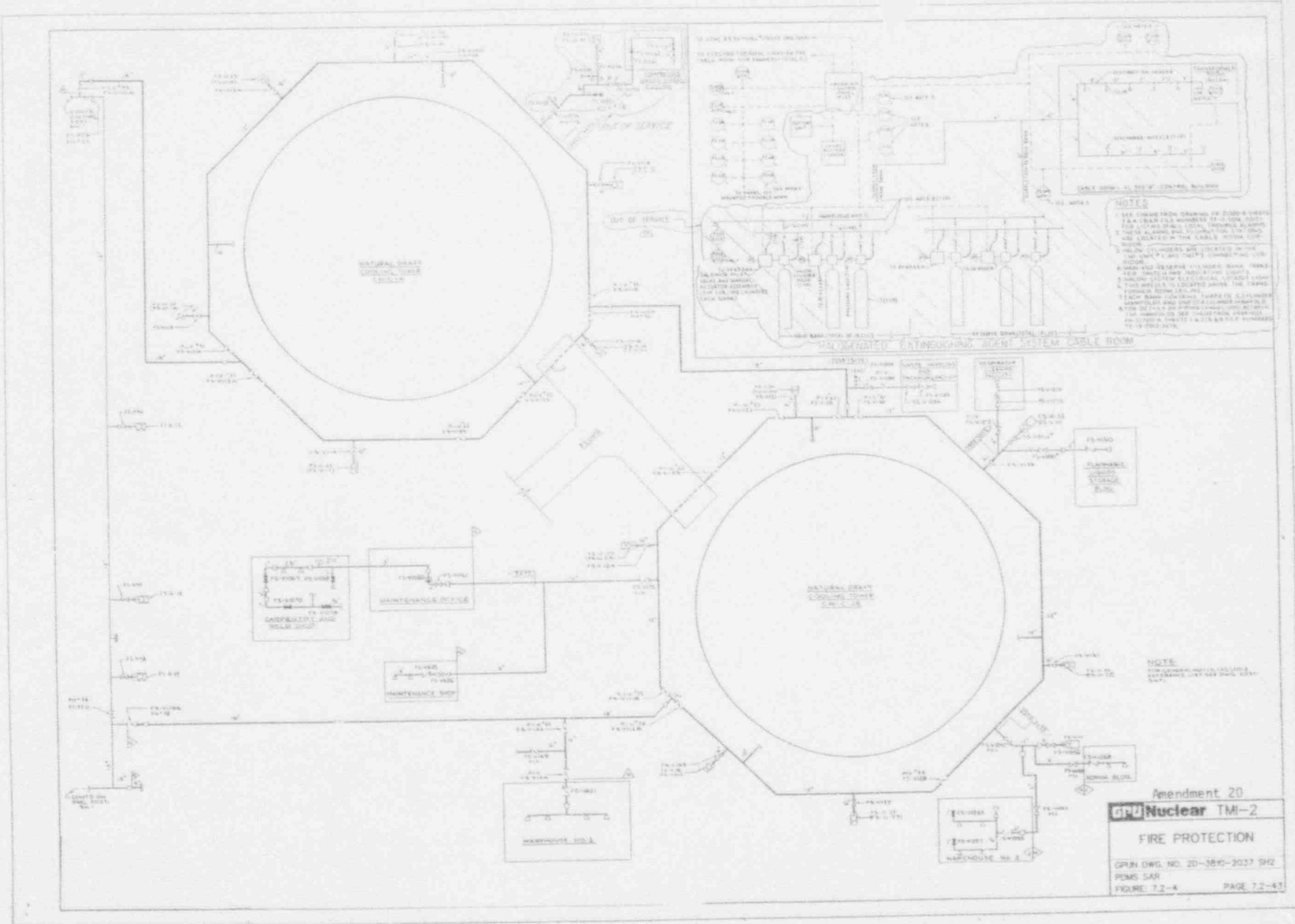

NATURAL DRAFT COOLING TOWER
HALOGENATED EXTINGUISHING AGENT SYSTEM CABLE ROOM
NOTES
OUT OF SERVICE
MAINTENANCE OFFICE
MAINTENANCE SHOP
WAREHOUSE NO. 2
WAREHOUSE No. 3
ADMIN. BLDG.
FLAMMABLE LIQUIDS STORAGE BLDG.
NOTE
Amendment 20
GPU Nuclear TMI-2
FIRE PROTECTION
GPUN DWG. NO. 2D-3810-3037 SH2
PDMS SAR
FIGURE 7.2-4
PAGE 7.2-43

TABLE 1.4-1

FIGURE CROSS REFERENCE

TITLE	B&R DWG. NO.	PDMS SAR FIG. NO.
Site Plan	4001	1.2-1
Reactor Building Basement Floor	2060	1.2-3
Reactor Building Ground Floor	2061	1.2-4
Reactor Building Operating Floor	2062	1.2-5
Reactor Building Section A-A	2063	1.2-6
Reactor Building Sections B-B, C-C, D-D	2064	1.2-7
Auxiliary and Fuel Handling Building, Basement and Sub-Basement Floor	2065	1.2-8
Auxiliary and Fuel Handling Building, Ground Floor	2066	1.2-9
Auxiliary and Fuel Handling Building, First Floor	2067	1.2-10
Auxiliary and Fuel Handling Building, Operating Floor	2068	1.2-11
Auxiliary and Fuel Handling Building, Sections A-A and B-B	2069	1.2-12
Auxiliary and Fuel Handling Building, Section C-C	2070	1.2-13
Auxiliary and Fuel Handling Building, Section D-D	2071	1.2-14
Auxiliary and Fuel Handling Building, Section E-E	2072	1.2-15
Control and Service Building, Lower Floor Plans	2380	1.2-17
Control and Service Building, Upper Floor Plans	2381	1.2-18
Control and Service Building, Sections	2382	1.2-19
River Water Pump House	2338	1.2-20

TABLE 1.4-2

ABBREVIATIONS AND ACRONYMS

ABST	Auxiliary Building Sump Tank
ACES	Automated Cutting Equipment System
AEC	Atomic Energy Commission
AFHB	Auxiliary and Fuel Handling Buildings
AGW	Accident Generated Water
AISC	American Institute of Steel Construction
AIT	Air Intake Tunnel
ALARA	As Low As Is Reasonably Achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
ATWS	Anticipated Transients Without Scram
AWS	American Welding Society
BBR	Brown Boveri Reactor
BWST	Borated Water Storage Tank
B&R	Burns and Roe
B&W	Babcock and Wilcox
CACE	Containment Air Control Envelope
CCW	Closed Cooling Water
CCTV	Closed Circuit Television
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
Ci	Curie
CRD	Control Rod Drive

TABLE 1.4-2 (Cont'd)

ABBREVIATIONS AND ACRONYMS

CRDCS	Control Rod Drive Control System
CRDM	Control Rod Drive Motor
CRDS	Control Rod Drive System
CSA	Core Support Assembly
DCR	Defueling Completion Report
DHCCW	Decay Heat Closed Cooling Water
DHR	Decay Heat Removal
DOE	Department of Energy
DOP	Dioctyl Phthalate
DTA	Defueling Test Assembly
DTFR	Decontamination Task Force Report
DWCS	Defueling Water Cleanup System
EPA	Environmental Protection Agency
ESF	Engineered Safety Features
ETN	Exposure Tracking Number
FCN	Field Change Notice
FHB	Fuel Handling Building
FPPE	Fire Protection Program Evaluation
FSAR	Final Safety Analysis Report
FTC	Fuel Transfer Canal
GDC	General Design Criteria
GI	Gastrointestinal
gpm	Gallons Per Minute
GPU	General Public Utilities
GPUN	GPU Nuclear Corporation
GPUNC	GPU Nuclear Corporation

TABLE 1.4-2 (Cont'd)

ABBREVIATIONS AND ACRONYMS

GRC	General Review Committee
H&V	Heating and Ventilation
HEPA	High Efficiency Particulate Air
HEU	Highly Enriched Uranium
HIC	High Integrity Container
HVAC	Heating, Ventilating, and Air Conditioning
IAEA	International Atomic Energy Agency
INEL	Idaho National Engineering Laboratory
IOSRG	Independent Onsite Safety Review Group
IWTS	Industrial Waste Treatment System
JCP&L	Jersey Central Power and Light
LCSA	Lower Core Support Assembly
LER	Licensee Event Report
LLD	Lowest Level of Detection
LOCA	Loss of Coolant Accident
MDHR	Mini-Decay Heat Removal
MET-ED	Metropolitan Edison Company
MIDAS	Meteorological Information and Dose Assessment System
MPC	Maximum Permissible Concentration
mph	Miles Per Hour
MSIV	Main Steam Isolation Valve
MSR	Moisture Separator Reheater
MUP	Makeup and Purification
MWHT	Miscellaneous Waste Holdup Tank
NFPA	National Fire Protection Agency

TABLE 1.4-2 (Cont'd)

ABBREVIATIONS AND ACRONYMS

NLB	National Liquid Blasting
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NSAC	Nuclear Safety Analysis Center
NTU	Nephelometric Turbidity Index
ODCM	Off-site Dose Calculation Manual
OMB	Office of Management and Budget
ORNL	Oak Ridge National Laboratory
OTSG	Once Through Steam Generator
PAF	Personnel Access Facility
PDMS	Post-Defueling Monitored Storage
PDSR	Post-Defueling Survey Report
PEIS	Programmatic Environmental Impact Statement
PENELEC	Pennsylvania Electric Company
PMF	Probable Maximum Flood
PORC	Plant Operations Review Committee
PORV	Pilot Operated Relief Valve
PSAR	Preliminary Safety Analysis Report
psi	Pounds Per Square Inch
P&ID	Piping and Instrument Diagram
QA	Quality Assurance
RAF	Radiation Area Factor
RB	Reactor Building
RC	Reactor Coolant
RCBT	Reactor Coolant Bleed Tank
RCMM	Remote Controlled Mobile Manipulator

TABLE 1.4-2 (Cont'd)

ABBREVIATIONS AND ACRONYMS

RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RCTV	Remote Controlled Transport Vehicle
RPS	Reactor Protection System
RRV	Remote Reconnaissance Vehicle
RV	Reactor Vessel
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SCBA	Self-Contained Breathing Apparatus
sccm	Standard Cubic Centimeters per Minute
scfm	Standard Cubic Feet Per Minute
SD	System Description
SDS	Submerged Demineralizer System
SEEDS	Simplified Environmental Effluent Dosimetry System
SER	Safety Evaluation Report
SFAS	Safety Features Actuation System
SFML	Safe Fuel Mass Limit
SFP	Spent Fuel Pool
SG	Steam Generator
SISI	System In-Service Inspection
SNM	Special Nuclear Material
SPC	Standby Pressure Control
SRP	Standard Review Plan
SSCCW	Secondary Side Closed Cooling Water
STP	Sewage Treatment Plant
TER	Technical Evaluation Report

TABLE 1.4-2 (Cont'd)

ABBREVIATIONS AND ACRONYMS

TLD	Thermoluminescent Dosimeter
TMI	Three Mile Island
TMINS	Three Mile Island Nuclear Station
TRVFS	Temporary Reactor Vessel Filtration System
USAR	Updated Safety Analysis Report
USGS	U. S. Geological Survey
UTM	Universal Transmeridian
WDG	Waste Disposal Gas
WDL	Waste Disposal Liquid
WDS	Waste Disposal Solid
WHPF	Waste Handling and Packaging Facility

APPENDIX 1A

POTENTIAL REDUCTIONS IN OCCUPATIONAL EXPOSURE DUE TO POST-DEFUELING MONITORED STORAGE

[NOTE: The following is a historical treatise that discusses the results of the Decontamination Task Force Report (DTFR) (Reference 2) conducted in 1985. The DTFR provides an evaluation of the reduction in occupational exposure attributed to PDMS. The actual radiological conditions existing in December 1993, i.e., at the time of entry into PDMS, as given in Section 5, have a negligible impact on the conclusions reached by this study. This Appendix will remain in its current condition to maintain that historical perspective. No further attempt will be made to be consistent with the rest of the SAR as it is revised.]

1A.1 SUMMARY AND INTRODUCTION

1A.1.1 SUMMARY

A comprehensive evaluation of the person-rem associated with additional required decontamination of the TMI-2 plant after completion of the "Cleanup Program" (i.e., Phase III Endpoint) has determined that deferring this decontamination for a period of 30 years will result in a potential occupational exposure savings in the range of 4,500 to 9,800 person-rem. In calculating this savings, person-rem resulting from decontamination tasks, radioactive waste processing tasks, and exposures due to tasks performed during PDMS were estimated. Table 1A-10 contains a summary of the estimated range of person-rem for both immediate additional decontamination and final decontamination as a part of decommissioning, assuming a 30-year period of PDMS.

1A.1.2 INTRODUCTION

Following the completion of the prerequisites identified in Section 1.1.2.1 of the PDMS SAR, the TMI-2 plant will enter PDMS. To enter this mode, the TMI-2 plant must be in a safe, stable condition so that it does not pose a risk to the health or safety of the public. GPU Nuclear has determined that by deferring any remaining decontamination until after PDMS, a significant savings in the occupational radiation exposures will be realized. The difference in occupational exposure as a result of performing these tasks after a period of PDMS (final decontamination as a part of decommissioning) instead of at the end of Phase III (immediate additional decontamination) is based on:

- o Reduction in radiation dose rates due to the natural decay of radioactive materials remaining in the plant;
- o Advances in remote technology directly applicable to final cleanup activities;
- o Advances in chemical decontamination methods; and
- o A longer development period to plan, engineer and, in some cases, perform further decontamination activities.

This report quantifies the potential savings in occupational exposure which might be realized due to delaying the final decontamination until after the PDMS period. The evaluation performed considers two cases: "immediate additional decontamination" (i.e., immediately after Phase III) and "final decontamination as a part of decommissioning" after PDMS; the delay is assumed to be approximately 30 years. Neither case calculates person-rem exposures for normal decommissioning activities. This report describes the plant conditions assumed to exist both before and after decontamination activities. These conditions form the basis for the dose rates used in the person-rem evaluation. The basis for the job-hour estimates used in the analysis are also provided in this report. This study is considered a reasonable estimate of the potential person-rem savings associated with PDMS based on available information.

In addition to the two cases listed above, person-rem are also evaluated assuming final decontamination as a part of decommissioning after a PDMS period of 20 years. This case is included to facilitate comparison with the person-rem stated in Supplement 3 of the Programmatic Environmental Impact Statement (Reference 1), which assumes a PDMS duration of 20 years followed by 4 years of final decontamination. It is not the plan of GPU Nuclear to have a PDMS period of 20 years nor has GPU Nuclear specified a duration for completing the decontamination activities, except that PDMS shall not continue beyond the time of decommissioning TMI-1.

This study should not be interpreted to imply a commitment by GPU Nuclear to employ specific decontamination techniques, nor to achieve specific endpoint radiological conditions during final decontamination.

1A.2 BACKGROUND INFORMATION

1A.2.1 RECOVERY TASKS

Decontamination and dose reduction activities have been conducted continuously during the TMI-2 cleanup period. Major tasks that have been performed are:

- o Decontamination Task Force Report (Reference 2)
- o Gross Decontamination Experiment (Reference 12)
- o Dose Reduction Working Group Tasks
- o Auxiliary and Fuel Handling Buildings (AFHB) decontamination
- o Reactor Building (RB) decontamination

In general, these tasks have been geared to ensuring that the recovery tasks, including stabilizing the plant and defueling, were performed in a radiological environment that ensured occupational exposures were ALARA. During the cleanup period, the priority tasks were those associated with removing the nuclear fuel from the plant. These tasks were important as they reduced the risk to public health and safety.

5.3 PDMS RADIOLOGICAL SURVEY

This section describes the radiological conditions at the TMI-2 facility upon entering PDMS. These conditions are expressed in terms of general area dose rate, loose surface contamination, and general isotopic distribution. The data is presented in a format consistent with the specific decontamination criteria introduced in Section 5.2.

5.3.1 RADIOLOGICAL ASSESSMENT

Upon completion of cleanup activities (including decontamination) in a given area or cubicle, the area was isolated to prohibit uncontrolled access. Deactivated systems traversing the area or cubicle were drained, vented, and isolated. The subject area was, at that point, configured for long-term monitored storage and available for a final PDMS radiological assessment. This assessment was performed utilizing radiological surveys (in this case, radiation, contamination and air activity surveys performed by radiological controls technicians) as a basis for determining whether the established decontamination program endpoints were achieved as well as to document the radiological conditions which existed upon entering PDMS. If at the conclusion of the radiological assessment it was determined that satisfactory radiological conditions were not achieved, additional decontamination efforts were undertaken or exceptions to the goals were taken.

5.3.1.1 Pre-PDMS Radiological Survey Methodology

Radiation contamination and air activity surveys were routinely performed during the course of the cleanup program in support of work activities. These surveys were performed in accordance with regulatory and industry standards and practices to verify and document radiation and contamination levels for use in controlling personnel exposure. These surveys were then evaluated as to whether or not they supported the conclusion that decontamination endpoints had been achieved. In those instances where existing surveys were judged unsuitable for substantiating decontamination endpoints, additional surveys were conducted.

5.3.1.2 Post-PDMS Radiological Survey Methodology

During the PDMS period, radiological conditions within the facility will be monitored through sampling and periodic surveillance . Surveillance activities for the Reactor Building consist of radiation surveys in conjunction with planned Reactor Building inspections. The purpose for conducting these surveys is to provide assurance that conditions are stable or to provide early indication of any changing conditions which may require corrective action. The Radiological Survey Plan for PDMS is described in Section 7.2.4.2.

5.3.1.3 Remedial Decontamination Activities

In the event that changing conditions are indicated, an evaluation will be performed as to the need for, and form of, corrective action to be taken. In general, areas will be assessed on a case-by-case basis with the deciding factors being the area's impact on personnel exposure and the possibility of a release to the environment. The Unit 2 PDMS organization will be staffed to provide the capability to take corrective action or call upon additional resources necessary to take corrective action.

5.3.2 RADIOLOGICAL CONDITIONS AT BEGINNING OF PDMS

Table 5.3-1 lists the specific radiological goals for the TMI-2 Reactor Building and the corresponding radiological conditions as of the most current radiological surveys existing in September 1992. The RB radiological conditions listed in Table 5.3-1 reflect rounded-off, average PDMS survey data for the entire cubicle/area in question. These data were compiled in the manner described in Section 5.3.1.1.

Table 5.3-2 lists the equivalent information for the AFHB as of November 1993.

Table 5.3-3 provides a summary of the radiological conditions for the balance-of-plant areas not covered by Tables 5.3-1 and 5.3-2.

5.3.2.1 Surface Contamination At Beginning Of PDMS

To establish a baseline at the beginning of PDMS, the radioactivity present as surface contamination in various areas of the facility has been evaluated. This information serves as an initial reference for the evaluation of any future activities in the respective areas.

In order to appraise the radioactivity present as loose surface contamination upon entry into PDMS, an analytical model was constructed utilizing available loose surface contamination data, generalized waste stream isotopic distributions and estimates of surface area. This information is formatted in a manner similar to the general area dose rate and loose surface contamination data presented in Tables 5.3-1, 5.3-2, and 5.3-3. Only surface contamination was considered; fixed contamination or contamination internal to piping systems or equipment was omitted. The generalized waste streams or distribution of principal isotopes are referenced on each of the tables.

Table 5.3-4 lists the data obtained from the analytical model described above for the TMI-2 Reactor Building. Table 5.3-5 lists the equivalent data for the AFHB and Table 5.3-6 provides a similar summary for the balance-of-plant areas. All of the calculations of the quantities of curies listed are based on the specific decontamination goals given on Tables 5.2-2 and 5.2-3.

TABLE 5.3-5

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
AX001	RB Emerg. Cooling Booster Pumps Area	C	1.82E-3
AX002	Access Corridor	B	5.45E-5
AX002a	N_2 Piping System	C	6.67E-6
AX003	Access Area	C	9.35E-4
AX004	Seal Injection Valve Rm	B	9.33E-3
AX005	MUP Pump 1C Rm	B	4.36E-3
AX006	MUP Pump 1B Rm	A	9.54E-3
AX007	MUP Pump 1A Rm	B	1.00E-3
AX008	Spent Resin Storage Tank 1B Rm	B	1.30E-1
AX009	Spent Resin Storage Tank 1A Rm	B	2.54E-1
AX010	Spent Resin Transfer Pump Rm	B	6.74E-2
AX011	Aux Bldg Sump Tank Pumps and Valve Rm	B	1.18E-4
AX012	Aux Bldg Sump and Tank Rm	B	3.97E-2
AX013	Evap Cond Tanks, Pumps and Demins Rm	B	2.31E-5
AX014	RC Evaporator Rm	A	2.27E-3
AX015a	Cleanup Filters Rm	A	3.78E-4

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
AX015b	Cleanup After Filters Rm	A	7.71E-4
AX016	Cleanup Demineralizer 2A Rm	A	1.23E-3
AX017	Cleanup Demineralizer 2B Rm	A	6.03E-4
AX018	Waste Transfer Pumps Rm	B	1.06E-3
AX019	Waste Disposal Liquid Valve Rm	A	7.94E-4
AX020	RC Bleed Holdup Tanks 1B and 1C Rm	A	3.05E-1
AX021	RC Bleed Holdup Tank 1A Rm	B	7.97E-4
AX022	North Stairwell	B	2.80E-5
AX023	Elevator Pit and Associated Equipment	B	1.01E-3
AX024	Aux Bldg Sump Filters Rm	B	1.78E-4
AX025	Area Between Service, Control, and RB	B	1.73E-4
AX026	Seal Injection Filters Rm	C	1.90E-4
AX027	South Stairwell	B	1.71E-5
AX101	Radwaste Disposal Control Panel Area	B	1.96E-5
AX102	RB Sump Pumps Filters Rm	B	2.61E-4
AX103	Motor Control Center 2-11EB Rm	C	2.88E-5

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
AX104	Motor Control Center 2-21EB Rm	B	3.03E-5
AX105	Substation 2-11E Rm	B	7.10E-5
AX106	Substation 2-21E Rm	B	8.04E-5
AX107	Motor Control Center 2-11EA Rm	B	8.94E-5
AX108	Motor Control Center 2-21EA Rm	A	6.46E-5
AX109	Nuclear Services Coolers and Pumps Area	B	3.42E-5
AX110	Intermediate Coolers Area	C	3.54E-5
AX111	Intermed Cooling Pumps and Filters Rm	B	7.16E-5
AX112	Seal Return Coolers and Filter Rm	B	2.43E-2
AX113	Waste Gas Analyzer Rm	B	2.97E-3
AX114	MUP Demineralizer 1A Rm	B	5.99E-4
AX115	MUP Demineralizer 1B Rm	B	2.78E-3
AX116	Makeup Tank Rm	A	2.15E-2
AX117	MUP Filters Rm	C	2.58E+1
AX118	Spent Fuel Coolers and Pumps Area	C	2.89E-4

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
AX119	Spent Fuel Demineralizer Rm	B	2.81E-5
AX120	Spent Fuel Filters Rm	A	9.33E-6
AX121	Inside Elevator Cab	B	1.14E-5
AX122	North Stairwell	B	2.95E-5
AX123	Access Area	B	9.45E-5
AX124	Concentrated Liquid Waste Pump Rm	B	1.09E-4
AX125	Waste Gas Decay Tank 1B Rm	B	1.92E-4
AX126	Waste Gas Filter Rm	B	4.75E-6
AX127	Waste Gas Decay Tank 1A Rm	B	1.17E-3
AX128	Valve and Instrument Rm	B	8.02E-5
AX129	Deborating Demineralizer 1B Rm	B	5.80E-5
AX130	Deborating Demineralizer 1A Rm	B	3.21E-5
AX131	Miscellaneous Waste Holdup Tank Rm	B	2.69E-4
AX132	Corridor Between Unit 1 and Unit 2	B	1.47E-4
AX133	South Stairwell	B	2.41E-5
AX134	Miscellaneous Waste Tank Pumps Rm	A	1.38E-3

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
AX135	Radwaste Disposal Control Panels	B	4.61E-6
AX201	North Stairwell	B	2.54E-5
AX202	Elevator Shaft	B	2.16E-5
AX203	4160V Switchgear 2-1E Rm	B	1.05E-4
AX204	4160V Switchgear 2-2E Rm	B	1.09E-4
AX205	RB Purge Air Sup. and Hy Ctrl Exh Area	A	3.95E-5
AX206	RB Purge Air Exhaust Unit B	B	1.41E-2
AX207	RB Purge Air Exhaust Unit A	B	1.56E-2
AX208	Aux Bldg Exhaust Unit B	B	2.42E-4
AX209	Aux Bldg Exhaust Unit A	B	6.24E-4
AX210	Fuel Handling Bldg Exhaust Unit B	B	6.06E-4
AX211	Fuel Handling Bldg Exhaust Unit A	B	3.56E-4
AX212	Decay Heat Surge Tk and Substation Area	B	6.33E-5
AX213	Unit Substations and Access Area	C	8.11E-5
AX214	Decon Facility	C	1.68E-4
AX215	Fuel Handling Bldg Supply Unit	C	2.80E-5

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
AX216	Aux Bldg Supply Unit	B	3.36E-5
AX217	Access Area	B	6.94E-5
AX218	Concentrated Waste Storage Tank Rm	B	1.44E-4
AX219	Inst Racks and Atmospheric Monitor Area	B	6.39E-5
AX220	Caustic Liquids Mixing Area	B	4.28E-5
AX221	Caustic Liquids Mixing Area Corridor	B	1.12E-4
AX222	South Stairwell	B	4.89E-6
AX223	Air Handling Units General Area	C	3.79E-4
AX301	Elevator Machine Rm	C	5.67E-6
AX302	North Stairwell	B	2.40E-5
AX303	Elevator and Stairwell Access	C	4.83E-5
AX304	Auxiliary Building Exhaust Fan #8	C	2.22E-5
AX305	Fuel Handling Building Exhaust Fan #10	A	1.94E-5
AX401	Roof	A	1.54E-4
AX402	Cooling Water Surge Tanks Rm	C	1.55E-5
AX403	Damper Rm	B	1.26E-5

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
AX501	RB Spray Pump 1A Rm	A	2.98E-2
AX502	RB Spray Pump 1B Rm	B	8.56E-3
AX503	Decay Heat Remov Cooler and Pump 1A Rm	A	8.08E-3
AX504	Decay Heat Remov Cooler and Pump 1B Rm	A	2.67E-3
FH001	Makeup Suction Valve Rm	C	1.57E-2
FH002	Access Corridor	C	2.17E-4
FH003a	Makeup Discharge Valve Rm	B	3.45E-3
FH003b	Makeup Discharge Valve Rm	B	1.75E-2
FH004	Westinghouse Valve Rm	C	6.66E-3
FH005	Mini Decay Heat Vault	B	8.61E-5
FH006	Decay Heat Service Coolers Area	B	4.48E-4
FH007	Neutrl and Recl Boric Acid Access Area	B	4.50E-5
FH008	Neutralizer Tanks Pumps Rm	B	2.17E-3
FH009	Neutralizer Tanks Rm	B	2.94E-3
FH010	Reclaimed Boric Acid Tank Rm	A	1.97E-4

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES [1]	CURIES [2]
FH011	Reclaimed Boric Acid Pump Rm	A	9.16E-4
FH012	Neutralizer Tanks Filters Rm	B	4.29E-5
FH013	Oil Drum Storage Area	B	4.49E-6
FH014	Annulus	A	5.22E-3
FH101	MUP Valve Rm	B	1.14E-1
FH102	East Corridor	B	5.67E-4
FH103	Sample Rm	B	2.40E-4
FH104	West Corridor	C	3.20E-5
FH105	Model Rm	B	4.38E-4
FH106	Monitor Tanks and Sample Sink Area	C	7.08E-5
FH107	Trash Compactor Area	B	5.62E-6
FH108	Truck Bay	A	5.46E-5
FH109	Spent Fuel Pool A	C	1.35E+2
FH110	SDS Spent Fuel Pool	C	4.62E-2
FH111	Fuel Cask Storage	C	1.14E-2
FH112	Annulus	B	4.39E-4
FH201	East Corridor	B	1.51E-4
FH202	West Corridor	B	1.07E-4

TABLE 5.3-5 (Cont'd)

SURFACE CONTAMINATION - AFHB

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES (1)	CURIES (2)
FH203	Surge Tank Area	B	4.35E-5
FH204	Standby Pressure Control Area	C	2.36E-4
FH205	Annulus	B	7.24E-5
FH301	Upper Spent Fuel Pool A Area	C	5.30E-5
FH302	SDS Operating Area	B	1.53E-4
FH303	Upper Standby Pressure Control Area	C	1.92E-4
FH304	Annulus	B	6.05E-4
FH305	Spent Fuel Pool Access Area	C	2.65E-4

NOTES:

(1) The principal isotopes and their relative distribution are defined below. The Sr-90 value represents the sum of the Sr-90 and Y-90 isotopes which are in equilibrium; the Cs-137 value represents the sum of the Cs-137 and Ba-137m isotopes which are in equilibrium. The "A", "B", and "C" categories relate to normal, makeup, and defueling waste streams, respectively. Only those isotopes important from an offsite dose perspective are included.

A		B		C	
Sr-90	0.08	Sr-90	0.29	Sr-90	0.63
Cs-137	0.92	Cs-137	0.71	Cs-137	0.28
Pu-238	4.43E-6	Pu-238	1.67E-5	Pu-238	4.25E-4
Pu-239	5.39E-5	Pu-239	2.04E-4	Pu-239	5.18E-3
Pu-240	1.43E-5	Pu-240	5.41E-5	Pu-240	1.37E-3
Pu-241	4.86E-4	Pu-241	1.84E-3	Pu-241	0.04
Am-241	1.56E-5	Am-141	5.92E-5	Am-141	1.50E-3
				Pm-147	0.04

(2) These are calculated values based on the specific decontamination values given on Table 5.3-2.

TABLE 5.3-6
SURFACE CONTAMINATION - OTHER BUILDINGS

CUBICLE NUMBER	AREA DESCRIPTION	PRINCIPAL ISOTOPES(1)	CURIES(2)
SB000	Service Building El. 281'	A	1.31E-4
SB002	M-20 Area	A	1.16E-4
SB002	M-20 Area Sump	A	1.04E-5
SB100	Service Building El. 305'	A	7.23E-5
	[RB Containment Control Cubicle]	B	5.72E-5
	[Secondary Chem Lab]	B	3.81E-4
SB500	Tendon Access Gallery	A	1.22E-4
TB000	Turbine Building El. 281'	A	5.90E-4
PA108	CACE Building	B	2.69E-5
RA101	PWST Pump House	A	2.72E-5
	[PWST Sump]	A	2.53E-6
RA104	BWST Area	A	2.92E-5

NOTES:

(1) The principal isotopes and their relative distribution are defined below. The Sr-90 value represents the sum of the Sr-90 and Y-90 isotopes which are in equilibrium; the Cs-137 value represents the sum of the Cs-137 and Ba-137m isotopes which are in equilibrium. The "A" category relates to the normal waste stream. Only those isotopes important from an offsite dose perspective are included.

A		B	
Sr-90	0.08	Sr-90	0.29
Cs-137	0.92	Cs-137	0.71
Pu-238	4.43E-6	Pu-238	1.67E-5
Pu-239	5.39E-5	Pu-239	2.04E-4
Pu-240	1.43E-5	Pu-240	5.41E-5
Pu-241	4.86E-4	Pu-241	1.84E-3
Am-241	1.56E-5	Am-141	5.92E-5

(2) These are calculated values based on the specific decontamination values given on Table 5.3-3.

a. Provided a source of processed water makeup for various tanks (e.g., BWST, WDL-T-9A/9B, FTC, SFP "A").

b. Provided a source of processed water inside the RB via penetration R-565.

6.2.37.2 PDMS Function

This system provides no active function during PDMS. The passive function provided by this system during PDMS is contamination control. Contamination within the system is controlled by the isolation of the boundary valves for the contaminated portions of the system.

6.2.38 OTSG RECIRCULATING SYSTEM

6.2.38.1 System Design

The OTSG Recirculating System was designed and installed during the TMI-2 cleanup period. The primary function was to:

1. Remove radioactivity from steam generator RC-H-1B (OTSG "B") and,

2. Chemically treat water in both steam generators (RC-H-1A, 1B) for wet-layup condition.

6.2.38.2 PDMS Function

This system provides no active function during PDMS. The passive functions provided by this system are Containment isolation and contamination control. The Containment isolation function is provided by maintaining valves GR-V1A, 1B, GR-V7A and 7B in the closed position. Contamination within the system is controlled by the isolation of the boundary valves for the contaminated portions of the system.

6.2.39 DECONTAMINATION SERVICE AIR SYSTEM

6.2.39.1 System Design

The function of the Decontamination Service Air System was to supply a source of air (in addition to the existing service air system) to:

a. The Unit 2 Reactor Building for support of work activities.

b. The Unit 2 AFHB for operation of decontamination equipment.

6.3 DEACTIVATED SYSTEMS

The section provides a description of those systems which are deactivated because they serve no active or passive function during PDMS. Table 6.3-1 lists the deactivated systems for the TMI-2 facility and their PDMS status. All deactivated systems require no maintenance and serve no active or passive function during PDMS. No attempts will be made to preserve or maintain these systems. Each of these systems is described in the following sections.

6.3.1 AUXILIARY STEAM SYSTEM

The Auxiliary Steam System was designed to supply process steam to the following equipment:

a. Reactor Coolant Evaporator
b. 13th Stage Feedwater Heaters FW-J-2A and FW-J-2B
c. Turbine Gland Seal Steam System
d. Turbine Driven Emergency Steam Generator Feed Pump
e. Carbon Filters of the Makeup Water Treatment Plant.
f. Unit 1/Unit 2 Aux Steam Cross-Connect Piping.

6.3.2 BLEED STEAM SYSTEM

The Bleed Steam System was designed to provide steam from six extraction stages of the high pressure and low pressure turbines to their respective feedwater heaters. This increased the efficiency of the power plant cycle.

In addition, the Bleed Steam System provided heating steam to the first stage reheaters of the moisture separator-reheaters in the Main and Reheat Steam System and supplied steam to the Auxiliary Steam System.

6.3.3 LONG-TERM/OTSG "B" COOLING SYSTEM

The long term OTSG "B" cooling system was designed and installed during the TMI-2 cleanup period and provided the following functions:

1. Provided a means to remove decay heat and the heat from one Reactor Coolant Pump from the primary coolant by recirculating water through the "B" Steam Generator using a new decay heat removal heat exchanger and pump.

2. Prevented contamination of the ultimate heat sink (river water) by using a closed cooling water system to cool the "B" Steam Generator.

e. Nitrous Oxide System

f. Propane System

Acetylene and nitrous oxide lines were provided to support the operation of an atomic absorption spectrophotometer. P-10 count gas was distributed to support the calibration of radiological instruments. Other gases routed by the system included nitrogen, methane, and propane for various laboratory uses. Vacuum lines were also provided for testing of various components.

The basic components of the laboratory gas system included a gas cylinder storage area (located along the north outside wall of the building adjacent to the Borated Water Storage Tank) and tubing runs from the cylinder storage area into the Service Building.

The system was not designed to seismic criteria. Design pressures and temperatures for the system were based upon the maximum cylinder pressures of the various gas cylinders to be provided. These pressures ranged from 2640 psig (for nitrogen) to 110 psig (for propane). In as much as pressurized gas cylinders provided the motive force for gas transport in the system, there were no pumps associated with the system except for VL-P-1 and VL-P-2, which were the vacuum pumps for each of the two available vacuum connections. The only other major pieces of equipment associated with the system were a line heater (NO-H-1) for the nitrous oxide supply and a flash arrester (AL-V3) for the acetylene supply system.

All storage bottles have been removed for PDMS.

6.3.30 MAKEUP WATER TREATMENT AND CONDENSATE POLISHING SYSTEM

The Makeup Water Treatment System processed Susquehanna River water and provided high purity filtered and demineralized water for the Demineralized Service Water System. In addition, this system supplied the condensate polishing system which reduced the level of suspended and dissolved impurities in the feedwater and condensate system to acceptable levels.

6.3.31 AMMONIA SYSTEM

The Ammonia System was used in the condensate polishing system to reduce the level of suspended and dissolved impurities in the Feedwater and Condensate System to acceptable levels, thereby eliminating impurities that could cause corrosion of steam generator tubes. The ammonium hydroxide and hydrazine feed to the Condensate and Feedwater Systems were used for maintaining feedwater pH and scavenging oxygen, respectively.

TABLE 6.3-1 (cont'd)

DEACTIVATED SYSTEMS

SYSTEM DESCRIPTION	SYSTEM CODE	PDMS FUNCTION	CONTAINMENT ISOLATION	INTERNAL CONTAMINATION	REMARKS
Propane Lab	PL	NONE	NO	N/A	All bottles removed from plant and all lines depressurized.
Water Treatment	WT	NONE	NO	NO	
Ammonia	AM	NONE	NO	NO	All ammonia removed from plant.
Reactor Building Chiller Water	RBC	NONE	NO	NO	
Safety Features Actuation	ES	NONE	NO	N/A	This system is the instrumentation monitoring and trip initiating system for the Engineered Safety Features System.
Breathing Air	BA	NONE	NO	NO	This system is a manifold attached to the "SA" system.
Containment Air Control Envelope HVAC	CH	NONE	NO	NO	
Control Rod Drive	CRD	NONE	NO	NO	
Miscellaneous Instrumentation	YM	NONE	NO	N/A	
Cond. Air Extraction Filter	CAE	NONE	NO	NO	This system is a post accident addition to the "VA" system.

Which, in turn, leads to the determination that the equivalent value of (ℓ/d^4) for the leak paths is:

$$(\ell/d^4)_{leak} = 2.61E10 \text{ ft}^{-3}$$

[If the length of the leak path is on the order of the Containment wall thickness (i.e., 4 ft), the total leak diameter would be 0.042 inches.]

The ratio of leak flow to Breather vent flow can then be written as:

$$\dot{m}_l / \dot{m}_v =$$

$$[(128\mu/\pi g_c)(\ell/d^4)_{vent} + K] / [(128\mu/\pi g_c)(\ell/d^4)_{leak}] \qquad (7)$$

with:

$$(\ell/d^4)_{vent} = 480 \text{ ft}^{-3}$$

$$K = 0.312 \text{ lbf-sec/ft}^5$$

This gives the ratio of mass flow rates as:

$$(\dot{m}_l / \dot{m}_v) = (0.00717 + 0.312) / 3.89E5 = .000001$$

Therefore, the Containment Atmospheric Breather clearly is "the most probable pathway".

As stated in Section 7.2.1.2.2, there is a welded plate installed downstream of the HEPA filter that holds four sample filter paper frames; each frame holds a set of two filter papers. The air flow into and out of the containment via the Breather also passes through each set of two sample filters. (For the purposes of this discussion, the sample filter papers closest to the Breather HEPA will be referred to as the No. 1 Filters and the sample filter papers farthest from the Breather HEPA and closest to the Auxiliary Building atmosphere as the No. 2 Filters.) The Breather HEPA filters the air leaving the Containment into the Auxiliary Building. Filter No. 1 collects the material that may pass through the HEPA filter. Filter No. 2 filters and samples the air coming back into the Containment from the Auxiliary Building.

All four of the No. 1 Filters are removed semi-annually and one is assayed for radioactivity. If any activity is found on the filter, it will be assumed that, for the sampling time period, a like amount of activity was released from the Containment into the Auxiliary Building (i.e., an assumed efficiency of 50%). This is a very conservative approach since the sample filter papers used have a collection efficiency of greater than 90%. Using this methodology, any activity assumed to be released is captured on the filter and will be assumed to have been released over the six month time period. Since the filter deposition is cumulative, this method provides determinative (but not real time) monitoring to verify that effluents through the Breather are within the calculated values in Chapter 8. Due to the extremely low releases calculated for PDMS, the sample filter paper is deemed adequate for determining the releases anticipated

Single line diagrams of the Unit 2 AC distribution system are shown on Figures 7.2-14 through 7.2-42 and contain the following details:

a. Power supply feeders (i.e., network configuration)

b. Busing arrangements

c. Loads supplied from each bus

d. Manual and automatic interconnections between buses, buses and loads, and buses and supplies

e. Equipment capacities

f. Instrumentation and control systems for the applicable power systems with the assigned power supply identified

g. Electric circuit protection system network.

7.2.5.1.3 Evaluation

The Auxiliary Electrical Distribution System has been modified to meet the requirements of PDMS. Due to the deactivation of the reactor and its associated support systems, Class 1E emergency diesel backed power systems are no longer required. In support of this, the emergency diesel generators have been deactivated and the Engineered Safety Feature buses no longer have connection capability to the emergency diesel generator buses 2DG-1 and 2DG-2. The Engineered Safety Feature buses will no longer be considered Class 1E. All non-PDMS support systems and components have been deactivated and isolated from the power distribution system. Administrative controls have been developed and are in place to govern the use of PDMS support systems and prevent unauthorized use of deactivated systems. Load consolidation has been performed in order to reduce the number of energized circuits which reduces plant maintenance and surveillance activities thereby enhancing overall plant safety. DC power required during PDMS is supplied through a battery charger. Backup power has been provided to support a significant portion of the fire protection system during a temporary loss of power.

The Auxiliary Electrical Distribution System, as modified for PDMS, will provide sufficient reliable electrical power to support all PDMS activities with enhanced overall plant and personnel safety. In the event that all electrical power is lost, all ventilation and water processing will be suspended and actions will be taken expeditiously to restore power. In the unlikely event that power cannot be restored within 14 days, a report will be submitted to the NRC within 30 days detailing the plans and schedule to restore power.

operational to transfer accumulated water to minimize potential spread of contamination due to localized flooding.

7.2.6.6 Sewers

7.2.6.6.1 PDMS Function

The basic function of the sewage collection system is to transport sewage from TMI-2 structures to the Sewage Treatment Plant. The PDMS configuration is shown on Figure 7.2-47.

7.2.6.6.2 System Description

Sewage from the temporary personnel access facility (TPAF) in the Turbine Building and several outbuildings is routed to the Sewage Treatment Plant which serves both TMI-1 and TMI-2. The major operational portion of the Sewer System is underground gravity flow piping that provides for the transport of sewage from the Unit 2 support facilities to the STP.

7.2.6.6.3 Evaluation

The Sewage Treatment Plant will process sewage from the TPAF and several outbuildings. The majority of TMI-2 sewage piping is underground below the frost line.

7.2.6.7 Domestic Water System

7.2.6.7.1 PDMS Function

During PDMS, portions of the existing domestic water system will remain operational to provide domestic water services required during PDMS.

7.2.6.7.2 System Description

The domestic water system is maintained as a modified operational system. Unit 2 is supplied with domestic water from Unit 1 which is then distributed to Unit 2 support facilities. Domestic water is provided to the radwaste seal water unit in the Auxiliary Building, to the TPAF in the Turbine Building, and to several outbuildings. The PDMS configuration is shown on Figures 7.2-47 and 7.2-48.

7.2.6.7.3 Evaluation

Since personnel access into the plant will be infrequent, only one source of domestic water is required in the Turbine Building. The Auxiliary Building header is isolated but, if necessary, can be repressurized to supply domestic water to the seal water unit by opening one valve. Unit 1 and Unit 2 support facilities will remain operational; therefore, domestic water will continue to be supplied to them.

7.2.6.8 Control Room Ventilation System

7.2.6.8.1 PDMS Function

The Control Room Ventilation System will be maintained in an operational condition to support PDMS activities. This system provides fresh, filtered, heated or cooled air in sufficient quantity to support personnel occupancy.

7.2.6.8.2 System Description

The Control Room Ventilation System is a forced flow heating and ventilation system consisting of a supply and exhaust subsystem which provides once-through ventilation with partial recirculation.

When the ventilation system is not operating, it provides a passive, filtered pathway for equalization to atmospheric pressure. The PDMS configuration is shown on Figure 7.2-49.

7.2.6.8.3 Evaluation

During PDMS, Control Room ventilation and air handling equipment provide a filtered pathway for active and passive operation to meet industrial and radiological requirements. The Control Room Ventilation System is maintained operational for the occasional maintenance and surveillance entries into the TMI-2 Control Room and in response to off-normal conditions.

7.2.6.9 Cable Room Ventilation System

7.2.6.9.1 PDMS Function

The Cable Room Ventilation System will be maintained in an operational condition to support PDMS activities. When in operation, this system provides fresh, filtered, heated or cooled air in sufficient quantity to maintain room temperatures suitable for personnel and equipment.

7.2.6.9.2 System Description

The Cable Room Ventilation System is a forced flow heating and ventilation system consisting of a supply and exhaust-return subsystem which provides ventilation with partial recirculation.

When the ventilation system is not operating, a damper in the bypass duct will open, allowing free passage of air in the exhaust-return duct system. The PDMS configuration is shown on Figure 7.2-49.

<u>REFERENCES</u>

7.2-1 GPU Nuclear letter, LL2-81-0191, "Design Pressure for Containment and Future Mechanical and Electrical Penetration Modifications," dated December 4, 1981.

TABLE 7.2-4

FIRE PROTECTION ZONE DETECTION SYSTEMS

BUILDING	LOCAL CONTROL PANEL*	ELEVATION	ZONE	PDMS STATUS OS	PDMS STATUS DS	ZONE DETECTORS**	AUXILIARY FUNCTIONS
Auxiliary Building	711	258'-6" & 280'-6"	2	X		FS-XD-6087, 6088, FS-XD-6089-1, 6089-2 FS-XD-6090-1, 6090-2 FS-XD-6091, 6092 FS-XD-6093-1, 6093-2 FS-XD-6094 through 6097	Stops Fans AH-E-7A & B, AH-E-8A, B, C, D, and AH-E-41.
		305'-0"	3	X		FS-XD-6098-1, 6098-2 FS-XD-6099-1, through 6099-3 FS-XD-6100-1 through 6100-4 FS-XD-6101, 6102 FS-XD-6103-1 through 6103-8 FS-XD-6104-1, 6104-2 FS-XD-6105	
		328'-0"	4A 4B 4C		X X X		
		328'-0" & 347'-6"	4D	X		FS-XD-6107-1, 6107-2 FS-XD-6108-1, 6108-2 FS-XD-6109-1 through 6109-38	
Chlorinator House	712***	---	5		X		
Circulating Water Pump House	713	---	6		X		
Coagulator Building	714	----	7	X			Stops Fan AH-E-42.
Control Building	715	280'-6"	8A 8B	X X		FS-XD-6142-1 through 6142-4 FS-XD-6143-1 through 6143-4	Stops Fans AH-C-17A, B & AH-E-20.
		Mezzanine	8C	X		FS-XD-6144-1 through 6144-9	
		280'-6"	8D 8E	X X		FS-XD-6138-1 through 6138-4 FS-XD-6139-1 through 6139-4	
		351'-6"	8F		X		
		305'-0" & 351'-6"	9	X		FS-XD-6147-2, 4, 6, 8, 10, 12	Stops Fans AH-C-17A, B, AH-E-20. Shuts Damper D4073.
		305'-0"	9A	X		FS-XD-6147-1, 3, 5, 7, 9, 11, 13	Stops Fans AH-C-17A, B, AH-E-20. Shuts Damper D4073.
			9B		X		
		331'-6"	10	X		FS-XD-6148-1 through 6148-16, FS-XD-6154, 6161	Stops Fans AH-C-16 A & B, AH-E-35, AH-E-4A &B, AH-E-5, AH-E-25. Shuts Damper D4092C.
		351'-6"	11A 11B	 X	X 	FS-XD-6155, 6159, 6160 FS-XD-6158-1 through 6158-15	Stops Fans AH-C-19A & B, AH-E-6, and AH-E-40.

TABLE 7.2-4 (Cont'd)

FIRE PROTECTION ZONE DETECTION SYSTEMS

BUILDING	LOCAL CONTROL PANEL*	ELEVATION	ZONE	PDMS STATUS OS	PDMS STATUS DS	ZONE DETECTORS**	AUXILIARY FUNCTIONS
Control Building Area	716	280'-6"	12A	X		FS-XD-6182-1 through 6182-8	Stops Fans AH-C-50A & B, AH-C-51.
			12B	X		FS-XD-6183-1 through 6183-12	Stops Fans AH-E-13, AH-C-58A through J, AH-E-62.
Fire Pump House	718	312'-0"	15		X		
Fuel Handling Building	719	280'-6"	16	X		FS-XD-6240-1 through 6240-12, FS-XD-6249	Stops Fans AH-E-9A & B, AH-E-10A, B, C, and D.
		305'-0"	17	X		FS-XD-6241 through 6241-4	
		328'-0"	18A		X		
			18B		X		
		347'-6"	19	X		FS-XD-6251-1 through 6251-12	
Mechanical Draft Cooling Tower	---	----	20		X		
Reactor Building	720	328'-0"	22A		X		
			22B		X		
			22C		X		
		305'-0" & 347'-6"	22D	X		FS-XD-6275-1 through 6275-5 FS-XD-6276-1 through 6276-5	
		347'-6"	22E	X		FS-XD-6277	Stops Fan AH-E-63.
		282'-6'	22F	X		FS-XD-6278	Stops Fans AH-E-12A & B, AH-E-19A & B, AH-E-34. Shuts Valves AH-V-1A & B, AH-V-4A & B.
River Water Pump House	718	280'-9" & 312'-0"	23		X		

TABLE 7.2-4 (Cont'd)

FIRE PROTECTION ZONE DETECTION SYSTEMS

BUILDING	LOCAL CONTROL PANEL*	ELEVATION	ZONE	PDMS STATUS OS	PDMS STATUS DS	ZONE DETECTORS**	AUXILIARY FUNCTIONS
Service Building	721	280'-6"	24	X		FS-XD-6342-1 through 6342-5 FS-XD-6343 FS-XD-6344-1 through 6344-4	Stops Fans AH-C-50A & B, AH-C-51
		305'-0"	25	X		FS-XD-6319, 6320 FS-XD-6321-1, 6321-2 FS-XD-6322 through 6337 FS-XD-6338-1, 6338-2 FS-XD-6339-1, 6339-2 FS-XD-6348-1 through 6348-4	Stops Fans AH-E-23A & B, AH-C-24, AH-C-25A & B, AH-E-26, AH-E-27, AH-E-28, AH-E-33 and AH-C-36.
		322'-0" & 331'-6"	26A		X		
			26B	X		FS-XD-6340-1, 6340-2 FS-XD-6341-1 through 6341-5 FS-XD-6315-1, 6315-2 FS-XD-6316-1, 6316-2 FS-XD-6317, 6318	
			26C		X		
			26D		X		
			26E		X		
Turbine Building	722	281'-6"	27A		X		
			27B	X		FS-XD-6364 FS-XD-6373-1 through 6373-25	
		305'-0"	28A		X		
			28B		X		
			30	X		FS-XD-6366-1 through 6366-8 FS-XD-6367-1 through 6367-4 FS-XD-6368-1 through 6368-3 FS-XD-6369-1, 6369-2	
		331'-6"	29	X		FS-XD-6365, 6370, 6371 FS-XD-6372-1 through 6372-16	Stops Fans AH-E-1 & 2, AH-E-38.

*Power Supply for all Zone Detection Panels is from Vital Power Panel 2-4V through Fire Protection Fuse Panel 4.
**Only operational area ionization smoke detectors are listed; all duct smoke detectors have been deactivated.
***Control Panel 712 receives operational signals from WHPF and Respirator Facility for transmission to TMI-1 Control Room.

9. Section 7.2.4.3 - Effluent Monitoring - indicates that "Areas and systems within the AFHB containing contamination sufficient to pose a potential for a release will be sealed". In the previous question we asked about the cubicles that will be sealed. Provide the following information for those areas and systems not discussed in your answer to our previous question:

1. What additional areas and systems will be sealed,

2. The [illegible]delines used to determine if an area should be sealed,

3. [illegible]ted level of contamination in each of the areas or systems that will be sealed [illegible]ixed and removable),

4. Where each area and system will be sealed and the method that will be used for sealing to ensure [illegible] there will be no release of contamination.

RESPONSE:

1. Besides the "A" spent fuel pool, discussed in response to the previous question, no other area has been identified which required sealing, since there are no areas that contain sufficient loose contamination to pose a contamination spreading concern. Piping systems which were found to be internally contaminated upon draining were sealed by cl[illegible]t and drain valves or valves which form a boundary with interfacing sy[illegible] Unisolable vent paths (e.g., the steam exhaust stack from the turbine driven [illegible]gency feedwater pump) were sealed by capping, plugging, etc.

2. An area would have been a candidate for sealing if surface contamination levels and area air flow characteristics had created a contamination spreading concern.

3. No area (besides the "A" spent fuel pool) required sealing. Piping systems were sealed when sample results indicated levels of contamination greater than LLD.

4. Since, no areas (besides the "A" spent fuel pool) required sealing, the method of sealing cannot be provided. Systems were sealed by closing vent and drain valves and valves which form a boundary with interfacing systems.

12. Section 6.17 - Mechanical Draft Cooling Tower. "Fire Protection for the wood portion of cooling towers will remain operational to mitigate consequences of a fire."

13. What type of fire protection system is in place? What methods are used to avoid pipe damage as a result of freezing temperatures?

RESPONSE: (The correct reference is to Section 6.1.7.)

The Mechanical Draft Cooling Tower has been dismantled; the combustible material from the two (2) Natural Draft Cooling Towers has been removed. PDMS SAR Sections 6.1.6 and 6.1.7 have been revised accordingly.

16. Section 7.1.6 - Unit 1/Unit 2 Corridor - The waste shredder, packaging, and other similar items constitute a possible combustible loading that should be addressed for PDMS. Are there fire barriers in place and/or extinguishing systems that protect the area? Are combustibles stored in a manner that reduces fire potential, such as minimal amounts in closed metal cabinets?

RESPONSE: This entire process (i.e., waste shredder, packaging, and other similar items) has been removed. Section 7.1.6 of the PDMS SAR has been changed to reflect this.

17. Section 7.2.2 - Fire Protection Service and Suppression - This section discussed "potential" fires and "credible" fires, however, only three cases are given in Section 8.2.5. Identify credible fires, by addressing combustible loading in the facility. Discuss the effects of such fires on PDMS-related systems (for example HVAC).

RESPONSE: For PDMS, there are four separate fire zones in the Reactor Building: 1. the combined 305' and 347' elevations; 2. the combined "A" and "B" D-rings; 3. the Fuel Transfer Canal (FTC); and 4. the basement. A fire could potentially occur in any one of these zones, but should be contained within that one zone due to construction configuration and remaining combustibles. As discussed in PDMS SAR Section 8.2.5, the worst-case fire with regard to off-site dose consequences is a postulated fire in the RB Basement. This postulated event bounds any credible fire accident in the Reactor, Auxiliary, and Fuel Handling Buildings for PDMS. Combustible loading in containment and adjacent areas is outlined in the TMI-2 Fire Protection Program Evaluation (FPPE), which is the TMI-2 fire hazards analysis. The TMI-2 FPPE for PDMS was submitted to the NRC via GPU Nuclear letter C312-93-2064, dated October 14, 1993. The FPPE incorporates the four fire zones concept discussed above. For the remainder of the plant, the fire loadings were discussed in a previous revision of the fire hazards analysis (submitted November 2, 1984). Those fire loadings have not changed significantly and are typically low (less than 1 hour loading of 80,000 BTU/ft^2 and in most cases less than a 1/2 hour loading of 40,000 BTU/ft^2). The combustibles consist of typical power plant materials, which are primarily electrical cable designed to IEEE-383. With the plant in PDMS, most electrical systems are de-energized, thus removing the principal ignition source. Therefore, many of the postulated fires in the FPPE are not considered credible; PDMS SAR Section 8.2.5 discusses the worst-case postulated fire with three (3) ventilation scenarios.

The effects of fire on systems used in PDMS is either insignificant or addressed in PDMS SAR Section 8.2.5. Interlocks with ventilation are listed in Table 7.2-4 of the PDMS SAR.

18. Section 7.2.2.1 - PDMS Function - Paragraph (b) indicates that "automatic fire suppression shall be provided to areas of the facility and systems which contain significant amounts of combustibles and possible ignition sources." Define "significant quantities" (for instance as BTU/sq ft in any one area). List the areas that you anticipate will contain these quantities.

RESPONSE: The original paragraph (b) of section 7.2.2.1 has been deleted since no areas contain significant quantities of combustibles and possible ignition sources.

For TMI-2, 80,000 BTU/ft^2 is the value used for "significant quantities" of combustibles. No area of the TMI-2 plant contains this quantity of combustibles.

19. Section 7.2.2.1 - PDMS Function - Paragraph (e) states that the "presence of flammable and/or combustible liquids and materials shall be minimized to the maximum extent practical." How will the minimization of flammable liquids and combustibles be carried out and enforced. What procedures will be used to control these items? Will periodic fire inspections be conducted?

<u>RESPONSE</u>: PDMS SAR Section 7.2.2.2 items f, g, and h defined the actions accomplished to reduce combustible material inventories in the plant, which were to remove most non-original plant items installed post-accident, remove most lube oil and fuel oil from tanks and reservoirs, and remove charcoal filters.

A Fire Protection Program similar to that which was in place during Facility Mode 3 will maintain these reductions and control the introduction of other materials. This Fire Protection Program also addresses plant fire protection and housekeeping inspections. The frequency of these inspections will be at least quarterly.

26. Section 7.2.2.2 - System Description - Paragraph (m) - How was it determined that the fire hazard risk in certain areas was small? Was a fire hazard analysis conducted? If so, provide a copy of the analysis.

RESPONSE: Fire loadings less than 40,000 BTU/ft^2 are considered small. The basis for this consideration is that the plant is in a stored condition with transient combustibles removed and most electrical systems de-energized.

The TMI-2 FPPE for PDMS was submitted to the NRC via GPU Nuclear letter C312-93-2064, dated October 14, 1993. See response to Question No. 17.

27. Section 7.2.2.3 - Evaluation - Is documentation available to show that combustibles have been removed (or procedures to indicate that combustibles will be removed) from areas in which the scope of fire protection has been reduced?

<u>RESPONSE</u>: PDMS SAR Section 7.2.2.2 discusses some of the removals. An internal Unit Work Instruction (UWI) tracks the removal of these materials. Essentially, as much as possible was removed from the plant with limitations based on cost of removal vs. fire risk and continued need for the post-accident component or supply. There is no intention to remove original plant or structural items other than significant hazards, such as fuel and lube oils (to the extent practical under ALARA considerations) and hydrogen gas.

28. Paragraph 3 - Will periodic function testing and maintenance occur to determine that each device is operational? If so, describe the testing program.

RESPONSE: The testing and maintenance program currently in place will continue on subsystems and components required to be operational for PDMS. Any deletions or reductions in scope (e.g., NFPA compliance) or frequency will be evaluated under the provisions of 10 CFR 50.59. Specific testing requirements are addressed in PDMS operating procedures.

33. Section 8.2.5 - Fire Inside Containment - This section postulates a fire from oil in the reactor coolant pumps, yet paragraph 6.3.51 states that the oil has been removed from the pumps. In addition, Section 7.2.2.2, paragraph (e) does not mention the removal of the oil from the reactor coolant pumps. Will the oil be present in the reactor coolant pumps during PDMS. How much will be present?

RESPONSE: The entire reactor coolant pump lube oil inventory was not removed since the dose rates severely limit access to the areas of the pumps and oil collection/drain systems. PDMS SAR Section 6.3.51 has been revised to reflect this. Each of the four reactor coolant pumps has two sumps containing 120 gallons of oil in the upper reservoir and 18 gallons in the lower for a total of 138 gallons of oil per pump. More than 40% of this oil has been removed.

A.1. What system has been established to verify continued maintenance of isolation of the areas and components that assure subcriticality?

RESPONSE: The current TMI-2 Technical Specifications state that Facility Mode 2 "shall exist when the following conditions are met:

a. The Reactor Vessel and Reactor Coolant System are defueled to the extent reasonably achievable.

b. The possibility of criticality in the Reactor Building is precluded.

c. There are no canisters containing core material in the Reactor Building."

Demonstration that these conditions have been met was contained in the TMI-2 Defueling Completion Report (DCR) which justified the transition from Facility Mode 1 to Facility Mode 2 and in GPU Nuclear letter C312-92-2080, dated December 18, 1992, which evaluated RV subcriticality based on an increased RV fuel estimate. The DCR stated that no inspections or monitoring are necessary during PDMS to ensure subcriticality. This conclusion is not altered by the evaluation contained in the referenced GPU Nuclear letter. Therefore, the subject of criticality has been resolved and is not an issue for TMI-2 in PDMS.

Subcriticality at TMI-2 during monitored storage is assured by at least two independent means in all fuel locations. Outside of the Reactor Vessel, there is far less than a critical mass in any single location. In addition, transport of material from one location to another is precluded by the drained state of the Reactor Coolant System. Finally, closed containment isolation valves prevent transport of fissile material between the Reactor Building and the Auxiliary and Fuel Handling Buildings.

In the Reactor Vessel, subcriticality is ensured as described in the TMI-2 DCR and the above mentioned GPU Nuclear letter. Once again, transport of fissile material to or from the Reactor Vessel is inhibited by the drained state of the Reactor Coolant System.

A.2. Is the Reactor Vessel to be sealed prior to PDMS? If the indexing fixture and shielded work platform are to remain in place, what is the expected dose rate from radiation (both direct and scattered) on the 305 ft. and 347 ft. levels?

RESPONSE: The Reactor Vessel is covered but not sealed. The cover controls the spread of contamination and prohibits water ingress but permits hydrogen egress via a vent.

The exposure rate on the 305 ft. and 347 ft. elevations average 150 mR/hr and 50 mR/hr, respectively. The exposure rate is overwhelmingly governed by Cobalt-60 activation of the baffle plates. Dose rate contributions from residual fuel and Cesium-137 surface contamination are negligible. Shine and backscatter are also negligible since the distance between the radiation source and the nearest solid object (i.e., the polar crane) is over 100 ft.

A.4. Will emergency lighting be maintained in the Service and Turbine Buildings during PDMS?

RESPONSE: Installed emergency lighting will be maintained during PDMS. Normal lighting is available throughout TMI-2 except in the RB. Normal lighting within the RB is provided by strings of lights installed on the 305' and 347' elevations. The lighting is adequate to support PDMS inspection and test activities without additional illumination from the installed building lighting. Eight hour portable emergency lighting will be carried by emergency personnel crews entering the buildings. This lighting will be staged with emergency response crew equipment. Routine entry crews will carry flashlights.

PDMS SAR Section 7.2.5.2 has been revised accordingly.

A.5. Has a decision been made as to dismantling the redwood cooling tower?

RESPONSE: The Mechanical Draft Cooling Tower has been dismantled; the combustible material from the two Natural Draft Cooling Towers was removed. PDMS SAR Sections 6.1.6 and 6.1.7 have been revised accordingly.

B.4. Provide additional detailed information on methodology for the determination of release rates and effluent concentrations for containment and AFHB gaseous effluents during passive mode conditions.

RESPONSE: As discussed in PDMS SAR Section 7.2.1.2, the Containment Atmospheric Breather was added to the Containment to provide passive pressure control of the Containment relative to ambient atmospheric pressure and to establish a "most probable pathway" through which the Containment will "breathe." Refer to Supplement 3, Question B.3 for a discussion of the methodology for determining gaseous effluent releases for reporting purposes.

In the Auxiliary and Fuel Handling Buildings (AFHB), no airborne effluent discharges are anticipated. Areas and systems within the AFHB containing contamination sufficient to pose a potential for a release will be sealed; refer to Supplement 1, Question 8 for further information.

B.7. Provide flowpath, methodology for inplace DOP testing, and clarification of size and location of HEPA filter in atmospheric breather for containment.

RESPONSE: Refer to PDMS SAR Figure 7.2-2. The Hydrogen Control Exhaust Unit is used as the Reactor Building passive breather. Filter position AH-F-33 contains a 24" x 24" x 11 1/2" HEPA and a welded plate installed downstream of the HEPA that holds four sample filter paper frames. Each frame holds a set of two sample filter papers. All other filter positions are empty.

The Reactor Building passive breather is operated in the following modes:

- Passive Breathing - AH-V-3A, AH-V-52, AH-V-153, AH-V-154, and AH-V-25 will be open and AH-V-4A, AH-V-120A, and AH-V-36 will be closed. A filter housing door downstream of AH-F-33 will be opened. In this configuration, the Reactor Building naturally aspirates via a HEPA-filtered pathway to the Auxiliary Building which, in turn, either naturally aspirates or is ventilated to the environment through yet another set of HEPA filters.

- DOP Testing - AH-V-3A, AH-V-25, and AH-V-36 will be open. AH-V-52, AH-V-4A, AH-V-120A, and the filter housing door, which would be open during passive breathing, will be closed. As the Hydrogen Control Exhaust Fan, AH-E-34, or a portable blower is operated, DOP is injected upstream of AH-F-33 and sampled downstream using ports. DOP testing of the HEPA filter will be performed without the sample filter paper frames in place.

B.8. Provide estimates of the total activity remaining in the Auxiliary Building, the Fuel Handling Building, and in each of the seven (7) other contaminated facilities at TMI-2.

RESPONSE: The estimated total activity present as loose surface contamination in the AFHB and the seven (7) other contaminated facilities at TMI-2 upon entry into PDMS is given in PDMS SAR Tables 5.3-5 and 5.3-6. The total quantity of contamination (fixed and loose) in the AFHB and the seven other contaminated facilities at TMI-2 is approximately 12,000 Ci as given in GPU Nuclear letter C312-93-2076, dated December 13, 1993.

B.11. Describe the air flow pathways between the Auxiliary Building and the Fuel Handling Building during PDMS.

RESPONSE: Refer to PDMS SAR Figures 1.2-8, 9, 10, and 11.

The TMI-2 Fuel Handling Building is a four floor building which shares a common wall with the TMI-2 Auxiliary Building. On all levels, there are personnel doors which allow passage through the common wall. When the AFHB ventilation is secured, the doors on the first three floors between the TMI-2 Fuel Handling Building and the TMI-2 Auxiliary Building (i.e., El. 280', 305', and 328') will remain open to allow free air passage between the buildings.

The TMI-2 Fuel Handling Building also shares a common roof and west wall with the TMI-1 Fuel Handling Building. The building space above the 347' elevation is common to TMI-1 and TMI-2 as is the Truck Bay (El. 305') and the Standby Pressure Control (SPC) pit (El. 328'). However, the doors from the TMI-2 side which access the Fuel Handling Building volume common to both TMI-1 and TMI-2 are closed, limiting the supply of air from the TMI-2 side. Dampers are shut; wall and floor penetrations are sealed. The Fuel Handling Building volume common to both TMI-1 and TMI-2 is maintained at a slightly negative pressure by the TMI-1 Fuel Handling Building ventilation system. Air flow from the TMI-2 side is expected to be negligible due to the lack of supply air.

A.11. What is meant in the same report as to "exceptions to Phase III endpoint criteria"?

RESPONSE: As stated in PDMS SAR Section 5.3.1, a final PDMS radiological assessment was performed utilizing radiological surveys as a basis for determining whether the established Phase III endpoints were achieved. At the conclusion of the radiological assessment, if it was determined that satisfactory radiological conditions were not achieved, either additional decontamination efforts were undertaken or exceptions to the goals were taken. An exception to an established radiological goal was approved based on the nature of the source of the higher dose rate (e.g., is the source highly mobile or tightly adhered), the decontamination methods already used and those available, and/or ALARA considerations.

A.12. Has a determination been made as to the cubicles in the AFHB that will be locked during PDMS?

<u>RESPONSE</u>: Internal cubicles that have doors may or may not be locked at the discretion of management. Cubicles that are not isolated by means of a locked door shall be "roped-off" and labeled with a sign that reads, "CONTROLLED ACCESS AREA IN PDMS LAYUP."

A.15. Evaluate the possibility (and the result) of installing a low volume fan on the passive breather line from the reactor containment building for some period of time upon entry into PDMS to accumulate a data base for release estimates.

RESPONSE: Since the Reactor Building is "breathing" due to daily temperature and pressure changes, a low volume fan would do very little to maintain a continuous flow. Provisions for determining release estimates has been addressed in PDMS SAR Section 7.2.1.2.3. Two additional sample filter paper frames have been installed downstream from the HEPA filter on the Containment Atmospheric Breather line. Each frame contains a set of four filter papers. The first filter paper set downstream of the HEPA collects radioactive content passing through the HEPA filter; one of the papers is assayed for radioactivity semi-annually. The second filter paper set downstream from the HEPA protects the first filter paper set from any extraneous radioactivity entering from the Auxiliary Building. Since the filter deposition is cumulative, this method provides determinative (not real time) monitoring to verify that effluents through the breather are within the calculated values. Due to the extremely low releases calculated for PDMS, the sample filter papers are adequate for determining the releases anticipated during PDMS.

A.18. Evaluate use of TLDs, remote video equipment or other methods to monitor potential fuel movement in the reactor vessel.

RESPONSE: Most standard radiation measuring sensors have a significant disadvantage measuring small quantities of fuel in a high radiation field. TLDs tend to lack sensitivity. Cameras will deteriorate rapidly in a high radiation field. All measuring techniques would require radiation exposure to workers due to the Reactor Vessel being drained. Since the RV is drained, there is a very low probability of any driving force significant enough to move any residual fuel. Since the results of our extremely conservative criticality analysis conclude that the small quantity of fuel remaining in the RV does not pose a criticality safety concern (i.e., criticality is precluded) and it is extremely difficult to measure small changes in radiation due to residual fuel relocation, GPU Nuclear intends to minimize radiation exposure to workers by not performing measurements to monitor potential fuel movement.

B.3. Revision 6, page 7.2-2, and 7.2-6 of the PDMS SAR describes two sample filter papers downstream of the HEPA on the containment atmospheric breather. It also states that "provisions have been made to allow semi-annual sample filter paper removal and assay and reinstallation or replacement of the DOP-tested HEPA."

- o Describe the purpose and the specific installation configuration of the sample filter papers and explain how GPU will assure that analysis of the sample filter paper is indicative of radionuclide releases from the containment breather.

- o Explain why the HEPA is to be reinstalled or replaced, how often is it to be reinstalled or replaced, and for what purpose.

RESPONSE: Since the containment preferentially "breathes" via the HEPA and sample filter papers to the Auxiliary Building (AB), air flow continuously reverses direction during PDMS due to ambient atmospheric pressure changes. The two filter-in-series design ensures that most of the contamination coming from the AB is trapped by the second paper filter downstream of the HEPA while the first paper filter is analyzed for radionuclide effluents from the Containment. As stated in PDMS SAR Section 7.2.1.2, extremely low releases are anticipated during PDMS. Although the efficiency of the sample filter papers will most likely be much greater than 50%, GPU Nuclear will report the results of the first paper filter assay as though a like quantity of radionuclides was released (i.e., an assumed efficiency of 50%).

The installation configuration of the sample filter papers is a welded plate that holds four filter frames; each frame holds a set of two filter papers that can be removed by loosening four wing nuts and sliding out the frame. The filter paper set is then removed from the frame and analyzed for radionuclide content. DOP testing of the HEPA filter will be performed without the sample filter paper frames in place. Based on the test results, the HEPA may have to be reinstalled or replaced to ensure that it is filtering effluents as designed. A frequency of reinstallation or replacement will be solely dependent on the results of the DOP testing performed to ensure HEPA integrity.

1. Provide an estimate of the total quantity of contamination (in curies) in the Auxiliary and Fuel Handling Buildings. Include both fixed and removable contamination.

RESPONSE: See the response to PDMS SAR Supplement 2, Question B.8.

2. Will sumps and floor drains in the AFHB be capped or sealed during PDMS? If some will not, identify which ones which will not be capped or sealed and indicate the methods to be used to ensure that activity within floor drain piping and sumps does not move outside as they dry. If no methods are to be used, provide an estimate of the number of curies located in the floor drains or sumps.

RESPONSE: Sumps that remain in service were not sealed. Sumps that were removed from service may have been sealed if radiological monitoring indicated that significant activity is migrating from the sump.

Floor drains remain open and unaltered where possible. A number of floor drains in the AFHB have been altered because they have become a source of contamination in their respective cubicles. The activity is believed to move along the drain lines as a result of two mechanisms: 1) the different air pressures in the cubicles causes the floor drain piping to be an air flowpath between the cubicles; and 2) the water loop seals in some of the drains evaporates allowing air flow. As a result of this potential problem, ball float valves have been installed in some of the drains. These ball floats allow water to drain from the drains. When no water is present, the ball floats lower and block airflow from the drain which also decreases the rate at which water evaporates from the loop seal. In addition to installing ball float valves, a few floor drains have been plugged.

Regarding a curie estimate, there are approximately 17 Ci of contamination in the floor drains and approximately 600 Ci in the sumps with over 99% contained in the Auxiliary Building sump.

5. The new technical specifications proposes deleting the definition of ACCIDENT GENERATED WATER. The staff suggests retaining the definition until the conclusion of the AGW disposal activity.

RESPONSE: AGW evaporation was completed on August 12, 1993. Therefore, this PDMS Technical Specification definition was deleted.

9. Section 3.3.3.1 of the current Technical Specifications requires specific radiation monitors to be operable. The licensee proposes deleting all listed radiation monitors. The staff recommends that the licensee retain radiation monitors in the waste handling and packaging facility (operable during radioactive waste handling or processing activities), the EPICOR Monitor until AGW processing is complete (the staff would agree to maintain monitor operational only when there is a potential for a release in the EPICOR Building, i.e., during radioactive waste handling or processing), and HP-219 and HP-219A. The staff will also accept inclusion of these monitors in the Offsite Dose Calculation Manual (ODCM) consistent with Generic Letter 89-01 dated January 31, 1989.

RESPONSE: All radiation monitors were transferred to the ODCM in accordance with Generic Letter 89-01. Therefore, PDMS Tech. Spec. Section 3.3.3.1 has been deleted.

15. Section 3.2.1.2, Gaseous Effluents, of the proposed specification should include in Table 4.2-2, the requirement that if the reactor building purge grab sample exceeds some level of MPC (staff suggests 25%), then the licensee would perform alpha and Sr-90 analyses on the sample.

RESPONSE: This section was transferred into the ODCM in accordance with Generic Letter 89-01. Therefore, PDMS Tech. Spec. Section 3.2.1.2 has been deleted.

16. The staff recommends that the proposed Liquid Effluent section of Section 3/4.2.1, Radioactive Discharges, be revised to state that if TMI-2 begins to release liquid discharges from the facility after conclusion of AGW evaporation that batch discharges be recirculated the equivalent of three volumes and sampled and analyzed prior to discharge. Additionally, a grab sample shall be taken during discharge or a monitor with alarm and recorder be placed on the discharge line downstream of the batch tank.

RESPONSE: This section was transferred into the ODCM in accordance with Generic Letter 89-01. Therefore, PDMS Tech. Spec. Section 3/4.2.1 has been deleted. However, PDMS SAR Section 7.2.3.2.1 has been revised to include a discussion of the radiation detector in the liquid discharge line.

17. Section 3.7.6, Flood Protection, in the existing Technical Specifications describes measures that should be taken by the licensee when the river exceeds 301 feet MSL at the Unit 1 river water intake structure. The licensee proposes deleting this requirement. The staff recommends that this requirement be retained.

RESPONSE: The requirements for flood protection are contained in the SAR text in accordance with the NRC Policy Statement on Tech. Spec. simplification. The Recovery Tech. Spec. requirements on flood protection were prescriptive and, as such, are better placed in a procedure rather than in Tech. Specs. To this end, GPU Nuclear has merged the Unit 1 and Unit 2 flood protection requirements into a site procedure. The contents of this procedure comply with the requirements for flood protection contained in the PDMS SAR.