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APPENDIX R EVALUATION OF AUXILIARY BUILDING HVAC DUCT PENETRATION AND CONTAINMENT SEISMIC GAPS

SUPPLEMENT TWO
10 CFR 50, APPENDIX R, SECTION IIIG

UNITS 1 & 2

DONALD C. COOK NUCLEAR PLANT

INDIANA & MICHIGAN ELECTRIC COMPANY

AMERICAN ELECTRIC POWER SYSTEM

AUGUST 1984

I&M

PLEASE NOTE: The hand-written information in this report was inadvertently left out of the final copy of the report supplied to us by our consultant. It will be included in all future copies.

HVAC DUCT PENETRATION ANALYSIS

APPENDIX R EVALUATION OF AUXILIARY BUILDING HVAC DUCT PENETRATIONS AND CONTAINMENT SEISMIC GAPS FOR THE DONALD C. COOK NUCLEAR PLANT

1.0 Introduction

In March 1983, a report entitled "Safe-Shutdown Capability Assessment and Proposed Modifications" was issued for the Donald C. Cook Nuclear Plant, Units 1 and 2. The report identified the safe shutdown system requirements relative to the fire protection guidelines of 10 CFR 50 Appendix R.

As a result of the continuing fire protection program upgrade and modification implementation program, Indiana and Michigan Electric Company identified the following areas of concern with respect to Appendix R conformance at the D.C. Cook Nuclear Plant:

1. Twenty-two ventilation duct penetrations pass through fire area floors/ceilings at various elevations and are not supplied with fire dampers.

2. The fire zones/areas adjacent to the Containment Building have seismic gaps which separate the floors, ceilings and walls of these zones/areas from the Containment Building.

Each of these concerns has been evaluated separately to determine their impact on the plant safe shutdown capability in the event of a fire. The analysis addresses the following:

1. Location of safe shutdown components and circuits.

2. Method of safe shutdown compliance used in a zone/area of concern.

3. Existing and proposed fire protection capabilities.

4. Combustible loading of the zone/area of concern.

The March 1983 submittal will be the primary source of information with more detailed data supplied as it relates to specific zones/areas. This analysis includes attached figures and tables to provide a better understanding of specific concerns. Each concern will have a methodology, evaluation and conclusion section.

2.0 Ventilation Duct Evaluation Methodology

This analysis has been completed to provide technical justification for not installing fire dampers in the ventilation system duct penetrations which communicate between fire areas vertically from elevation to elevation. The ventilation ducts associated with the 22 penetrations were located on HVAC drawings showing the entire flow path of each duct. Penetrations into zones/areas equipped with rated fire dampers were eliminated and what remained is depicted on Figures 1 through 8 attached.

The registers in the remaining ducts were located with the direction of the arrows on each defining whether it is ~~supply~~ exhaust (///) or ~~exhaust~~ supply (///). Each figure represents the elevations of the Auxiliary Building showing both units. The circled numbers on the figures represent fire zones/areas found and the numbers next to the arrows indicate the register number found in corresponding Tables 1 through 6. Only the fire zones/areas containing the ducting of concern are represented on the figures. The figures are letter-coded to identify the fire area involved and defined at the boundaries with the unique markings. For

detailed boundaries of each fire area or zone and specific general arrangement drawings, refer to the Section 2 Figures 2.1 through 2.11 of the March 1983 submittal. The attached figures are meant to indicate the presence of the duct or register in a fire zone/area and not to provide specific locations within the zone/area. Tables 1 through 6 identify the specific American Electric Power Service Corporation HVAC drawing number and the drawing coordinates to locate the registers.

The 22 duct penetrations and associated registers were evaluated individually as depicted on the figures. The registers within a zone/area were evaluated with respect to safe shutdown component and circuit locations. The March, 1983 submittal considered fire damage to safe shutdown systems, components and circuits within areas and zones. This same information will be utilized as appropriate to resolve issues arising from the register locations within a fire zone/area. The general approach was to 1) consider the effect on Section III.G.2 compliance, i.e., evaluate the damage to redundant safe shutdown equipment and/or circuits, and 2) consider the effect on Section III.G.3, i.e., evaluate damage to alternate shutdown equipment and/or circuits. Thus, where an individual duct communicated with different zones or areas, the duct penetrations and registers were evaluated to determine the impact on the two cases just described. Both cases consider area/zone communication between elevations and at the fire area/zone boundaries where the duct

penetration was not provided with a fire damper. The impact of ducts and registers on safe shutdown also considers the location of suppression and detection systems, the amount of combustible material in the zone/area, and particularly the provided method of safe shutdown as described in the March 1983 submittal.

The stairways communicating between elevations have been provided with automatic suppression systems to maintain elevations as separate fire areas. The mechanical and electrical ceiling/floor penetrations are being provided with seals in accordance with the March 1983 submittal.

The combustible loading values and surface areas presented are given for the entire fire area. Plant walkdowns have been performed and physical raceway location drawings have been evaluated to determine that the combustible loading in the fire areas evaluated is uniformly distributed through the area. Fire areas containing concentrated combustibles will be specifically discussed in the evaluation of the area.

2.1 Evaluation of Figure 1

The exhaust duct represented on this figure is designed to remove warm air from various areas of Unit 1 and discharges to the air shaft at the north end of Fire Zone 44. This figure shows two duct penetrations (30"x26" and 72"x30"). The following summary tables provide the fire protection features and safe shutdown compliance methods for the zones/areas of concern.

o Fire protection features

Fire Area/Zone	Detection	Suppression
1	Ionization Detectors	Automatic Suppression System in Stairway only
6N	Ionization Detectors	Automatic Preaction Sprinkler
6M	Ionization Detectors	Automatic Preaction Sprinkler
44N	Ionization Detectors	Automatic Preaction Sprinkler

o Safe shutdown compliance methods

Fire Area/Zone	Compliance Methods
1	Cables required for safe shutdown are being provided with fire wrapping.
6M	One division of redundant safe shutdown cables for each unit is being provided with fire wrapping.
6N	Modifications are being implemented to provide alternative shutdown capability.
44N	Modifications are being implemented to provide alternative shutdown capability.

As shown in Figure 1, the air shaft extends up to the 633 ft elevation where the exhaust fans, creating a negative pressure in the air shaft, expel the warm air to the atmosphere. Fire Zone 1, on the 573 ft elevation, is a portion of Fire Area A which also contains fire zones 1A through 1H. The safe shutdown components within this area (RHR pumps and associated cables) will be protected from fire as defined in the March, 1983 submittal. The ventilation duct registers in this area, as shown on Figure 1, are located within the north section of Fire Zone 1, which only contains RHR pump cables. The cables within Fire Zone 1 required for safe shutdown (RHR pump power cables) are being provided with fire wrapping and thus would not be affected by hot gases or combustion products from the ventilation registers in this fire zone. In addition, the fire area has a very low combustible loading (2666 BTU/ft^2) with an equivalent fire severity of two minutes. The area also contains automatic detection within each fire zone. The mechanical and electrical penetrations through the ceiling to the 587 ft elevation are sealed including the 30"x26" ventilation duct exiting Fire Zone 1 into Fire Zone 6N.

Fire Zone 6N contains the duct penetrating from below as shown in Figure 1. Fire Zone 6N on the 587 ft elevation is a portion of Fire Area B, which also contains Fire Zones 6M, 6S, 5, 64A, 64B, 65A and 65B. Fire Zone 6N contains motor control centers as well as various redundant safe shutdown system

component cables for Unit 1. However, Fire Zone 6N, as described in the March 1983 submittal, will be provided with alternate shutdown capability. The zone is also equipped with automatic suppression and detection (enhanced since March 1983 submittal). Fire Area B has a very low combustible loading (9331 BTU/ft^2) with an equivalent fire severity of seven minutes. The automatic suppression system for Fire Area B contains approximately 168 sprinkler heads which provide coverage for approximately 23,600 ft^2. Five of the sprinkler heads are located within a ten foot cylindrical radius of the duct penetration through the floor and additional sprinklers are located in the vicinity of the registers and remaining duct work. The fire area also contains approximately 36 ionization type detectors. The registers in the area with the exception of register 5 are all located in the north section (Fire Zone 6N). Register 5 is located in fire Zone 6M which contains redundant safe shutdown circuits and which have been provided with fire wrapping protection of one redundant division for each unit as described in the March 1983 submittal. Fire Zone 6M is also provided with automatic suppression and detection. These systems in concert with installed fire wrapping provide adequate protection from hot gases and combustion products potentially transmitted through the ventilation system. Fire Zone 6N is provided with seals in the mechanical and electrical ceiling penetrations to the 609 ft elevation, including the ventilation duct exiting into Fire Zone 44N.

Fire Zone 44N, located on the 609 ft elevation, is a part of the Fire Area C, which also contains Fire Zones 44S, 44A through 44H, and 37. Fire Zone 44N contains motor control centers and various redundant cables of systems required for safe shutdown. As indicated on Figure 1, all the registers are located in the north end. The large duct (72"x30") penetrating the floor from the 587 ft elevation has seven sprinkler heads at the 609 ft elevation within a ten foot cylindrical radius of the penetration. In total, Fire Area C contains approximately 240 sprinkler heads covering an area of approximately 20,000 ft^2. The area also contains approximately 30 ionization type detectors. Adequate coverage for the duct and the registers is provided by these fire protection devices to ensure adequate protection from hot gases and combustible products potentially transmitted through the ventilation system. In addition, Fire Zone 44N will be provided with alternate shutdown capability. As indicated in Table 5-2 in Section 5 of the March 1983 submittal, both Fire Zones 6N and 44N have the same systems and components potentially affected. Thus the communication of the two zones does not affect the compliance strategy nor the safe shutdown capability. Fire Area C has a very low combustible loading (13,330 BTU/ft2) with a fire severity of ten minutes,

2.2 Evaluation of Figure 2

Figure 2 has a similar duct configuration as Figure 1, but represents Unit 2. This figure represents two duct penetrations (25"x28" and 36"x24"). The following summary tables provide the fire protection features and safe shutdown compliance methods for the zones/areas of concern.

- Fire protection features

Fire Area/Zone	Detection	Suppression
1	Ionization Detectors	Automatic Suppression in the Stairway only
6S	Ionization Detectors	Automatic Preaction Sprinkler
6M	Ionization Detectors	Automatic Preaction Sprinkler
44S	Ionization Detectors	Automatic Preaction Sprinkler

- Safe shutdown compliance methods

Fire Area/Zone	Compliance Methods
1	Cables required for safe shutdown are being provided with fire wrapping.
6S	Modifications are being implemented to provide alternative shutdown capability.
6M	One division of redundant safe shutdown cables for each unit is being provided with fire wrapping.
44S	Modifications are being implemented to provide alternative shutdown capability.

The fire zones are located within the fire areas previously described in the Figure 1 evaluation, so combustible loadings and fire severities are the same. The 573 ft elevation is the same as the Unit 1 side, including the cable and component configuration. The HVAC system configuration on the 587 ft elevation is similar to Unit 1. Fire Zone 6S will be provided with alternate shutdown capability and compliance in Fire Zone 6M is described in the Figure 1 evaluation.

The penetration through the floor to the 587 ft elevation within Fire Zone 6S has one sprinkler head to provide water suppression in the immediate vicinity of the vertical run. The penetration area of the 36"x24" duct is protected by four sprinkler heads in Fire Zone 44S within a ten foot cylindrical radius of the duct to prevent duct related fire damage. Also, Fire Zone 44S will be provided with alternate shutdown capability with the exception of the component cooling water pumps which, as described in the March 1983 submittal, are protected to ensure the availability of at least two CCW pumps for safe shutdown.

2.3 Evaluation of Figure 3

Figure 3 has a similar configuration as Figure 2, but this figure represents a single duct with two penetrations (each 44"x24"). The following summary tables provide the fire protection features and safe shutdown compliance methods for the zones/areas of concern.

o Fire protection features

Fire Area/Zone	Detection	Suppression
6S	Ionization Detectors	Automatic Preaction Sprinkler
44S	Ionization Detectors	Automatic Preaction Sprinkler
52	Ionization Detectors	Automatic Preaction Sprinkler

o Safe shutdown compliance methods

Fire Area/Zone	Compliance Methods
6S	Modifications are being implemented to provide alternative shutdown capability.
44S	Modifications are being implemented to provide alternative shutdown capability.
52	Modifications are being implemented to provide alternative shutdown capability.

The duct is part of the supply ventilation system coming from the 633 ft elevation down to the 587 ft elevation. As indicated on Figure 3, one register is on the 587 ft elevation in Fire Zone 6S. The shutdown method, fire protection features and combustible loading are described in the Figure 2 evaluation for this zone. The penetration in the ceiling of Fire Zone 6S is

protected by two sprinkler heads located in the 587 ft elevation within a ten foot cylindrical radius of the duct penetration. The duct from the floor to the ceiling within Fire Zone 44S is continuous with no register openings. Additional protection is provided by at least five sprinkler heads in the immediate vicinity of the duct in Fire Zone 44S. The duct penetrating into the 633 ft elevation has a register opening in the south end of Fire Zone 52, which is part of Fire Area D. The penetration through the floor into Fire Zone 52 has six sprinkler heads within a ten foot cylindrical radius of the duct. Fire Zone 52 has alternate shutdown provisions for the main steam system located outside Fire Area D, while all other safe shutdown systems within Fire Area D have at least one redundant train located outside the area. Cold shutdown systems require manual operation of valves which are also located outside of the area. Fire Area D is equipped with automatic fire suppression and detection and contains approximately 222 sprinkler heads in Fire Zone 52 and approximately 87 sprinkler heads in Fire Zone 51. Fire Area D has 39 ionization detectors, including 17 in Fire Zone 52. The two charcoal filter units in this fire zone are protected by automatic deluge systems actuated by a thermistor circuit. Fire Area D has a very low combustible loading (13,330 BTU/ft^2) with a fire severity of ten minutes,

2.4 Evaluation of Figure 4

Figure 4 represents one duct penetration (30"x24") and is similar to Figures 2 and 3 (see Section 2.3). The exhaust duct shown communicates with Fire Zones 6S and 44S, and is ducted to the air shaft at the extreme south end of Fire Zone 44S. The duct in Fire Zone 6S has register openings, but is continuous with no register openings within Fire Zone 44S and is adjacent to the duct described in Figure 3. The sprinkler head arrangement is identical for both the ducts located in Fire Zone 44S as shown in Figures 3 and 4; therefore, the evaluation performed in Figure 3 applies to Figure 4.

For fire protection features and safe shutdown capability compliance methods, refer to Section 2.3, Fire Areas/Zones 6S and 44S.

2.5 Evaluation of Figure 5

Figure 5 represents two duct penetrations of the same size (52"x24") which communicate with Fire Zones 6N and 44N. The following summary tables provide the fire protection features and safe shutdown compliance methods for the zones/areas of concern.

o Fire protection features

Fire Area/Zone	Detection	Suppression
6N	Ionization Detectors	Automatic Preaction Sprinkler
44N	Ionization Detectors	Automatic Preaction Sprinkler

o Safe shutdown compliance methods

Fire Area/Zone	Compliance Methods
6N	Modifications are being implemented to provide alternative shutdown capability.
44N	Modifications are being implemented to provide alternative shutdown capability.

The explanation of safe shutdown, fire protection features, and combustible loadings are contained in the evaluation of Figure 1. The ducts shown are parallel to each other. The penetrations through the ceiling of Fire Zone 6N are protected by two sprinkler heads within a 16 foot cylindrical radius of the ducts. These ducts, as shown in Figure 5, are continuous in Fire Zone 44N with no register openings. Additional protection of the duct penetration is provided by two sprinkler heads each over the penetration from Fire Zone 44N into the supply air plenum.

2.6 Evaluation of Figure 6

Figure 6 represents one duct penetration (34"x30"). The duct, as indicated on Figure 6, enters the auxiliary cable vault in Unit 2 which is equipped with a rated fire damper. The duct continues from the auxiliary cable vault to Fire Zone 52 which is also equipped with a fire damper. For fire protection features and safe shutdown capability compliance methods refer to Section 2.3, Fire Zones 6S, 44S and 52. The duct penetration at the 609

ft elevation is protected by the presence of three sprinkler heads within a ten-foot cylindrical radius on the 6S side and two on the 44S side.

2.7 Evaluation of Figures 7 and 8

Figures 7 and 8 represent a total of 12 duct penetrations (four 45"x35", two 40"x40", two 36"x36", two 22" x 34" and two 28" x 34"), with Unit 2 being a mirror image of Unit 1 and each unit containing six duct penetrations. The following summary tables provide the fire protection features and safe shutdown compliance methods for the zones/areas of concern.

o Fire protection features

Fire Area/Zone	Detection	Suppression
49	Ionization detectors and Thermistors for charcoal filter unit	Automatic deluge for charcoal filter unit
50	Ionization detectors and Thermistors for charcoal filter unit	Automatic deluge for charcoal filter unit
69	Ionization detectors and Thermistors for HVAC units	Automatic deluge for charcoal filter unit

o Safe shutdown compliance methods

Fire Area/Zone	Compliance Methods
49	At least one redundant division of safe shutdown cables is located outside the fire area
50	At least one redundant division of safe shutdown cables is located outside the fire area
69 including the HVAC vestibules on the 650 ft elevation	The locations contain no safe shutdown systems, components or cables.

There are no registers or openings in the ducts shown on Figures 7 and 8, however, they do communicate from Fire Area D in Zones 49 (Unit 1) and 50 (Unit 2) to Fire Zone 69 including the HVAC vestibules at the 650 ft elevation. Fire Zones 49 and 50, as part of Fire Area D, have been analyzed for safe shutdown with the Section III.G.2 compliance methods presented in the March 1983 submittal. Fire Zone 69 including the HVAC vestibules on the 650 ft elevation and the area in which they are contained have no safe shutdown equipment or circuits located in them. Fire Areas D and E were combined for the purposes of this analysis. Because Fire Area E contains no safe shutdown components or circuits, the combination of these areas does not change the method of safe shutdown for Fire Area D. Fire Area E has a very low combustible loading (1333 BTU/ft^2) with a fire severity of one minute;

3.0 Conclusions for Ventilation Duct Penetration Evaluation

This analysis has been completed to provide technical justification for not installing fire dampers in the ventilation system duct penetrations which communicate between fire areas vertically from elevation to elevation. The fire protection features; e.g. suppression and detection systems and/or the low combustible loadings within these areas provide adequate assurance that fire damage related to ventilation ducting will not impair safe shutdown capability. The major emphasis, however, should be placed on the method of compliance and safe shutdown for each of the fire zones/areas involved. The center line fire zones on the 587 ft and 609 ft elevations will be provided with fire wrapping for safe shutdown circuits. The north and south portions of both elevations are being modified to provide alternate safe shutdown capability. Elevations 587, 609 and 633 have been modified to provide additional automatic suppression coverage. Also the registers between and within elevations have been evaluated and determined not to communicate between redundant safe shutdown components or circuits.

A single fire starting in one of the fire areas of concern, which are communicating through vertical undampered ducts, would not affect safe shutdown capability. The technical basis for this analysis is summarized below:

(1) Existing suppression systems in areas/zones which are provided with automatic suppression systems will extinguish the postulated fire and fire will not propagate outside of the area/zone.

(2) Combustible loading contained in the fire areas/zones of concern is very low.

(3) In fire areas/zones which are not provided with automatic suppression systems, the required safe shutdown components and/or cables are being protected.

(4) A fire starting in an area could be assumed to propagate to the adjacent area through vertical undampered duct penetrations. However, safe shutdown outside of these areas still can be achieved using the unaffected train or alternate safe shutdown method.

In conclusion, this analysis verifies that the safe shutdown system requirements relative to the guidelines of Appendix R are being met and the exemption from installation of fire dampers in the ventilation ducts is justified.

4.0 Seismic Gap Evaluation Methodology

A seismic gap exists around the Containment Building of each unit which provides an opening of approximately 6" between the Containment Building and the walls, ceilings and floors of the structures immediately adjacent to containment. The March 1983 submittal did not address the seismic gap when fire area boundaries were defined. Thus, this evaluation has been performed to confirm that these seismic gaps in the fire boundaries do not affect safe shutdown capability.

The fire areas and zones adjacent to the perimeter of containment which contain seismic gaps are the following:

Fire Areas as Presented by Table 1-1

Fire Area	Description	Elevation
7	Quadrant 1 Cable Tunnel	596 ft
8	Quadrant 4 Cable Tunnel	596 ft
10	Quadrant 3M Cable Tunnel	596 ft
11	Quadrant 3S Cable Tunnel	596 ft
38	Quadrant 2 Cable Tunnel	612 ft

Fire Areas as Presented by Table 1-2

Fire Area	Description	Elevation
23	Quadrant 3N Cable Tunnel	596 ft
24	Quadrant 3M Cable Tunnel	596 ft
26	Quadrant 4 Cable Tunnel	596 ft
27	Quadrant 1 Cable Tunnel	596 ft
39	Quadrant 2 Cable Tunnel	612 ft

Fire Areas/Zones as Presented by Table 2-1

Fire Area/ Zone	Description	Elevation
33B	NESW Valve Area	612 ft
12	Quadrant 2 Piping Tunnel	596 ft
49	HVAC Vestibule	633 ft
69	Auxiliary Building	650 ft
108	West Steam Valve Enclosure	612 ft

Fire Areas/Zones as Presented by Table 2-2

Fire Area/ Zone	Description	Elevation
34B	NESW Valve Area	612 ft
22	Quadrant 2 Piping Tunnel	596 ft
50	HVAC Vestibule	633 ft
69	Auxiliary Building	650 ft
109	West Steam Valve Enclosure	612 ft

The March 1983 submittal, the primary source of information for this analysis, contains additional information on the fire area and zone descriptions. The attached tables (1-1, 1-2, 2-1, 2-2) provide a summary of the evaluations performed on the areas or zones affected by seismic gaps.

The general methodology used was to evaluate the area/zone of concern in concert with the adjacent areas/zones on the left, right, and immediately above. The new area defined by this method (seismic gap evaluation area) was analyzed to determine the impact on safe shutdown components and circuits. Four fire areas, as previously defined in the March, 1983 submittal, contain multiple zones within the area and are part of this analysis.

The seismic gap evaluation areas only considers the zone or area immediately adjacent to the postulated fire area. This configuration assumes the seismic gap will allow communication between adjacent areas or zones. Due to distance, low combustible loading, location of combustibles and/or presence of detection and suppression systems the affect of the fire will not involve all areas and zones which communicate by seismic gaps.

Fire Zones 33 and 33A were not considered within the seismic gap evaluation as they are only adjacent to each other and Fire Zone 33B. Fire Zones 33, 33A and 33B were evaluated as one area in the March 1983 submittal. Fire Zone 33B is considered in this evaluation and includes Fire Zone 33A as part of the seismic gap evaluation area. The mirror image zones (34, 34A, 34B) in Unit 2 were considered in a similar manner. The communication between Fire Zones 49 and 50 is through Fire Zone 52 separated by over 150 feet. Fire Zone 51 is adjacent to 52. Fire Zones 49 (Unit 1) and 50 (Unit 2) are the only zones within the area which contain seismic gaps at the containment wall. The communication between fire zones 49 and 50 within this area was evaluated in the March, 1983 submittal. Fire Zone 52 is provided with automatic suppression and detection and thus provides adequate assurance that either a fire or related combustion products would be contained within Fire Zone 49 (the same configuration exists for Fire Zone 50). The fire area containing zones 3, 32, 36, 69, and 48 contain no safe shutdown equipment and could have been

included into a larger area but to minimize the size of fire areas these fire zones are considered as one area.

The compliance strategies (i.e., safe shutdown method) for each area or zone are maintained and used throughout the evaluation while taking into account additional considerations such as:

1. Distance between fire zones/areas
2. Location of combustibles
3. Combustible loading
4. Detection and suppression systems

4.1 Evaluation of Tables 1-1 and 1-2

Five previously defined fire areas in each unit have automatic CO_2 suppression and detection systems in the area. These areas are listed in Tables 1-1 and 1-2. The walls, floors, and ceilings of the ten areas (including both units) are constructed to at least a 1-1/2-hour fire rating. A seal in the seismic gaps provides a barrier for containing the gaseous suppression system. The seal is affixed to both the containment wall and the floor, ceiling or wall of the perimeter buildings. The seal is made of glass fiber reinforced silicone sheeting and is a fire retardant material.

A fire originating within the areas containing automatic suppression would stay confined to that area and be extinguished by the automatic suppression system. Thus, each of these ten areas was evaluated as an isolated area based on the assumption that the fire within the areas containing suppression systems would be contained and extinguished in the area.

4.2 Evaluation of Tables 2-1 and 2-2

Evaluations of areas or zones, which were not equipped with automatic suppression systems, considered the seal damaged in adjacent areas/zones (left, right and above) including those containing automatic suppression. Each newly defined evaluation area was reanalyzed on a safe shutdown system basis with the results presented in the system evaluation column in Tables 2-1 and 2-2. The areas and/or zones of concern which do not have automatic suppression systems have low combustible loadings and within the immediate vicinity of the seismic gaps are generally void of exposed fixed combustibles.

The zones/areas of concern are presented in Tables 2-1 and 2-2. Excluding the areas containing automatic suppression from the postulated fire location, the following combinations of areas/zones are evaluated:

Unit 1 Postulated Fire Locations and Associated Zones/Areas

1. 33B with 33A, 38, 108 and 49
2. 12 with 7, 11, 33B and 38
3. 49 with 69 and 108
4. 69 with 108
5. 108 with 49 and 69

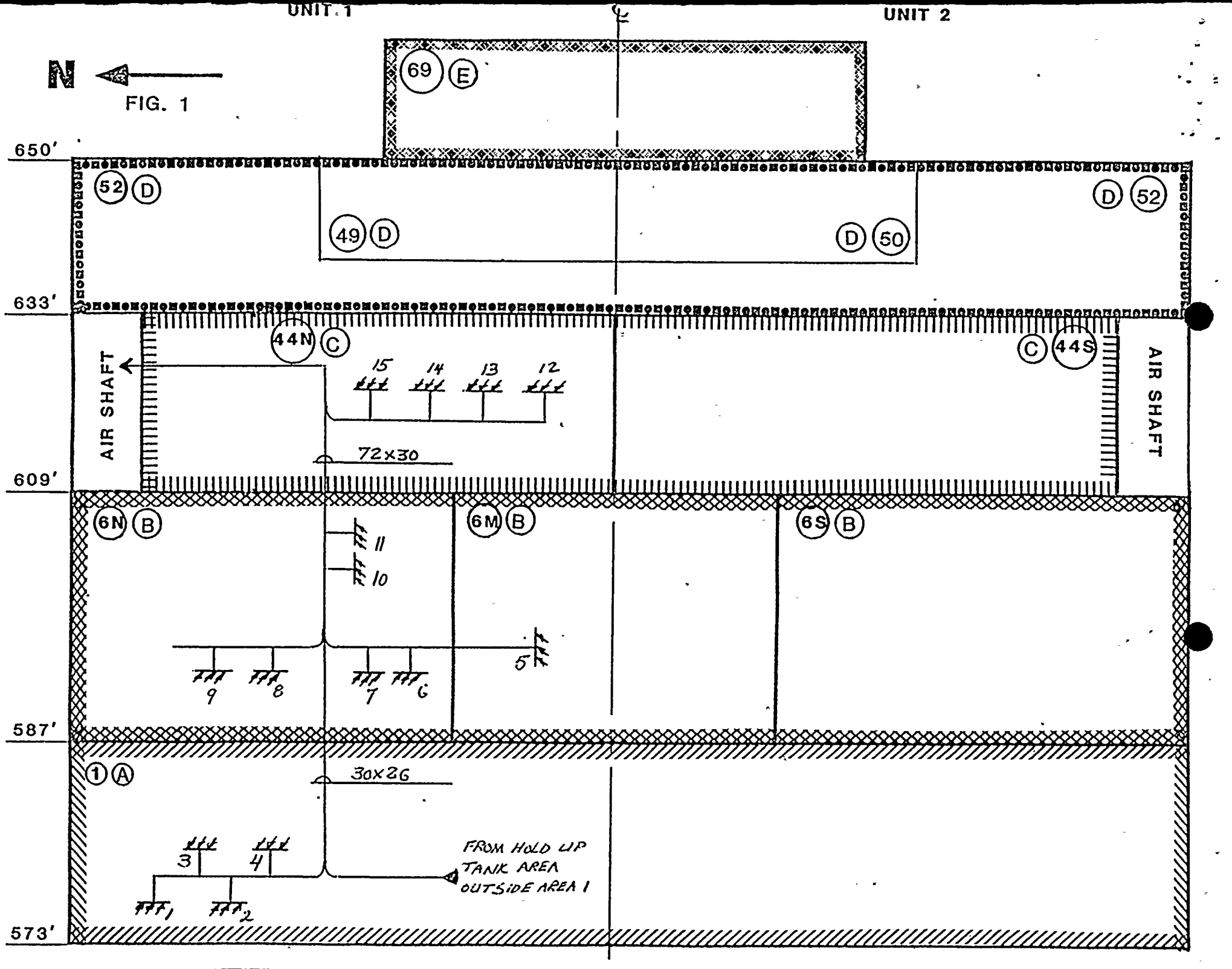
Unit 2 Postulated Fire Locations and Associated Zones/Areas

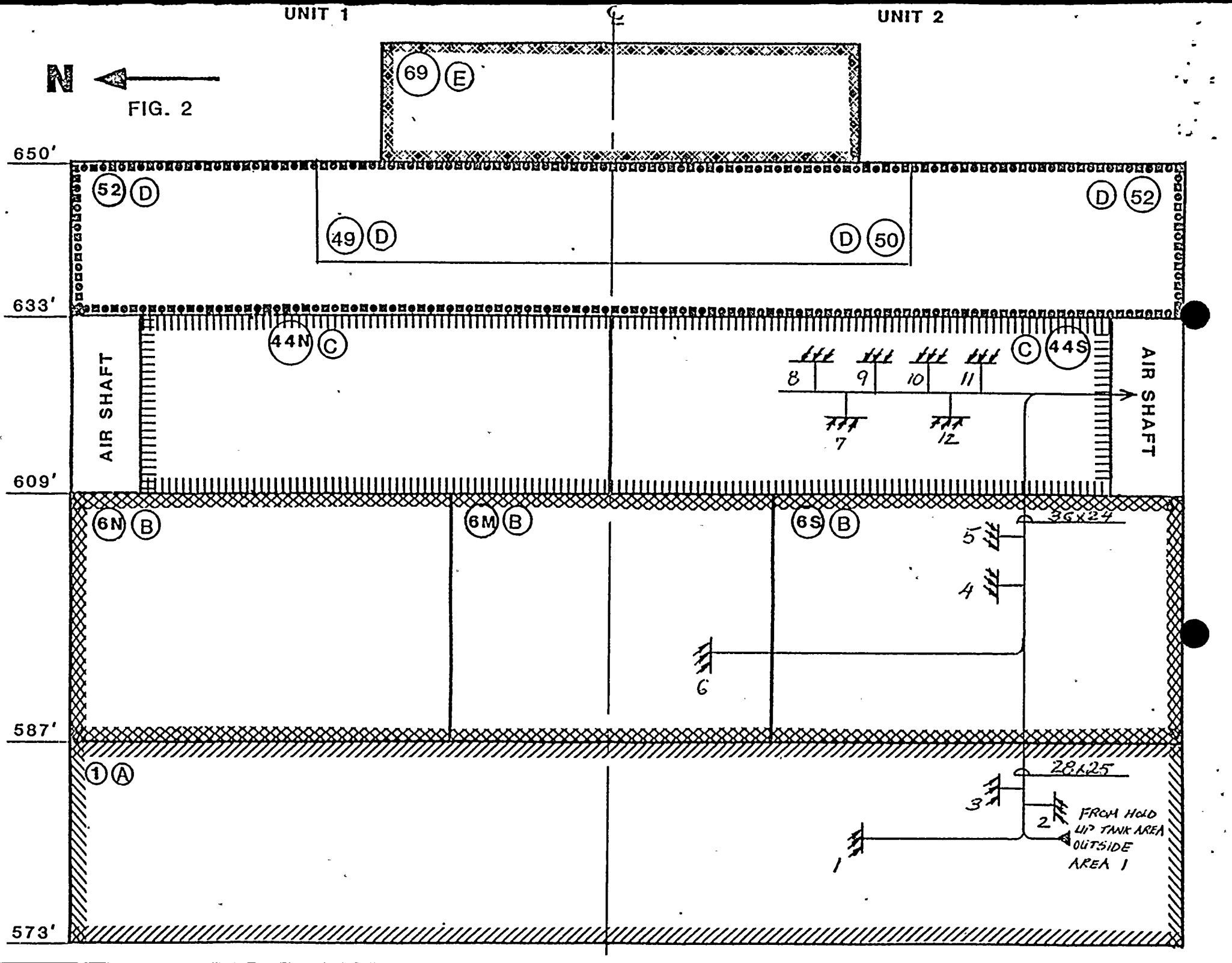
1. 34B with 34A, 39, 109 and 50
2. 22 with 27, 23, 34B and 39
3. 50 with 69 and 109
4. 69 with 109
5. 109 with 50 and 69

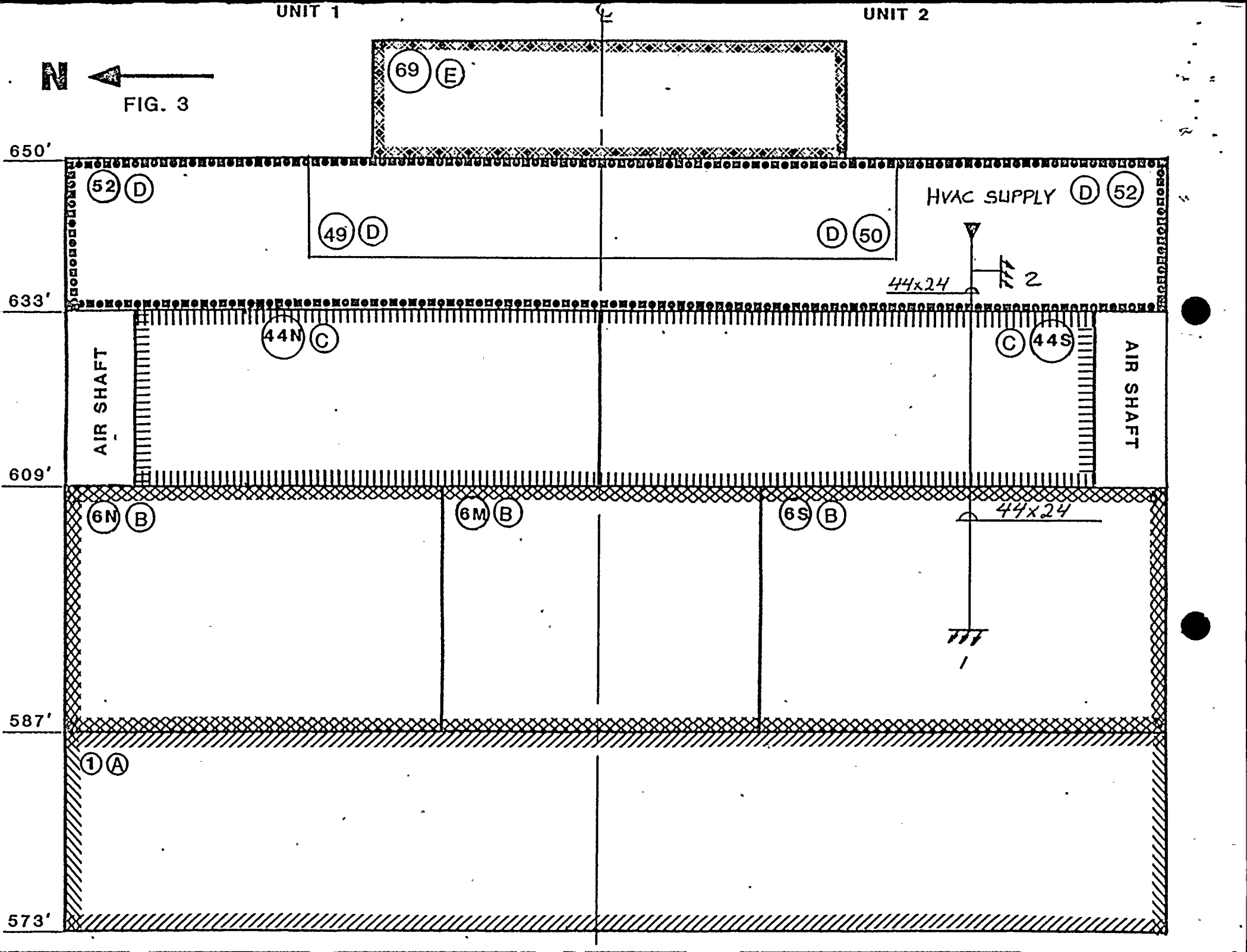
Tables 2-1 and 2-2 present the results of the system evaluation for each postulated fire location.

5.0 Conclusion for Containment Seismic Gap Evaluation

This seismic gap evaluation shows the safe shutdown capability for D.C. Cook Nuclear Plant (Units 1 and 2) has not been compromised as a result of seismic gaps. The analysis performed and the results presented in the tables indicate on a system basis, the capability to safely shutdown both units when considering fire damage to safe shutdown components and circuits contained in the seismic gap evaluation areas. The method of analysis is conservative when considering the fire hazards involved in the vicinity of the seismic gaps. That is, it is not anticipated that the evaluated areas would be affected to the extent that fire would propagate through the seismic gaps and cause damage throughout the evaluation area. Combustion products would likely enter the adjacent areas or zones, however, damage to safe shutdown components and circuits would likely not occur. In any event, the analysis contained herein assumes the damage to safe shutdown components and circuits in the seismic gap evaluation area did occur and verifies that safe shutdown capability is maintained.


UNIT 1
UNIT 2
N
FIG. 1
69 E
650'
52 D
49 D
D 50
D 52
633'
44N C
C 44S
AIR SHAFT
AIR SHAFT
15
14
13
12
72x30
609'
6N B
6M B
6S B
11
10
5
9
8
7
6
587'
1 A
30x26
3
4
1
2
FROM HOLD UP TANK AREA OUTSIDE AREA 1
573'


UNIT 1
UNIT 2
N
FIG. 2
69 E
650'
52 D
49 D
D 50
D 52
633'
AIR SHAFT
44N C
C 44S
AIR SHAFT
8
9
10
11
7
12
609'
6N B
6M B
6S B
36X24
5
4
6
587'
1 A
28X25
3
2
FROM HOLD UP TANK AREA OUTSIDE AREA 1
1
573'


UNIT 1
UNIT 2
N
FIG. 3
650'
633'
609'
587'
573'
69 E
52 D
49 D
D 50
HVAC SUPPLY D 52
44x24
2
AIR SHAFT
44N C
C 44S
AIR SHAFT
6N B
6M B
6S B
44x24
1
1 A

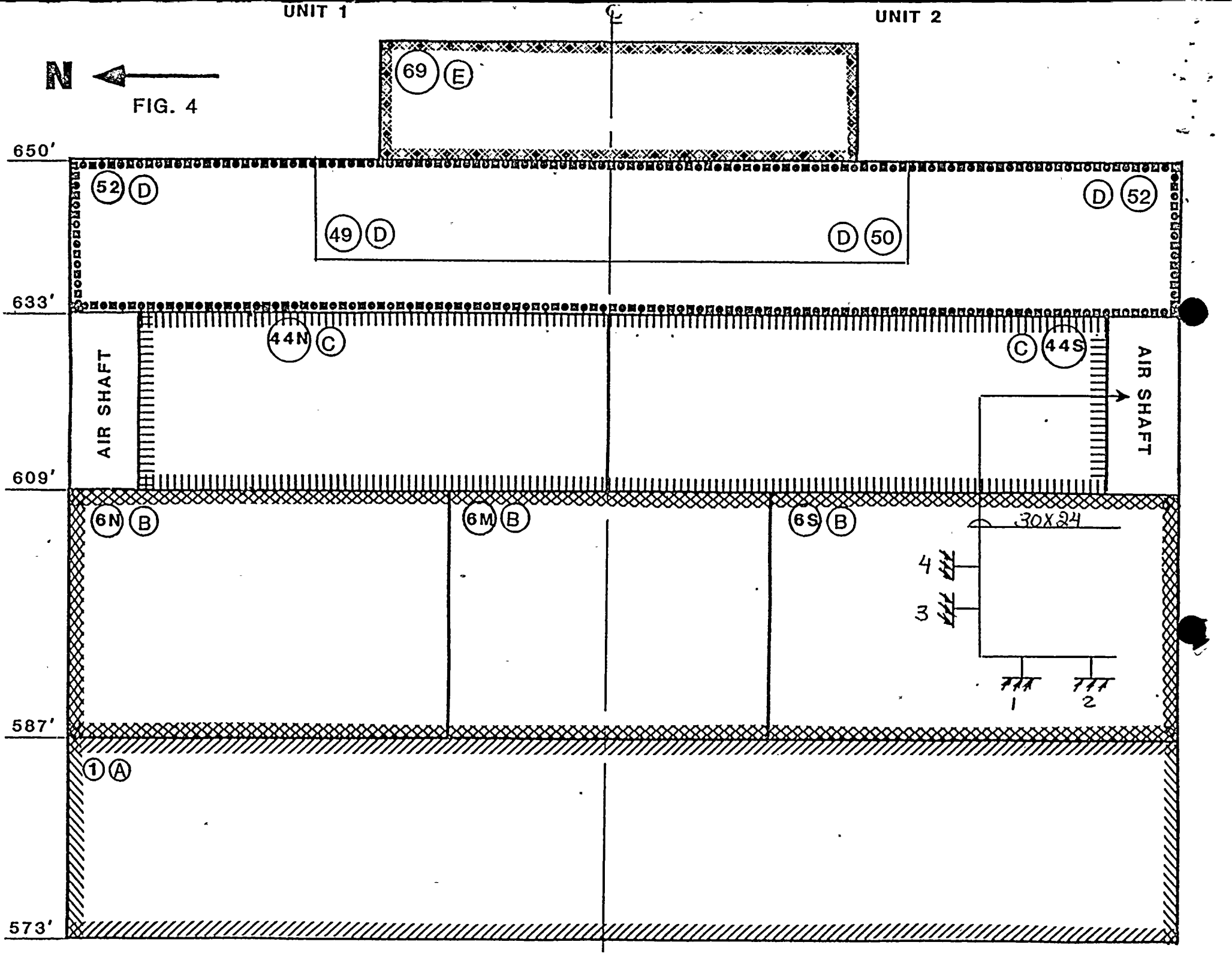
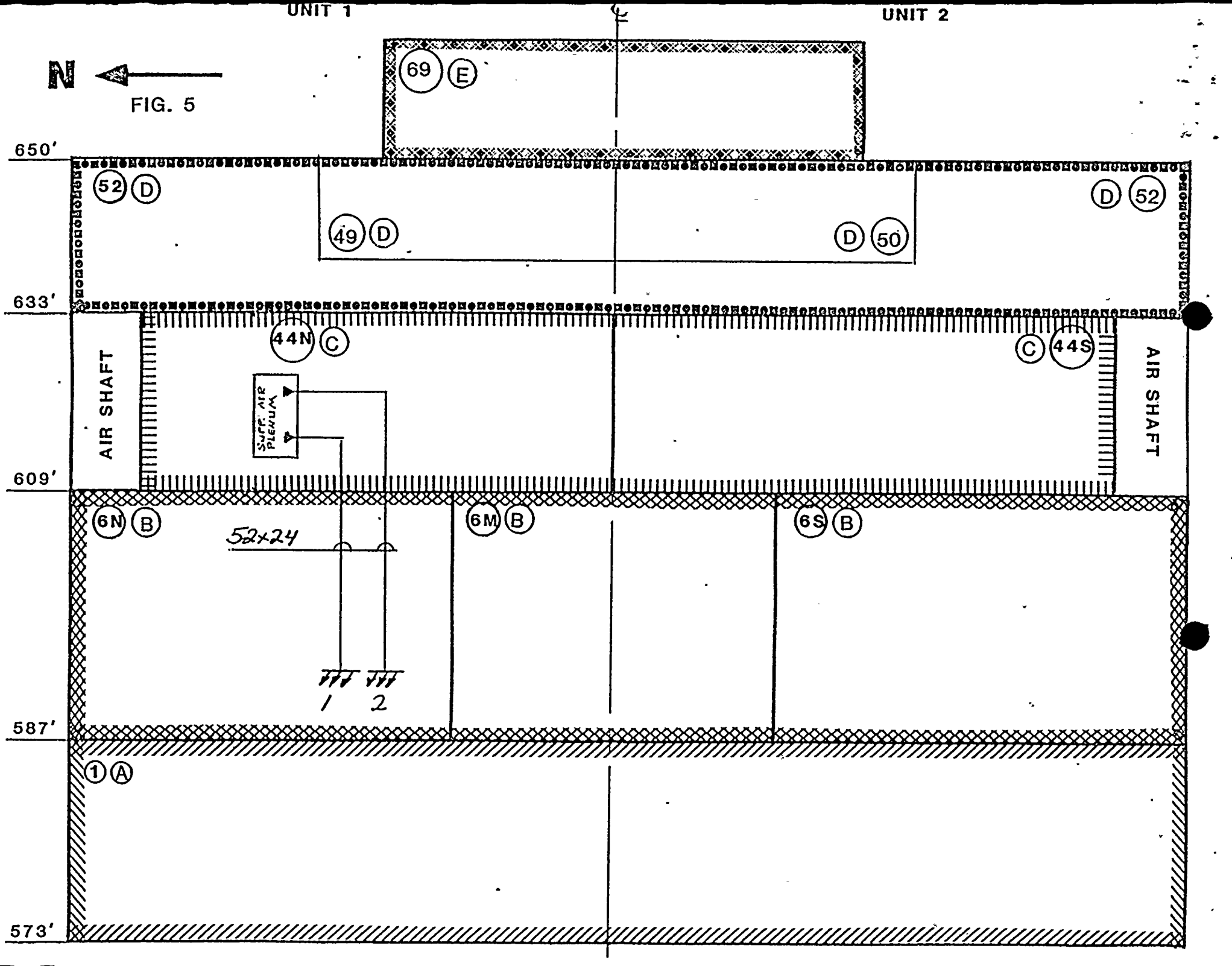
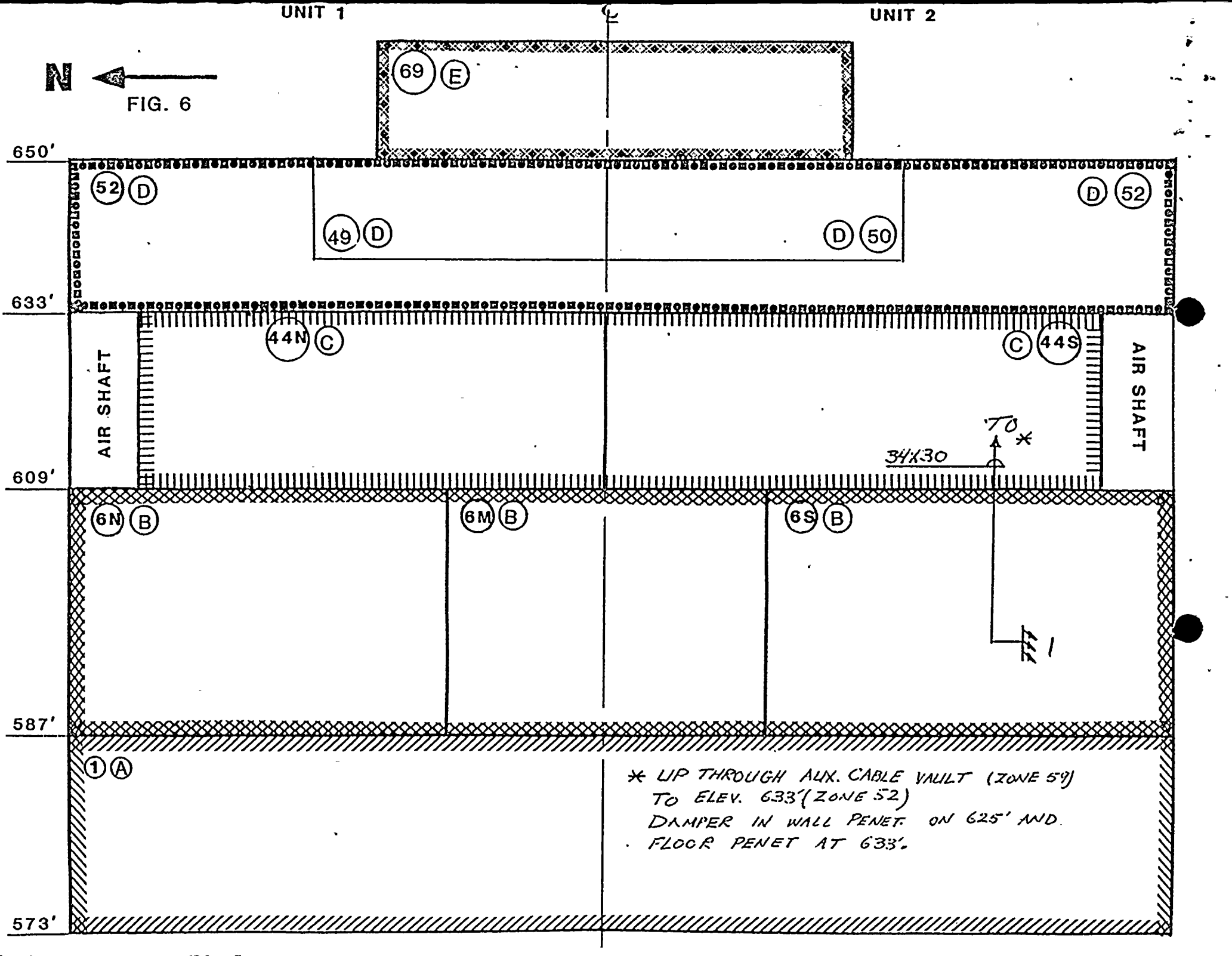
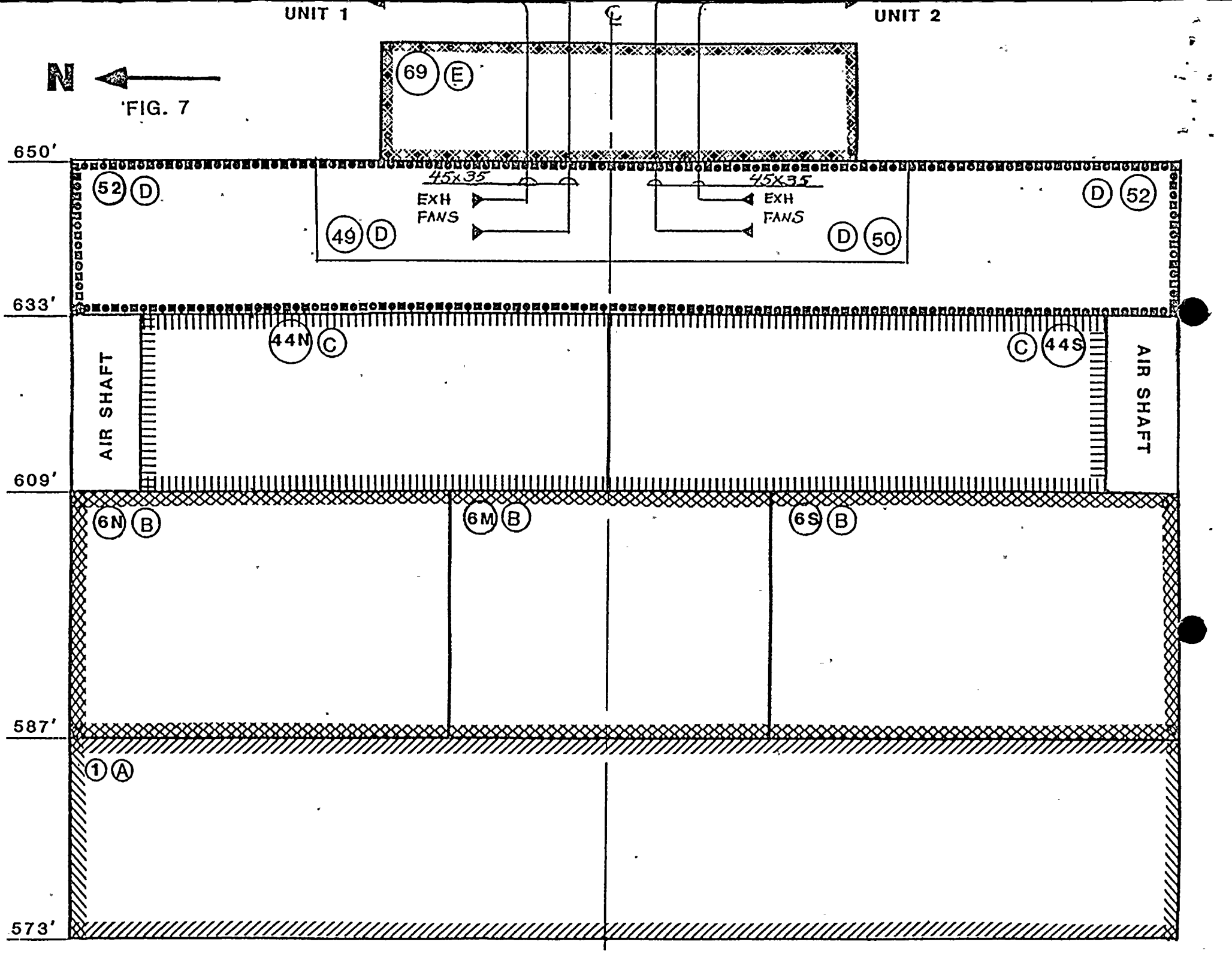

UNIT 1
UNIT 2
N
69 E
650'
52 D
49 D
D 50
D 52
633'
AIR SHAFT
44N C
C 44S
AIR SHAFT
609'
6N B
6M B
6S B
30X24
4
3
1
2
587'
1 A
573'

FIG. 4


UNIT 1
UNIT 2
N
FIG. 5
69 E
650'
52 D
49 D
D 50
D 52
633'
44N C
C 44S
AIR SHAFT
AIR SHAFT
SUPP. AIR PLENUM
609'
6N B
6M B
6S B
52x24
1
2
587'
1 A
573'


UNIT 1
UNIT 2
N
FIG. 6
69 E
650'
52 D
49 D
D 50
D 52
633'
44N C
C 44S
AIR SHAFT
AIR SHAFT
TO *
34X30
609'
6N B
6M B
6S B
587'
1 A
573'
* UP THROUGH AUX. CABLE VAULT (ZONE 59) TO ELEV. 633' (ZONE 52)
DAMPER IN WALL PENET. ON 625' AND FLOOR PENET AT 633'.


UNIT 1
UNIT 2
N
FIG. 7
69 E
650'
52 D
45x35
EXH FANS
49 D
45x35
EXH FANS
D 50
D 52
633'
AIR SHAFT
44N C
C 44S
AIR SHAFT
609'
6N B
6M B
6S B
587'
1 A
573'

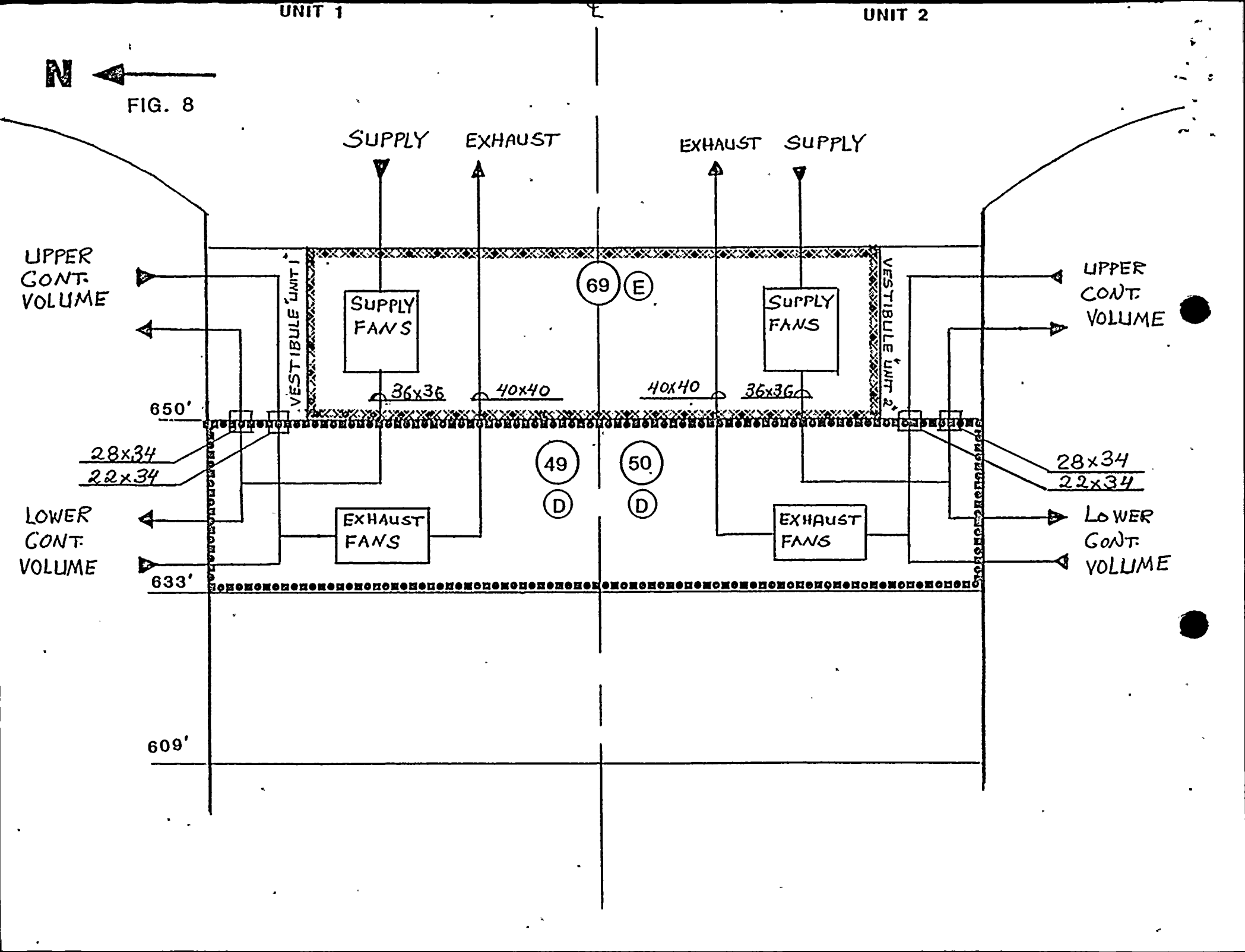

UNIT 1
UNIT 2
N
SUPPLY
EXHAUST
EXHAUST
SUPPLY
UPPER CONT. VOLUME
VESTIBULE 'UNIT 1'
SUPPLY FANS
69
E
SUPPLY FANS
VESTIBULE 'UNIT 2'
UPPER CONT. VOLUME
650'
36x36
40x40
40x40
36x36
28x34
22x34
49
D
50
D
28x34
22x34
LOWER CONT. VOLUME
EXHAUST FANS
EXHAUST FANS
LOWER CONT. VOLUME
633'
609'

FIG. 8

TABLE 1

AIR REGISTER LOCATION

AIR REGISTER NUMBER	LOCATION		DRAWING NUMBER
	AREA	COORDINATES	
1	Reactor Coolant Drain Tank Pump	WL-4.5 & W of WL-M	12-5713-4
2	Pipe Tunnel	WL-4.7 & W of WL-M	12-5713-4
3	Drain Tank and Pump	WL-5.3 & W of WL-M	12-5713-4
4	Sump Pump Room	WL-4.5 & E of WL-L	12-5713-4
5	Reactor Coolant Filter Unit 1	WL-5.5 & WL-M	12-5715-10
6	Valve Operating Gallery	WL-3.6 & WL-K	12-5715-10
7	Boric Acid Evaporating Room	WL-4 & WL-K	12-5715-10
8	Seal Water Injection Area	WL-4.5 & W of WL-M	12-5715-10
9	Pipeway	WL-4.5 & WL-M	12-5715-10
10	Gas Decay Tank Room	WL-4.8 & W of WL-L	12-5715-10
11	Tunnel, Elevation 601 ft	WL-5 & W of WL-L	12-5715-10
12	Volume Control Tank	WL-5 & E of WL-L	12-5717-7
13	Concentrate Holding Tank	WL-5.2 & WL-K	12-5717-7
14	Waste Gas Compressor Room	WL-4.4 & E of WL-K	12-5717-7
15	Concentrate Holding Tank	WL-5.2 & WL-K	12-5717-7

TABLE 2

AIR REGISTER LOCATION

AIR REGISTER NUMBER	LOCATION		DRAWING NUMBER
	AREA	COORDINATES	
1	Pipe Tunnel	WL-7.5 & WL-M	12-5713-4
2	Reactor Coolant Drain Tank	WI-7.3 & WL-M	12-5713-4
3	Sump Pump & Tank	WL-7 & WL-M	12-5713-4
4	Pipeway	WL-8 & WL-M	12-5715-10
5	Seal Water Injection Filters	WL-8 & WL-M	12-5715-10
6	Reactor Coolant/Seal Water Filter	WL-6.4 & WL-M	12-5715-10
7	Monitor Tank Area	WL-8.4 & WL-M	12-5717-7
8	Monitor Tank Area	WL-8 & WL-M	12-5717-7
9	Monitor Tank Area	WL-7.6 & WL-M	12-5717-7
10	Monitor Tank Area	WL-7.3 & WL-M	12-5717-7
11	Volumn Control Tank Area	WL-7 & E of WL-M	12-5717-7
12	Seal Water Heat Exchanger Area	WL-7 & E of WL-M	12-5717-7

TABLE 3

AIR REGISTER LOCATION

AIR REGISTER NUMBER	LOCATION		DRAWING NUMBER
	AREA	COORDINATES	
1	Behind MCC's on Elevation 587	WL-8 & E of WL-M	12-5715-10
2	Elevation 633 ft Unit 2 Side	WL-8.2 & W of WL-M	12-5719-7

TABLE 4

AIR REGISTER LOCATION

AIR REGISTER NUMBER	LOCATION		DRAWING NUMBER
	AREA	COORDINATES	
1	Valve Gallery Pipe Tunnel	WL-7 & W of WL-L	12-5715-10
2	Gas Decay Tank Room	WL-7 & W of WL-L	12-5715-10
3	Boric Acid Evaporator	WL-8 & WL-K	12-5715-10
4	Valve Operating Gallery	WL-8.5 & WL-K	12-5715-10

TABLE 5

AIR REGISTER LOCATION

AIR REGISTER NUMBER	LOCATION		DRAWING NUMBER
	AREA	COORDINATES	
1	CVCS Facility	WL-4.4 & WL-L	12-5715-10
2	CVCS Facility	WL-4.4 & WL-L	12-5715-10

TABLE 6

AIR REGISTER LOCATION

AIR REGISTER NUMBER	LOCATION		DRAWING NUMBER
	AREA	COORDINATES	
1	Monitor Pumps	WL-8 & WL-L	12-5715-10

TABLE 1-1

UNIT 1 FIRE AREAS/ZONES PROTECTED BY AUTOMATIC CO_2 SUPPRESSION

FIRE AREA*	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	COMMENT
7	115,031	960	86	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
8	30,595	1,650	23	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
10	103,542	800	78	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
11	28,278	741	21	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
38	39,161	2,650	29	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.

*FIRE AREAS AS DEFINED IN SAFE SHUTDOWN CAPABILITY ASSESSMENT OF MARCH 1983 SUBMITTAL

TABLE 1-2

UNIT 2 FIRE AREAS/ZONES PROTECTED BY AUTOMATIC CO_2 SUPPRESSION

FIRE AREA*	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	COMMENT
27	84,252	1,056	63	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
26	21,747	2,346	16	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
24	77,303	800	58	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
23	27,830	840	21	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.
39	28,630	3,667	21	CO_2 AUTOMATIC	IONIZATION AND INFRARED TYPES	EXISTING AUTOMATIC CO_2 SUPPRESSION SYSTEM WILL EXTINGUISH ANY POSTULATED FIRE IN THE AREA/ ZONE AND THE FIRE WILL NOT PROPAGATE OUTSIDE OF THE AREA/ZONE THROUGH SEISMIC GAPS. THE PREVIOUS SAFE SHUTDOWN CAPABILITY COMPLIANCE METHODS STILL APPLY.

*FIRE AREAS AS DEFINED IN SAFE SHUTDOWN CAPABILITY ASSESSMENT OF MARCH 1983 SUBMITTAL

TABLE 2-1

UNIT 1 FIRE AREAS/ZONES OF CONCERN

SEISMIC GAP EVALUATION AREA							
POSTULATED FIRE LOCATION	ADJACENT AREA/ZONE OF CONCERN	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
33B		*	*	*	NONE	NONE	FIRE ZONES 33B, 33A, 38, 108 AND 49 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION. THE SAFE SHUTDOWN SYSTEMS AVAILABILITY IS PRESENTED BELOW: 1. MS - INSTRUMENTATION ASSOCIATED WITH STEAM GENERATORS 1 AND 4 IS AVAILABLE IN CONJUNCTION WITH MANUAL OPERATION OF ASSOCIATED MRVs OUTSIDE OF THE EVALUATION AREA. 2. AF - TWO OUT OF THREE TRAINS OF THE AF SYSTEMS ARE LOCATED OUTSIDE THE EVALUATION AREA; THUS STEAM GENERATORS 1 AND 4 CAN BE SUPPLIED WITH AUXILIARY FEEDWATER. 3. RCS - T_h AND T_c NORMAL INDICATIONS ARE AFFECTED, BUT ALTERNATIVE INDICATION CAPABILITY IS BEING PROVIDED AS PRESENTED IN MARCH 1983 SUBMITTAL. AT LEAST ONE TRAIN OF OTHER RCS PROCESS MONITORING SYSTEM COMPONENTS IS LOCATED OUTSIDE OF THE EVALUATION AREA. 4. CVCS- THE SAFE SHUTDOWN COMPONENTS AND CIRCUITS ASSOCIATED WITH THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA, EXCEPT THE CABLE ASSOCIATED WITH QRV-251, WHICH FAILS AT 50 GPM MINIMUM FLOW POSITION. 5. THE FOLLOWING SYSTEMS HAVE NO COMPONENTS OR CIRCUITS IN THE EVALUATION AREA: o ESSENTIAL SERVICE WATER (ESW) o COMPONENT COOLING WATER (CCW) o EMERGENCY POWER SYSTEM (EPS) o RESIDUAL HEAT REMOVAL (RHR)
	33A	*	*	*	AUTOMATIC DELUGE FOR CHARCOAL FILTER	THERMISTOR FOR CHARCOAL FILTER UNIT	
	38	39,161	2,650	29	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	
	108	0	897	0	NONE	NONE	
	49	65,658	3,200	49	AUTOMATIC DELUGE FOR CHARCOAL FILTER	IONIZATION AND THERMISTOR FOR CHARCOAL FILTER	

* FIRE ZONES 33, 33A AND 33B ARE CONTAINED IN A FIRE AREA FOR WHICH THE COMBUSTIBLE LOADING IS 11,016 BTU/FT^2, AREA IS 2,890 FT^2 AND EQUIVALENT FIRE SEVERITY IS 8 MINUTES

TABLE 2-1 (continued)

SEISMIC GAP EVALUATION AREA							
POSTULATED FIRE LOCATION	ADJACENT AREA/ZONE OF CONCERN	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
12		515	7,812	<1	NONE	NONE	FIRE ZONES 12, 7, 11, 33B AND 38 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION. THE SAFE SHUTDOWN SYSTEMS AVAILABILITY IS PRESENTED BELOW: 1. MS - AT LEAST ONE TRAIN OF SAFE SHUTDOWN COMPONENTS AND CIRCUITS ASSOCIATED WITH THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA. 2. AF - AT LEAST ONE TRAIN OF SAFE SHUTDOWN COMPONENTS AND CIRCUITS OF THIS SYSTEM ASSOCIATED WITH THE SAME UNAFFECTED MS TRAIN ARE LOCATED OUTSIDE OF THE EVALUATION AREA. 3. RCS - T_h AND T_c NORMAL INDICATIONS ARE AFFECTED, BUT ALTERNATIVE INDICATION CAPABILITY IS BEING PROVIDED AS PRESENTED IN MARCH 1983 SUBMITTAL. AT LEAST ONE TRAIN OF OTHER SAFE SHUTDOWN PROCESS MONITORING SYSTEM COMPONENTS ARE LOCATED OUTSIDE OF THE EVALUATION AREA. 4. CVCS- THE SAFE SHUTDOWN COMPONENTS AND CIRCUITS ASSOCIATED WITH THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA, EXCEPT QRV-251, WHICH FAILS AT 50 GPM MINIMUM FLOW POSITION. 5. EPS - AT LEAST ONE TRAIN OF SAFE SHUTDOWN COMPONENTS AND CIRCUITS OF THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA. THE ELSC LOCATED IN THE AREA, WHICH COULD BE AFFECTED, SUPPLIES POWER TO THE AFFECTED TRAIN OF SAFE SHUTDOWN INSTRUMENTATION DISCUSSED ABOVE. 6. RHR - MANUAL OPERATION OF THE AFFECTED VALVES, WHICH HAVE CABLES IN THE EVALUATION AREA, IS AVAILABLE.
	7	115,031	960	86	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	
	11	28,278	741	21	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	
	33B	*	*	*	NONE	NONE	
	38	39,161	2,650	29	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	

(THIS FIRE AREA IS CONTINUED ON THE NEXT PAGE)

* FIRE ZONES 33, 33A AND 33B ARE CONTAINED IN A FIRE AREA FOR WHICH THE COMBUSTIBLE LOADING IS 11,016 BTU/FT^2, AREA IS 2,890 FT^2 AND EQUIVALENT FIRE SEVERITY IS 8 MINUTES

TABLE 2-1 (continued)

SEISMIC GAP EVALUATION AREA							
POSTULATED FIRE LOCATION	ADJACENT AREA/ZONE OF CONCERN	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
12 (cont.)							7. THE FOLLOWING SAFE SHUTDOWN SYSTEMS, COMPONENTS AND CIRCUITS ARE LOCATED OUTSIDE OF THE EVALUATION AREA: o ESW o CCW
49		65,658	3,200	49	AUTOMATIC DELUGE FOR CHARCOAL FILTER	IONIZATION AND THERMISTOR FOR CHARCOAL FILTER	FIRE ZONES 49, 69 AND 108 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION REGARDING SAFE SHUTDOWN CAPABILITY ASSESSMENT. FIRE ZONES 49 AND 69 CONTAIN NO SAFE SHUTDOWN SYSTEMS, COMPONENTS AND CIRCUITS. THE SAFE SHUTDOWN COMPONENTS AND CIRCUITS LOCATED IN THIS EVALUATION AREA ARE THE COMPONENTS AND CIRCUITS LOCATED IN FIRE ZONE 108 FOR WHICH COMPLIANCE METHOD IS PRESENTED IN 1983 SUBMITTAL.
	69	1,314	17,914	1	AUTOMATIC DELUGE FOR HVAC UNIT	IONIZATION AND THERMISTORS FOR HVAC UNITS	
	108	0	897	0	NONE	NONE	
69		1,314	17,914	1	AUTOMATIC DELUGE FOR HVAC UNIT	IONIZATION AND THERMISTORS FOR HVAC UNITS	FIRE ZONES 69 AND 108 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION REGARDING SAFE SHUTDOWN CAPABILITY ASSESSMENT. FIRE ZONE 69 CONTAINS NO SAFE SHUTDOWN SYSTEMS, COMPONENTS AND CIRCUITS. THE SAFE SHUTDOWN COMPONENTS AND CIRCUITS LOCATED IN THIS EVALUATION AREA ARE THE COMPONENTS AND CIRCUITS LOCATED IN FIRE ZONE 108 FOR WHICH COMPLIANCE METHOD IS PRESENTED IN 1983 SUBMITTAL.
	108	0	897	0	NONE	NONE	

TABLE 2-1 (continued)

SEISMIC GAP EVALUATION AREA							
POSTULATED FIRE LOCATION	ADJACENT AREA/ZONE OF CONCERN	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
108		0	897	0	NONE	NONE	FIRE ZONES 49, 69 AND 108 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION REGARDING SAFE SHUTDOWN CAPABILITY ASSESSMENT. FIRE ZONES 49 AND 69 CONTAIN NO SAFE SHUTDOWN SYSTEMS, COMPONENTS AND CIRCUITS. THE SAFE SHUTDOWN COMPONENTS AND CIRCUITS LOCATED IN THIS EVALUATION AREA ARE THE COMPONENTS AND CIRCUITS LOCATED IN FIRE ZONE 108 FOR WHICH COMPLIANCE METHOD IS PRESENTED IN 1983 SUBMITTAL.
	49	65,658	3,200	49	AUTOMATIC DELUGE FOR CHARCOAL FILTER	IONIZATION AND THERMISTOR FOR CHARCOAL FILTER	
	69	1,314	17,914	1	AUTOMATIC DELUGE FOR HVAC UNIT	IONIZATION AND THERMISTORS FOR HVAC UNITS	

TABLE 2-2

UNIT 2 FIRE AREAS/ZONES OF CONCERN

SEISMIC GAP EVALUATION AREA							
POSTULATED FIRE LOCATION	ADJACENT ZONE OF CONCERN	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
34B		*	*	*	NONE	NONE	FIRE ZONES 34B, 34A, 39, 109 AND 50 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION. THE SAFE SHUTDOWN SYSTEMS AVAILABILITY IS PRESENTED BELOW: 1. MS - INSTRUMENTATION ASSOCIATED WITH STEAM GENERATORS 1 AND 4 IS AVAILABLE IN CONJUNCTION WITH MANUAL OPERATION OF ASSOCIATED MRVs. 2. AF - MANUAL OPERATION OF AFFECTED FM0212 AND 242 IN CONJUNCTION WITH REMOTE OPERATION OF OTHER REQUIRED SAFE SHUTDOWN COMPONENTS OF THIS SYSTEM OUTSIDE OF THE EVALUATION AREA WILL UTILIZE AF SYSTEM TO SUPPLY AUXILIARY FEEDWATER TO STEAM GENERATORS 1 AND 4. 3. RCS - T_{li} AND T_c NORMAL INDICATIONS ARE AFFECTED, BUT ALTERNATIVE INDICATION CAPABILITY IS BEING PROVIDED AS PRESENTED IN MARCH 1983 SUBMITTAL. AT LEAST ONE TRAIN OF OTHER RCS SAFE SHUTDOWN PROCESS MONITORING SYSTEM COMPONENTS IS LOCATED OUTSIDE OF THE EVALUATION AREA. 4. CVCS- THE SAFE SHUTDOWN COMPONENTS ASSOCIATED WITH THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA, EXCEPT THE CABLE ASSOCIATED WITH QRV-251, WHICH FAILS AT 50 GPM MINIMUM FLOW POSITION. 5. EPS - SAFE SHUTDOWN COMPONENTS AND CIRCUITS OF ONE TRAIN OF EPS WHICH INCLUDES DGAB ARE LOCATED OUTSIDE OF THE EVALUATION AREA.
	34A	*	*	*	AUTOMATIC DELUGE FOR CHARCOAL FILTER IN 34A	THERMISTOR FOR CHARCOAL FILTER UNIT IN 34A	
	39	28,630	2,667	21	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	
	109	0	897	0	NONE	NONE	
	50	48,878	3,200	37	AUTOMATIC DELUGE FOR CHARCOAL FILTER	IONIZATION AND THERMISTOR FOR CHARCOAL FILTER	

(THIS FIRE AREA IS CONTINUED ON THE NEXT PAGE)

* FIRE ZONES 34, 34A AND 34B ARE CONTAINED IN A FIRE AREA FOR WHICH THE COMBUSTIBLE LOADING IS 5,809 BTU/FT^2, AREA IS 2,890 FT^2 AND EQUIVALENT FIRE SEVERITY IS 4 MINUTES

TABLE 2-2 (continued)

SEISMIC GAP EVALUATION AREA							
POSTULATED FIRE LOCATION	ADJACENT ZONE OF CONCERN	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
34B (cont.)							6. CCW - CIRCUITS AND COMPONENTS ASSOCIATED WITH THIS SYSTEM REQUIRED FOR HOT SHUTDOWN ARE LOCATED OUTSIDE OF THE EVALUATION AREA. MANUAL OPERATION OF THE AFFECTED VALVES REQUIRED FOR COLD SHUTDOWN IS AVAILABLE. 7. RHR - MANUAL OPERATION OF THE AFFECTED VALVES, WHICH HAVE CABLES IN THE EVALUATION AREA, IS AVAILABLE. 8. ESW - NOT AFFECTED, EVALUATION AREA DOES NOT CONTAIN COMPONENTS OR CIRCUITS ASSOCIATED WITH THIS SYSTEM REQUIRED FOR SAFE SHUTDOWN.
22		591	8,460	<1	NONE	NONE	FIRE ZONES 22, 27, 23, 34B AND 39 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION. THE SAFE SHUTDOWN SYSTEMS AVAILABILITY IS PRESENTED BELOW: 1. MS - INSTRUMENTATION ASSOCIATED WITH STEAM GENERATORS 1 AND 4 IS AVAILABLE IN CONJUNCTION WITH MANUAL OPERATION OF ASSOCIATED MRVs OUTSIDE OF THE EVALUATION AREA. 2. AF - MANUAL OPERATION OF AFFECTED FM0212 AND 242 AND FRV 247 IN CONJUNCTION WITH REMOTE OPERATION OF OTHER COMPONENTS OF THIS SYSTEM REQUIRED FOR SAFE SHUTDOWN OUTSIDE OF THE EVALUATION AREA WILL UTILIZE AF SYSTEM TO SUPPLY AUXILIARY FEEDWATER TO STEAM GENERATORS 1 AND 4. 3. RCS - T_h AND T_c NORMAL INDICATIONS ARE AFFECTED, BUT ALTERNATIVE INDICATION CAPABILITY IS BEING PROVIDED AS PRESENTED IN MARCH 1983 SUBMITTAL. AS LEAST ONE TRAIN OF OTHER RCS SAFE SHUTDOWN PROCESS MONITORING SYSTEM COMPONENTS IS LOCATED OUTSIDE OF THE EVALUATION AREA.
	27	84,252	1,056	63	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	
	23	27,830	840	21	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	
	34B	*	*	*	NONE	NONE	
	39	28,630	2,667	21	AUTOMATIC CO_2	IONIZATION AND INFRARED TYPES	

(THIS FIRE AREA IS CONTINUED ON THE NEXT PAGE)

* FIRE ZONES 34, 34A AND 34B ARE CONTAINED IN A FIRE AREA FOR WHICH THE COMBUSTIBLE LOADING IS 5,809 BTU/FT^2, AREA IS 2,890 FT^2 AND EQUIVALENT FIRE SEVERITY IS 4 MINUTES

SEISMIC GAP EVALUATION AREA							
POSTULATED FIRE LOCATION	ADJACENT ZONE OF CONCERN	COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
22 (cont.)							4. CVCS- THE SAFE SHUTDOWN COMPONENTS ASSOCIATED WITH THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA, EXCEPT CABLE ASSOCIATED WITH QRV-251, WHICH FAILS AT 50 GPM MINIMUM FLOW POSITION. 5. EPS - SAFE SHUTDOWN COMPONENTS AND CIRCUITS OF ONE TRAIN OF EPS WHICH INCLUDES DGAB ARE LOCATED OUTSIDE OF THE EVALUATION AREA. 6. CCW - CIRCUITS AND COMPONENTS ASSOCIATED WITH THIS SYSTEM REQUIRED FOR HOT SHUTDOWN ARE LOCATED OUTSIDE OF THE EVALUATION AREA. MANUAL OPERATION OF THE AFFECTED VALVES REQUIRED FOR COLD SHUTDOWN IS AVAILABLE. 7. RHR - MANUAL OPERATION OF THE AFFECTED VALVES, WHICH HAVE CABLES IN THE EVALUATION AREA, IS AVAILABLE. 8. ESW - NOT AFFECTED, EVALUATION AREA DOES NOT CONTAIN COMPONENTS OR CIRCUITS ASSOCIATED WITH THIS SYSTEM REQUIRED FOR SAFE SHUTDOWN.
50		49,898	3,200	37	AUTOMATIC DELUGE FOR CHARCOAL FILTER	IONIZATION AND THERMISTOR FOR CHARCOAL FILTER	FIRE ZONES 50, 69 AND 109 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION. THE SAFE SHUTDOWN SYSTEMS AVAILABILITY IS PRESENTED BELOW: 1. MS - INSTRUMENTATION ASSOCIATED WITH STEAM GENERATORS 1 AND 4 IS AVAILABLE IN CONJUNCTION WITH MANUAL OPERATION OF ASSOCIATED MRVs OUTSIDE OF THE EVALUATION AREA. 2. AF - ONE TRAIN OF THIS SYSTEM INCLUDING PUMP PP-3W (AND ASSOCIATED CABLES) AND FM0212 AND 242 AND ASSOCIATED CABLES ARE LOCATED OUTSIDE OF THE EVALUATION AREA.
	69	1,314	17,914	1	AUTOMATIC DELUGE FOR HVAC UNIT	IONIZATION AND THERMISTORS FOR HVAC UNITS	
	109	0	897	0	NONE	NONE	

(THIS FIRE AREA IS CONTINUED ON THE NEXT PAGE)

TABLE 2-2 (continued)

SEISMIC GAP EVALUATION AREA		COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
POSTULATED FIRE LOCATION	ADJACENT ZONE OF CONCERN						
50 (cont.)							3. CVCS- COMPONENTS AND CIRCUITS ASSOCIATED WITH THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA, EXCEPT ONE OF THE CHARGING PUMPS SUCTION VALVE CABLE (REDUNDANT VALVE IS AVAILABLE). 4. CCW - CIRCUITS AND COMPONENTS ASSOCIATED WITH THIS SYSTEM REQUIRED FOR HOT SHUTDOWN ARE LOCATED OUTSIDE OF THE EVALUATION AREA. MANUAL OPERATION OF THE AFFECTED VALVES REQUIRED FOR COLD SHUTDOWN IS AVAILABLE. 5. RHR - MANUAL OPERATION OF THE AFFECTED VALVES, WHICH HAVE CABLES IN THE EVALUATION AREA, IS AVAILABLE. 6. THE FOLLOWING SAFE SHUTDOWN SYSTEMS COMPONENTS AND CIRCUITS ARE LOCATED OUTSIDE OF THE EVALUATION AREA: o RCS o EPS o ESW
69		1,314	17,914	1	AUTOMATIC DELUGE FOR HVAC UNIT	IONIZATION AND THERMISTORS FOR HVAC UNITS	FIRE ZONES 69 AND 108 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION REGARDING SAFE SHUTDOWN CAPABILITY ASSESSMENT. FIRE ZONE 69 CONTAINS NO SAFE SHUTDOWN SYSTEMS, COMPONENTS AND CIRCUITS. THE SAFE SHUTDOWN COMPONENTS AND CIRCUITS LOCATED IN THIS EVALUATION AREA ARE THE COMPONENTS AND CIRCUITS LOCATED IN FIRE ZONE 108 FOR WHICH COMPLIANCE METHOD IS PRESENTED IN 1983 SUBMITTAL.
	109	0	897	0	NONE	NONE	

TABLE 2-2 (continued)

SEISMIC GAP EVALUATION AREA		COMBUSTIBLE LOADING (BTU/FT^2)	AREA (FT^2)	EQUIVALENT FIRE SEVERITY (MIN)	SUPPRESSION	DETECTION	SYSTEM EVALUATION
POSTULATED FIRE LOCATION	ADJACENT ZONE OF CONCERN						
109		0	897	0	NONE	NONE	FIRE ZONES 50, 69 AND 109 ARE COMBINED AS ONE AREA FOR THIS SYSTEM EVALUATION. THE SAFE SHUTDOWN SYSTEMS AVAILABILITY IS PRESENTED BELOW: 1. MS - INSTRUMENTATION ASSOCIATED WITH STEAM GENERATORS 1 AND 4 IS AVAILABLE IN CONJUNCTION WITH MANUAL OPERATION OF ASSOCIATED MRVs OUTSIDE OF THE EVALUATION AREA. 2. AF - ONE TRAIN OF THIS SYSTEM INCLUDING PUMP PP-3W (AND ASSOCIATED CABLES) AND FM0212 AND 242 AND ASSOCIATED CABLES ARE LOCATED OUTSIDE OF THE EVALUATION AREA. 3. CVCS- COMPONENTS AND CIRCUITS ASSOCIATED WITH THIS SYSTEM ARE LOCATED OUTSIDE OF THE EVALUATION AREA, EXCEPT ONE OF THE CHARGING PUMPS SUCTION VALVE CABLE (REDUNDANT VALVE IS AVAILABLE). 4. CCW - CIRCUITS AND COMPONENTS ASSOCIATED WITH THIS SYSTEM REQUIRED FOR HOT SHUTDOWN ARE LOCATED OUTSIDE OF THE EVALUATION AREA. MANUAL OPERATION OF THE AFFECTED VALVES REQUIRED FOR COLD SHUTDOWN IS AVAILABLE. 5. RHR - MANUAL OPERATION OF THE AFFECTED VALVES, WHICH HAVE CABLES IN THE EVALUATION AREA, IS AVAILABLE. 6. THE FOLLOWING SAFE SHUTDOWN SYSTEMS COMPONENTS AND CIRCUITS ARE LOCATED OUTSIDE OF THE EVALUATION AREA: o RCS o EPS o ESW
	50	49,898	3,200	37	AUTOMATIC DELUGE FOR CHARCOAL FILTER	IONIZATION AND THERMISTOR FOR CHARCOAL FILTER	
	69	1,314	17,914	1	AUTOMATIC DELUGE FOR HVAC UNIT	IONIZATION AND THERMISTORS FOR HVAC UNITS	