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October 16, 1984

United States Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Mr. George W. Knighton, Chief
Licensing Branch 3
Office of Nuclear Reactor Regulation

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
Response to DSER Outstanding Issue 197

Gentlemen:

Attached is revised FSAR material in response to Outstanding Issue 197 of the Draft Safety Evaluation Report. This revision addresses those concerns raised by the reviewer in meetings on August 30, 1984, and September 26, 1984. This information will be incorporated in the FSAR upon acceptance by the reviewer.

DUQUESNE LIGHT COMPANY

By W. J. Woolever for
E. J. Woolever
Vice President

GLB/wjs
Attachment

cc: Mr. H. R. Denton, Director (NRR) (w/a)
Mr. D. Eisenhut, Director Division of Licensing (w/a)
Mr. J. Knox (w/a)
Mr. T. Novak, Assistant Director Division of Licensing (w/a)
Mr. G. Walton, NRC Resident Inspector (w/a)

SUBSCRIBED AND SWORN TO BEFORE ME THIS
16th DAY OF October, 1984.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

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COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 16th day of October, 1984, before me, a Notary Public in and for said Commonwealth and County, personally appeared H. M. Siegel, who being duly sworn, deposed and said that he is authorized to sign for E. J. Woolever, who (1) is Vice President of Duquesne Light, (2) is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

1.8 Conformance to NRC Regulatory Guides

R.G. No. 1.75 Rev. 2
FSAR Reference Sections 7.1.2.2.1, 8.3.1.4, 8.3.2.2

PHYSICAL INDEPENDENCE OF ELECTRIC SYSTEMS (SEPTEMBER 1978)

Beaver Valley Power Station - Unit 2 complies with the following clarifications:

1. General (Clarification)

Ventilated tray covers and cable bus enclosures are considered equivalent to solid tray covers.

Lengths of cable enclosed in a protective wrap of woven silicon dioxide are considered to be protected from electrically induced problems in adjacent cables to the same degree as the same cable in an enclosed raceway. The protective wrap of woven silicon dioxide (trade name - SIL-TEMP) is nominally 54 mils thick and is wrapped longitudinally around cable(s) with a 50 percent overlap to ensure that cable(s) is enclosed by one thickness of the protective wrap. The protective wrap of woven silicon dioxide (trade name - SIL-TEMP) may also be a tape, nominally 125 mils thick and applied in half-lapped layers. The Sil-Temp material has been tested at Wyle Labs in Huntsville, Alabama for both Pennsylvania Power & Light and Long Island Lighting Company to demonstrate its effectiveness in providing protection from electrically induced cable problems.

For the purposes of electrical separation, equivalent protection is provided through enclosure by rigid aluminum conduit, rigid steel conduit, electro-metallic tubing (EMT), flexible aluminum conduit, flexible steel conduit, and protective wrap. Enclosures provided to meet the requirements of BTP CMEB 9.5-1 are considered equivalent to enclosures provided for electrical separation and will have 1 hour or longer fire rating.

Metal clad cable, type MC, utilized in low energy, 120V ac and 125V dc nominal, circuits and in low density applications is considered adequately protected. As such, the minimum separation between these cables and other cables, or raceway (where required) is 1 in. These cables are further described as follows:

a. Type MC cable is a factory assembly of conductors, each individually insulated, enclosed in a metallic sheath of interlocking tape or a smooth or corrugated tube.

b. Largest conductor size is number 10 AWG.

c. No more than six conductors.

d. No more than three number 10 AWG conductors with remaining conductors of smaller size.

e. Aluminum sheath cable (a Type MC cable in which the aluminum is continuously welded) and/or interlocked armor cable may have an overall jacket of neoprene or hypalon.

Type SO or SJO cords for lighting drops to fixtures are size 12 AWG or smaller and supply low energy, 120V ac or 125V dc, in low density applications. Adequate protection is provided by 1 in. or greater distance to Class 1E raceways.

A raised floor panel can be used as a barrier. Panels are 1 in. thick particle board with 22 gauge steel top and bottom sheets, and are fire rated Class A. These panels are considered a barrier when used in a configuration as shown in IEEE 384 (1974), Figure 2, 3, or 4.

The Cable Spreading Areas (Main Control Room, Cable Spreading Room, and Computer Room) are protected areas and are not exposed to potential hazards such as high pressure piping, missiles, flammable material, flooding, or wiring that is not flame

retardant. They do not contain high energy equipment such as switchgear, transformers, rotating equipment, or potential sources of missiles or pipe whip and are not used for storing flammable materials.

2. Position C.6 (Clarification)

Analyses of potential hazards in Section 5.1.1.1 of IEEE 384 (1974) are accomplished as follows:

a) The high pressure piping and missile analyses are described in Sections 3.6 and 3.5, respectively.

b) The fire protection analyses are outlined in Section 9.5.1 and the Fire Protection Evaluation Report.

c) Flame retardant characteristics of cable systems are described in Section 8.3.3.

d) The building design for external and internal flooding is described in Sections 3.4 and 3.8, respectively. The environmental effects on safety-related components due to internal flooding are described in Sections 3.6B, 3.4, and 3.11.

3. Position C.7 (Section 4.6 of IEEE-384)

Minimum separation between Class 1E and non-Class 1E circuits is as specified in Sections 5.1.3, 5.1.4, or 5.6.2 of IEEE-384 (1974), except as discussed under Position C.16. The minimum separation distances discussed in this section are those given to minimize the damage potential due to failures or faults internal to the electrical equipment or circuits. Other hazards are addressed in Item 2 (Position C.6) above.

Where plant arrangement in non-hazardous general plant areas for perpendicular crossings precludes the minimum vertical separation but a spacing of 8 3/4 in. (i.e., the minimum vertical tray spacing) is maintained, a tray cover on the lower tray, or a tray bottom on the upper tray, or a barrier interposed between the Class 1E and the non-Class 1E circuits provides the necessary separation as shown on Figures 8.3-26 and 27.

In non-hazardous general plant areas at locations of cable entry/exit from cable trays for Class 1E and non-Class 1E situations, a tray cover on the top of the lower tray with 6 in. minimum space as shown on Figures 8.3-40 and 41 provides the necessary separation.

Where plant arrangement in the control room or cable spreading room precludes the minimum vertical separation, but a spacing of 8 3/4 in. (i.e., the minimum vertical tray spacing) is maintained, a tray cover on the top of the lower tray, or a tray cover on the bottom of the upper tray, or a barrier interposed between the Class 1E and the non-Class 1E circuits provides the necessary separation, as shown on Figures 8.3-22 (Details A, B, C, and D), 28 and 29.

In the control room or cable spreading room at locations of cable entry/exit from cable trays for Class 1E and non-Class 1E situations, a tray cover on the top of the lower tray with 6 in. minimum space as shown on Figures 8.3-42 and 43 provides the necessary separation.

Where plant arrangement in the control room or cable spreading room precludes achieving the minimum vertical separation or the minimum horizontal separation, either the non-Class 1E circuit(s) or the Class 1E circuit(s) are run in an enclosed raceway (i.e., conduit or tray with tray covers on top and bottom) or a barrier is interposed between the non-Class 1E circuit(s) and Class 1E circuit(s). The minimum distance between cable and an enclosed

raceway or cable and a barrier is 1 in. as shown on Figures 8.3-22 (Detail E), 34, 35, 38, and 39.

Testing performed for the NRC by Sandia Labs (SAND 78-1810C) demonstrated the effectiveness of tray covers and enclosed bottoms for parallel trays, one over the other, when a fire was induced. This test was done with non-IEEE 383 qualified cable, and it shows the effectiveness of the covers.

4. Position C.9

Cable trays for control and instrumentation cables may be filled above the side rails where the overfill has been limited to a maximum of 1 1/2 in. above the top of the side rail and where solid high-hat covers with a 2 in. raised flat center section are used to enclose the top of the cable tray as shown on Figure 8.3-48.

5. Position C.10

Class 1E cable and raceways shall be marked at intervals not exceeding 15 ft and shall be plainly visible.

6. Position C.12

a) Power cables that supply power to control room distribution panels, limited to 120V ac and/or 125V dc, are:

1. Enclosed in rigid conduit in the cable spreading room.

2. Enclosed in rigid conduit with flexible conduit at entrance to the panels.

b) Power cables to facilities serving the control room, limited to 120V ac and/or 125V dc, are enclosed in rigid conduit except at entrance/exit to floor sleeves in the cable spreading room and control room, and at entrance to equipment in the control room.

c) Other power cables (480V and 120V ac service) that traverse the cable spreading room to provide services (ventilation, etc.) to this area are enclosed in rigid conduit.

d) The loss of the above cables, or the control room or cable spreading room due to the design basis event fire, will not compromise the capability to achieve cold shutdown as outlined in Section 9.5.1 and in the Fire Protection Evaluation Report.

e) The Beaver Valley Power Station - Unit 2 design utilizes a single cable spreading room.

7. Position C.16 (Section 5.6.2 of IEEE-384)

The minimum 6 in. separation (or a barrier) applies to spacing between exposed terminals, contacts, and equipment of redundant Class 1E circuits or Class 1E and non-Class 1E circuits for testing and maintenance purposes. A minimum of 1 in. separation (or a barrier) is required between redundant wire bundles or Class 1E and non-Class 1E wire bundles. The minimum of 1 in. separation is sufficient because the control boards are protected from and/or are not subject to hazards such as external fire, flooding, high energy piping, and missiles. Internal electrical fires are not considered a hazard due to fire retardant materials and low energy application.

Separation requirements for Westinghouse NSSS equipment are specifically addressed in Section 7.1.2.2.

8.3.1.4 Independence of Redundant Systems

8.3.1.4.1 Principal Criteria

The principal design criterion that establishes the minimum requirements for preserving the independence of redundant Class 1E power systems through physical arrangement and separation and for ensuring the minimum required equipment availability during any design basis event (Class 1E power system and design basis event are defined in IEEE 308) is as follows:

> Class 1E electrical equipment is physically and electrically separated from its redundant counterpart or mechanically protected as required to prevent the occurrence of common mode failures. Separation of equipment is maintained to prevent loss of redundant features from single failures.

8.3.1.4.2 Equipment, Raceway, and Cable (in air) Considerations

Design features of the major Class 1E system components which ensure conformance to the design bases are described below.

The safety-related portions of the onsite ac power system are divided into two load groups (trains). The safety-related actions of each load group are redundant and independent of the safety actions provided by its redundant counterpart.

Redundant safety-related systems are not subject to common mode failure through failure of the ventilation system. The ventilation systems are discussed in Section 9.4.

Redundant safety-related systems are located in fire protected areas. The fire protection system is discussed and analyzed in Section 9.5.1 and in the Fire Protection Evaluation Report.

Safety-related equipment in all plant areas is either protected from automatic fire protection effluents or, on the basis of test data, has demonstrated its operability in the environment that may be caused by the fire protection effluents.

Redundant safety-related systems (including cable, electrical equipment, actuated equipment, sensors, and sensor to processor connections) are located in protected areas. Missile protection is discussed and analyzed in Section 3.5. Flood protection is discussed and analyzed in Sections 3.4 and 3.11. Protection against postulated pipe rupture is discussed and analyzed in Section 3.6. Seismic design is discussed and analyzed in Sections 3.7 and 3.10. Wind, hurricane, and tornado protection is discussed and analyzed in Section 3.3. Environmental (normal and postulated accident) design is discussed and analyzed in Section 3.11. Protection from rain, ice, snow, and lightning is inherent in station building and electrical system design.

The design criteria for redundant safety-related systems ensure that no single equipment maintenance outage, equipment malfunction, or operator action will prevent a safety-related system from performing its intended safety function.

The loss of the preferred power supply in conjunction with any postulated natural phenomenon will not prevent a safety-related system from performing its intended safety function.

The independence of the redundant safety-related systems is preserved by physical as well as electrical separation.

Separation is accomplished as follows:

1. The emergency generator, switchgear, load centers, motor control centers, and distribution panels associated with one safety-related train are physically separated from their redundant counterparts of the other safety-related train as discussed in Section 8.3.1.1.

2. The physical description of the containment electrical penetration areas is discussed in Section 8.3.1.1.16.

3. Associated circuits per R.G. 1.75 are identified with the same color code as, and meet all the requirements of, the Class 1E circuit with which they are associated up to and including an isolation device. Beyond the isolation device they are identified as nonsafety-related.

4. The minimum separation distance between redundant Class 1E cables and between Class 1E cables and non-Class 1E cables is:

   General Plant Areas (GPA)

   (Refer to Table 8.3-6 for specific areas)

   5 feet vertically
   3 feet horizontally

   Cable Spreading Areas (CSA)

   (Main Control Room, Cable Spreading Room, and Computer Room)

   3 feet vertically
   1 foot horizontally

The vertical spacing distance between trays is measured from the top of the side rail of the lower tray to the bottom of the side rail of the upper tray. The horizontal spacing distance between trays is measured from outside of side rail flange to outside of side rail flange.

Where plant arrangement precludes the minimum separation distance, actual installations conform to one of the acceptable arrangements listed in IEEE 384 (1974). These acceptable arrangements between redundant Class 1E cables and between Class 1E and non-Class 1E cables will be achieved by maintaining lesser distances in conjunction with the use of tray covers, enclosed raceway, protective wraps, or barriers.

Acceptable arrangements are as follows:

a. Tray to Tray Separation

In the GPA, where an 8 3/4 in. minimum vertical tray spacing is maintained between redundant Class 1E trays or between non-Class 1E and Class 1E trays, a tray cover on the top of the lower tray and a tray cover on the bottom of the upper tray are installed as shown on Figure 8.3-16, Details A, B, and C. In the GPA, where the 8 3/4 in. minimum vertical tray spacing cannot be maintained between redundant Class 1E trays or between non-Class 1E and Class 1E, the free-air space may be reduced to 1 in. where a tray cover on the top of the lower tray and a tray cover on the bottom of the upper tray are installed in the same configurations as shown on Figure 8.3-16, Details A, B, C. Free-air space is measured from tray cover to tray cover.

In the GPA, where a 1 in. minimum horizontal tray spacing is maintained between redundant Class 1E trays or between non-Class 1E and Class 1E trays, tray covers on the top and bottom of both trays are installed as shown on Figure 8.3-17, Details A and B.

In the GPA, where a 1 in. minimum horizontal tray spacing is maintained between a Class 1E tray running vertically and a redundant Class 1E tray running horizontally, tray covers on both trays are installed as shown on Figure 8.3-18.

In the GPA, where a 1 in. minimum horizontal tray spacing is maintained between a Class 1E tray running vertically and a non-Class 1E tray running horizontally, tray covers on both trays are installed as shown on Figure 8.3-19.

In the GPA, where a 1 in. minimum horizontal tray spacing is maintained between a non-Class 1E tray running vertically and a Class 1E tray running horizontally, tray covers on both trays are installed as shown on Figure 8.3-20.

In the CSA, where an 8 3/4 in. minimum vertical tray spacing is maintained between redundant Class 1E trays, tray covers on the bottom of the upper tray and on the top of the lower tray are installed as shown on Figure 8.3-21, Detail A.

In the CSA, where a 1 in. minimum horizontal tray spacing is maintained between redundant Class 1E trays, tray covers on the top and bottom of both trays are installed as shown on Figure 8.3-21, Detail B.

In the CSA, where an 8 3/4 in. minimum vertical tray spacing is maintained between a non-Class 1E tray and a Class 1E tray, a tray cover on the bottom of the upper tray or a tray cover on the top of the lower tray is installed as shown on Figure 8.3-22, Details A, B, C, and D.

In the CSA, where a 1 in. minimum horizontal tray spacing is maintained between non-Class 1E and Class 1E trays, tray covers on the top and bottom of one of the trays are installed as shown on Figure 8.3-22, Detail E.

In the CSA, where a 1 in. minimum horizontal tray spacing is maintained between a Class 1E tray running vertically and a redundant Class 1E tray running horizontally, tray covers on both trays are installed as shown on Figure 8.3-23.

In the CSA, where a 1 in. minimum horizontal tray spacing is maintained between a Class 1E tray running vertically and a non-Class 1E tray running horizontally, tray covers on both trays are installed as shown on Figure 8.3-24.

In the CSA, where a 1 in. minimum horizontal tray spacing is maintained between a non-Class 1E tray running vertically and a Class 1E tray running horizontally, tray covers on both trays are installed as shown on Figure 8.3-25.

In the GPA, where an 8 3/4 in. minimum vertical tray spacing is maintained between Class 1E and non-Class 1E vertical trays which cross in the horizontal plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-26.

In the GPA, where an 8 3/4 in. minimum vertical tray spacing is maintained between non-Class 1E and Class 1E vertical trays which cross in the horizontal plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-27.

In the CSA, where an 8 3/4 in. minimum vertical tray spacing is maintained between Class 1E and non-Class 1E vertical trays which cross in the horizontal plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-28.

In the CSA, where an 8 3/4 in. minimum vertical tray spacing is maintained between non-Class 1E and Class 1E vertical trays which cross in the horizontal plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-29.

In the above cases, where tray covers are not used, a barrier is provided per IEEE 384 (1974), Figure 2, 3, or 4.

b. Tray to Conduit Separation

In the GPA, vertical separation between a Class 1E tray and a redundant Class 1E conduit may be reduced to 1 in., where a tray cover on the bottom of the tray is installed as shown on Figure 8.3-30, Detail A.

In the GPA, vertical separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in., where a tray cover on the top of the tray is installed as shown on Figure 8.3-30, Detail B.

In the GPA, horizontal separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in., where tray covers on the top and bottom of the tray are installed as shown on Figure 8.3-30, Detail C.

In the GPA, vertical separation between a Class 1E tray and a non-Class 1E conduit may be reduced to 1 in., where a tray cover on the bottom of the tray is installed as shown on Figure 8.3-31, Detail A.

In the GPA, vertical separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in., where a tray cover on top of the tray is installed as shown on Figure 8.3-31, Detail B.

In the GPA, horizontal separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in., where tray covers on the top and bottom of the tray are installed as shown on Figure 8.3-31, Detail C.

In the GPA, vertical separation between a non-Class 1E tray and a Class 1E conduit may be reduced to 1 in., where a tray cover on the bottom of the tray is installed as shown on Figure 8.3-32, Detail A.

In the GPA, vertical separation between a non-Class 1E conduit and a Class 1E tray may be reduced to 1 in., where a tray cover on the top of the tray is installed as shown on Figure 8.3-32, Detail B.

In the GPA, horizontal separation between a non-Class 1E conduit and Class 1E tray may be reduced to 1 in., where tray covers on the top and bottom of the tray are installed as shown on Figure 8.3-32, Detail C.

In the CSA, vertical separation between a Class 1E tray and a redundant Class 1E conduit may be reduced to 1 in., where a tray cover on the bottom of the tray is installed as shown on Figure 8.3-33, Detail A.

In the CSA, vertical separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in., where a tray cover on the top of the tray is installed as shown on Figure 8.3-33, Detail B.

In the CSA, horizontal separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in., where tray covers on the top and bottom of the tray are installed as shown on Figure 8.3-33, Detail C.

In the CSA, vertical separation between a Class 1E tray and a non-Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-34, Detail A.

In the CSA, vertical separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-34, Detail B.

In the CSA, horizontal separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-34, Detail C.

In the CSA, vertical separation between a non-Class 1E tray and a Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-35, Detail A.

In the CSA, vertical separation between a non-Class 1E conduit and a Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-35, Detail B.

In the CSA, horizontal separation between a non-Class 1E conduit and a Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-35, Detail C.

c. Conduit to Conduit Separation

In the GPA and CSA, separation between Class 1E and redundant Class 1E conduit or Class 1E and non-Class 1E conduit may be reduced to 1 in.

d. Cable in Air to Cable in Air Separation

In the GPA, where cables are appropriately grouped together and are either installed in conduit or enclosed in a protective wrap, separation between Class 1E cables and redundant Class 1E cables, and between Class 1E cables and non-Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-36, Details A, B, and C.

In the CSA, where cables are appropriately grouped together and are either installed in a conduit or enclosed in a protective wrap, separation between redundant Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-37.

In the CSA, where cables are appropriately grouped together and the non-Class 1E group is installed in conduit or enclosed in a protective wrap, separation between the Class 1E cables and the non-Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-38, Details A, B, and C.

In the CSA, where cables are appropriately grouped together and the Class 1E group is installed in conduit or enclosed in a protective wrap, separation between the non-Class 1E cables and the Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-39, Details A, B, and C.

In the above cases, where conduit or protective wraps are not used, a barrier is provided in accordance with IEEE 384 (1974), Figure 2, 3, or 4.

e. Cable in Air to Tray Separation

In the GPA, where 8 3/4 in. minimum vertical spacing between Class 1E and non-Class 1E trays is maintained and tray covers are provided in accordance with Figure 8.3-16, Detail C, where a Class 1E cable enters the Class 1E tray, the separation between the Class 1E cable and the non-Class 1E tray may be reduced to 6 in. as shown on Figure 8.3-40.

In the GPA, where 8 3/4 in. minimum vertical spacing between non-Class 1E and Class 1E trays is maintained and tray covers are provided in accordance with Figure 8.3-16, Detail B, where a non-Class 1E cable enters the non-Class 1E tray the separation between the non-Class 1E cable and the Class 1E tray may be reduced to 6 in. as shown on Figure 8.3-41.

In the CSA, where 8 3/4 in. minimum vertical spacing between Class 1E and non-Class 1E trays is maintained and a tray cover is installed on the lower tray (non-Class 1E tray) in accordance with Figure 8.3-22, Detail A, where a Class 1E cable enters the Class 1E tray, the separation between the Class 1E cable and the non-Class 1E tray may be reduced to 6 in. as shown on Figure 8.3-42.

In the CSA, where 8 3/4 in. minimum vertical spacing between non-Class 1E and Class 1E trays is maintained and a tray cover is installed on the lower tray (Class 1E tray) in accordance with Figure 8.3-22, Detail C, where a non-Class 1E cable enters the non-Class 1E tray, the separation between the non-Class 1E cable and the Class 1E tray may be reduced to 6 in. as shown on Figure 8.3-43.

f. Cable in Air to Conduit Separation

In the GPA, separation between Class 1E cables and a redundant Class 1E conduit may be reduced to 1 in., where the cables are enclosed in conduit or a protective wrap as shown on Figure 8.3-44, Detail A.

In the GPA, separation between Class 1E cables and a non-Class 1E conduit may be reduced to 1 in., where the cables are enclosed in conduit or a protective wrap as shown on Figure 8.3-44, Detail B.

In the GPA, separation between non-Class 1E cables and a Class 1E conduit may be reduced to 1 in., where the cables are enclosed in conduit or a protective wrap as shown on Figure 8.3-44, Detail C.

In the CSA, separation between Class 1E cables and a redundant Class 1E conduit may be reduced to 1 in., where the cables are enclosed in conduit or a protective wrap as shown on Figure 8.3-45.

In the CSA, separation between Class 1E cables and a non-Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-46, Details A, B, and C.

In the CSA, separation between non-Class 1E cables and a Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-47, Details A, B, and C.

5. In addition to separation by train and channel, there is also separation by voltage level and service within a train or channel. A computer program for the routing of cables prohibits the scheduling of a Class 1E cable in an assigned raceway of either a redundant Class 1E cable or a non-Class 1E cable. In addition, cables are routed in separate raceway systems according to the voltage service levels given

in Table 8.3-4. Each voltage service level corresponds to the raceway/cable identification letter given in this table (i.e., H, L, K, C, or X). Each cable with one identification number would be separated from cables with a different identification number (i.e., H (4160V) cables are not run with L (large 480V) cables). In special cases, C and K cables may be run together in the same tray and the raceway would be designated a K tray. In other special cases, K and L cables may be run together in the same tray if maintained spacing is provided to the cables in accordance with the L spacing in Table 8.3-4. The raceway would then be designated an L tray.

Trays for cables of different voltage levels are generally stacked in descending voltage order with the highest voltage cables in the uppermost trays. Instrument cables are generally installed in the lowest tray.

6. In general, Class 1E equipment is not installed in potential missile-producing areas. Where this is not practical, suitable missile protection is provided as discussed in Section 3.5.

7. In general, trays in the same vertical stack are separated by 8 3/4 in. minimum as measured from the bottom of the side rail of the upper tray to the top of the side rail of the lower tray.

8. In Category I areas, H (4160V) and L (large 480V) cables will be enclosed either by use of rigid or flexible conduit, protective wraps, or top and bottom tray covers. In Category II areas, H (4160V) and L (large 480V) cables whose separation is reduced below 5 ft vertical and 3 ft horizontal will be enclosed as detailed for Category I areas above. Refer to Section 3.2 for listing of Category I and Category II areas.

9. Ventilated cable tray covers are equivalent to solid cable tray covers.

10. Lengths of cable enclosed in a protective wrap of woven silicon dioxide (trade name - Sil-Temp) are considered to be protected from electrically induced problems in adjacent cables to the same degree as the same cable in an enclosed raceway.

11. Enclosures provided to meet the requirements of BTP CMEB 9.5-1 are considered equivalent to enclosures provided for electrical separation and will have 1-hour or longer fire rating.

12. Fire barriers are installed at all locations where trays penetrate a fire rated wall or floor.

13. Cable splices in raceways are prohibited.

14. The cable spreading areas (main control room, cable spreading room, and computer room) are protected areas and are not exposed to potential hazards such as high pressure piping, missiles, flammable material, flooding, or wiring that is not flame retardant. They do not contain high energy equipment such as switchgear, transformers, rotating equipment, or potential sources of missiles or pipe whip and are not used for storing flammable materials.

15. Cables in the cable spreading areas (CSA), that converge prior to entering control and instrument panels, in general perform control and instrument functions. Power cables are limited to feeders supplying power to equipment or ventilation units used for those areas. Power cables in these areas are installed in conduit.

16. In general, the minimum separation distance between redundant Class 1E circuits and between Class 1E and non-Class 1E circuits, internal to control panels and cabinets, is as follows:

For Exposed Contacts and Terminals

6 inches

For Wire Bundles

1 inch

Where device arrangement precludes the minimum separation at exposed contacts or terminals, a barrier or enclosure is provided. The barrier or enclosure extends 1 inch beyond exposed contacts or terminals.

Where wire bundle arrangement precludes the minimum separation, a barrier or enclosure, by flexible conduit or protective wrap, is provided.

Where the minimum separation between Class 1E circuits and non-Class 1E circuits is not maintained and installation of a barrier is not possible, the non-Class 1E circuit is classified as part of the Class 1E circuit up to an isolation device to prevent interaction between Class 1E and non-Class 1E circuits.

Separation requirements for Westinghouse NSSS equipment are specifically addressed in Section 7.1.2.2.

17. A raised floor panel can be used as a barrier. Panels are 1 in. thick particle board with 22 gauge steel top and bottom sheets and are fire rated Class A. These panels are considered a barrier when used in a configuration as shown in IEEE 384 (1974), Figure 2, 3, or 4.

18. Separation of cables (i.e., between redundant Class 1E circuits and between Class 1E and non-Class 1E circuits) at entrances to control panels and cabinets is consistent with the area in which they are located.

19. Separation is not required between either Train A (orange) and Channel I (red), or Train B (purple) and Channel II (white) except for service (or voltage class) considerations.

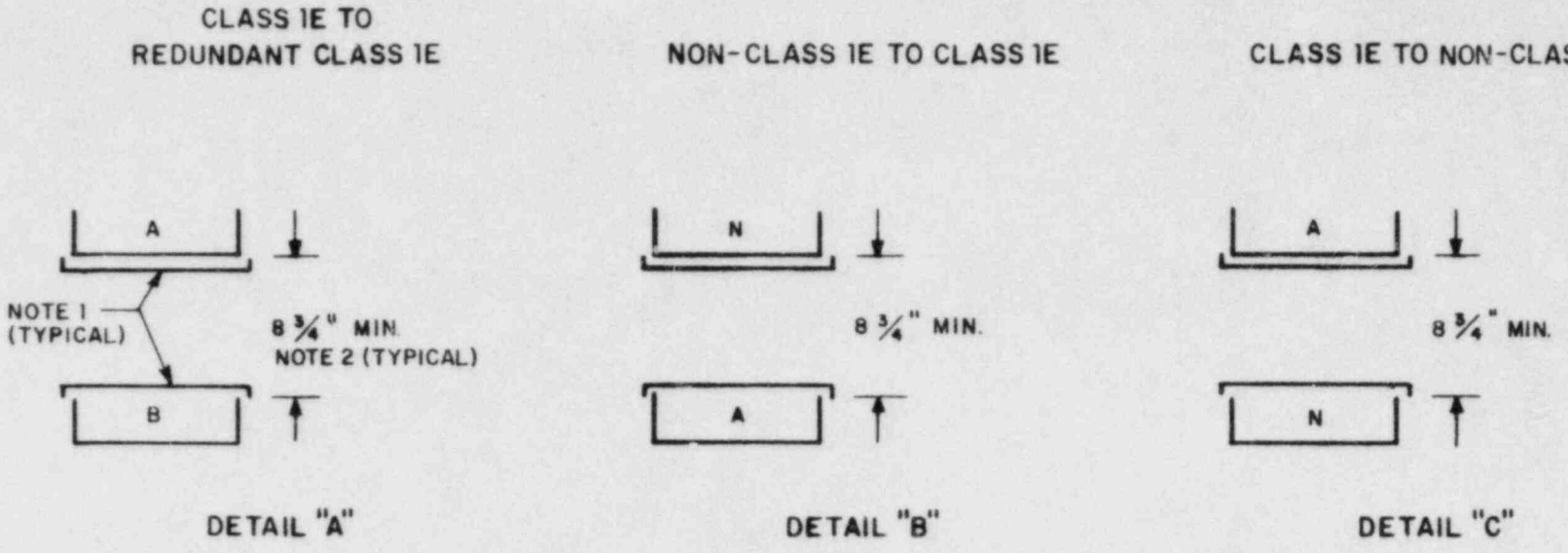
20. Each of the four channels of the excore neutron detection system are run in a dedicated conduit system. In addition to the standard separation required between Class 1E and non-Class 1E cables detailed in the above paragraphs of Section 8.3.1.4, cables in this system require the following supplemental separation:

    - Each excore channel cable will maintain a separation of ? ft from another excore channel cable.

    - Each excore channel cable will maintain a separation of 2 ft from any 480V ac, 120V ac, and 125V dc power or control cable.

    - Each excore channel cable will maintain a separation of 6 ft from any 4160V power cable.

GENERAL PLANT AREAS - TRAY TO TRAY



LEGEND

A - CLASS 1E RACEWAY

B - REDUNDANT CLASS 1E RACEWAY

N - NON CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-16

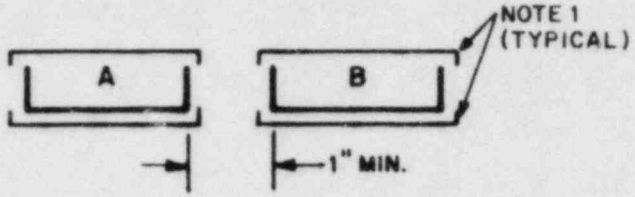
GENERAL PLANT AREAS (GPA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2

FINAL SAFETY ANALYSIS REPORT

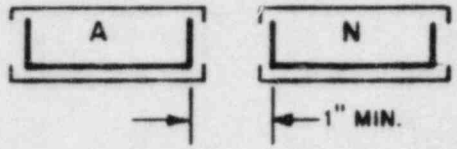
GENERAL PLANT AREAS - TRAY TO TRAY

CLASS 1E TO REDUNDANT CLASS 1E



DETAIL "A"

CLASS 1E TO NON-CLASS 1E



DETAIL "B"

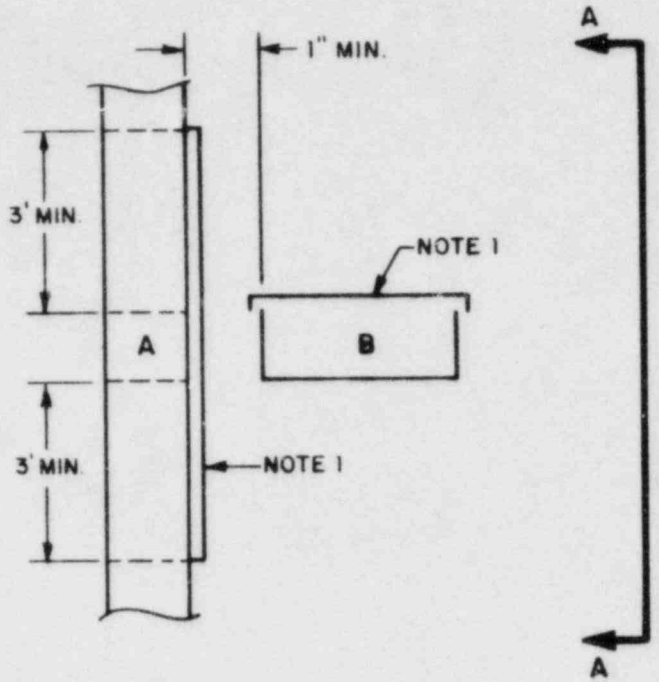
LEGEND

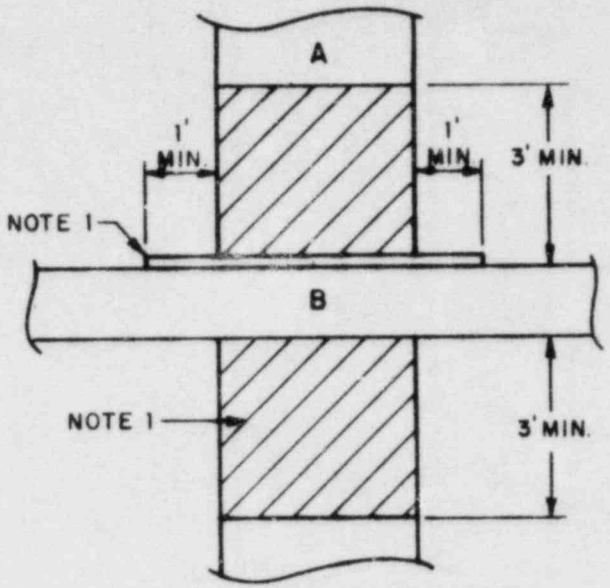
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-17
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION
ARRANGEMENTS
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS - TRAY TO TRAY
CLASS 1E TO REDUNDANT CLASS 1E





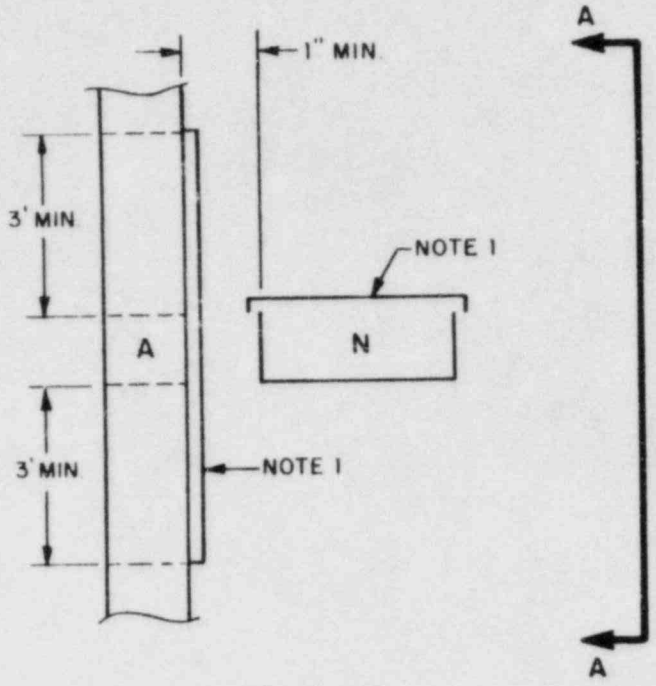
SECTION A-A

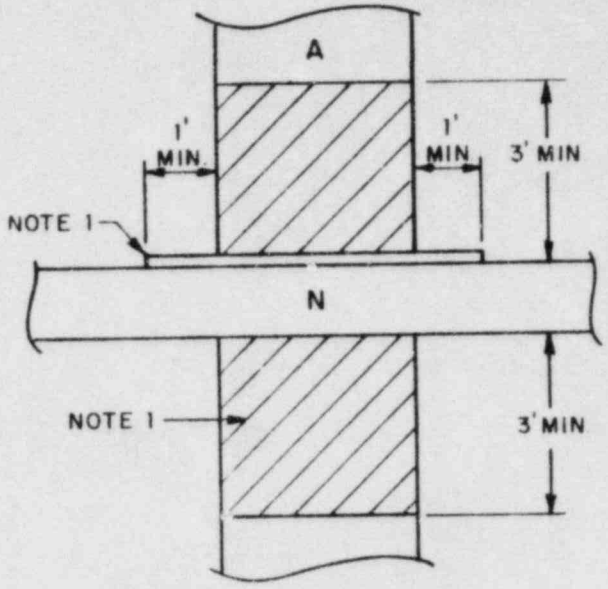
LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-18
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS - TRAY TO TRAY
CLASS 1E TO NON-CLASS 1E





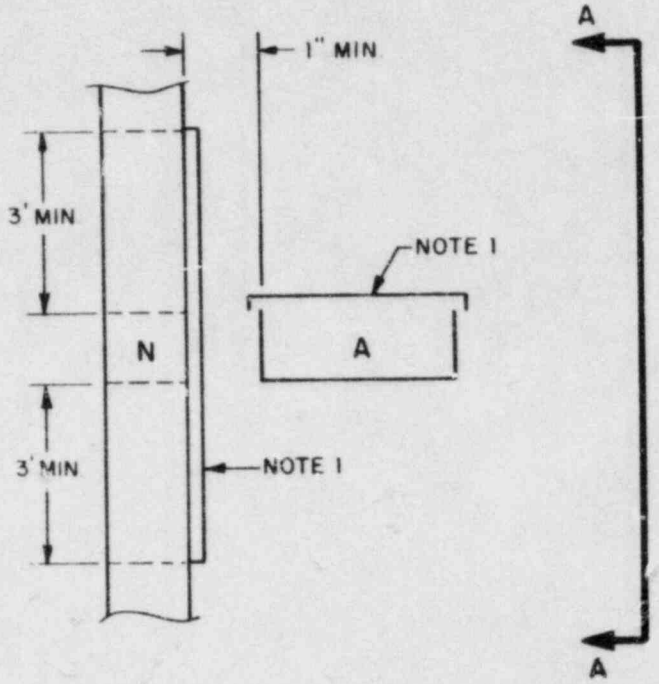
SECTION A-A

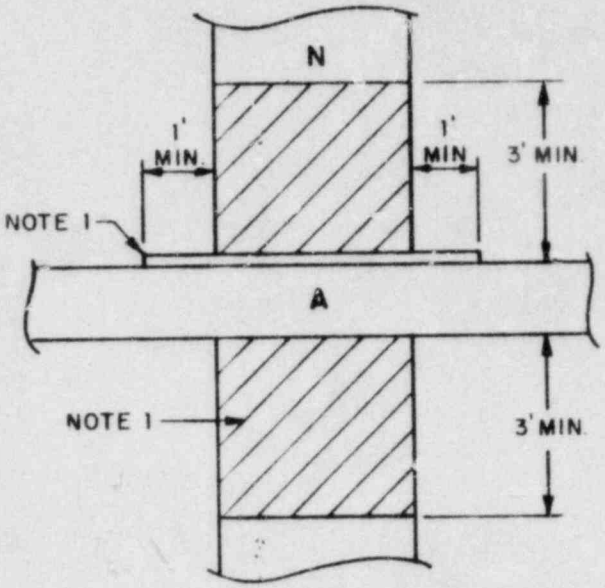
LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-19
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS - TRAY TO TRAY
NON-CLASS 1E TO CLASS 1E





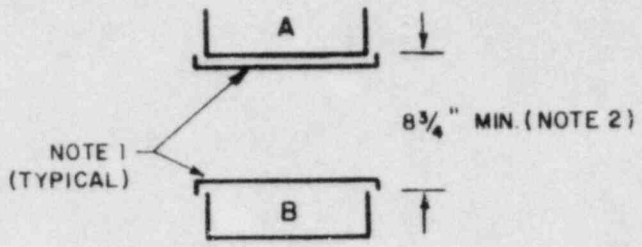
SECTION A-A

LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

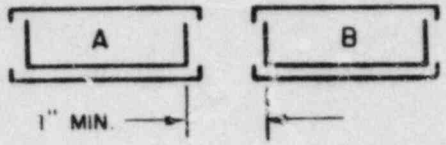
NOTE 1: TRAY COVER

FIGURE 8.3-20
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY
CLASS 1E TO REDUNDANT CLASS 1E



DETAIL "A" - VERTICAL



DETAIL "B" - HORIZONTAL

LEGEND

A - CLASS 1E RACEWAY

B - REDUNDANT CLASS 1E RACEWAY

N - NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

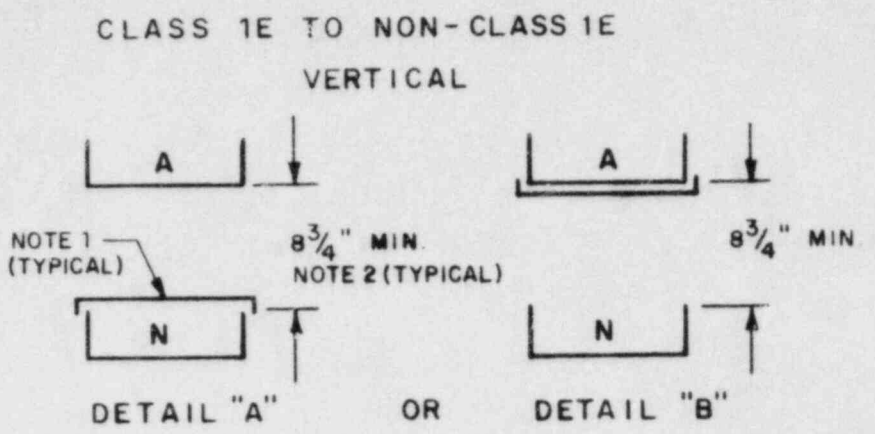
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

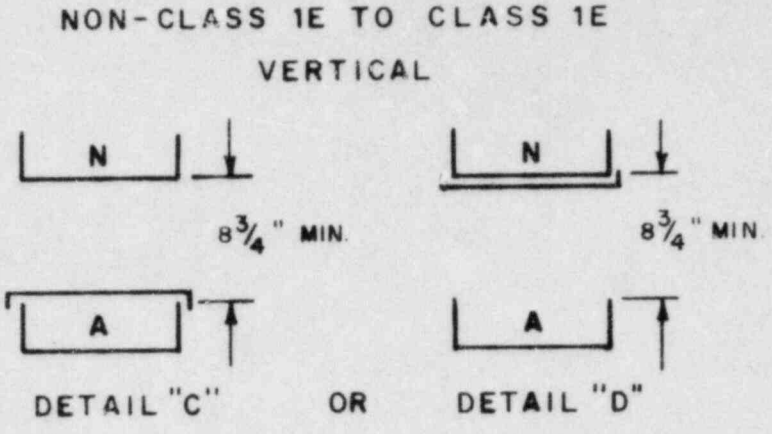
FIGURE 8.3-21

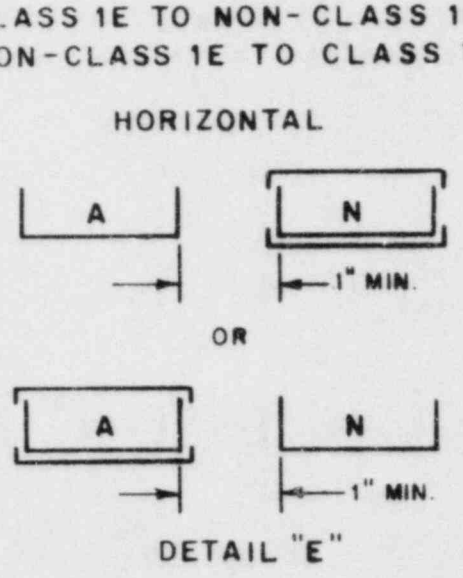
CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY





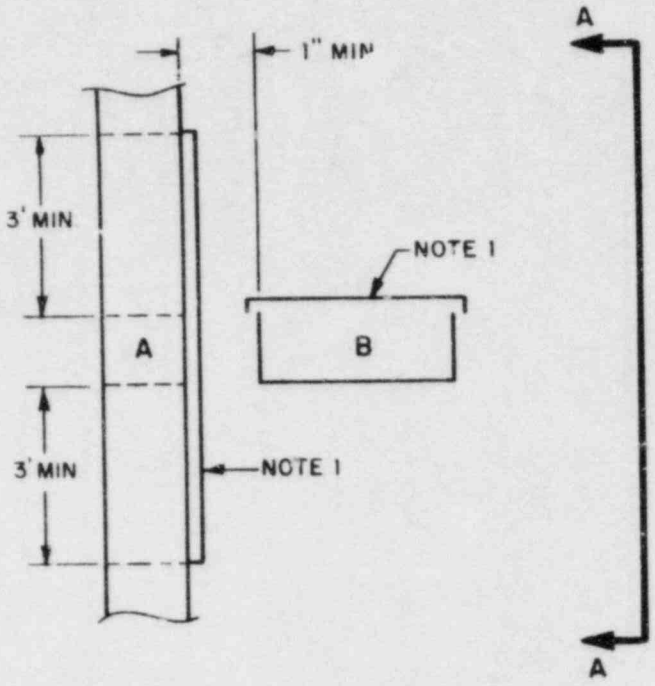


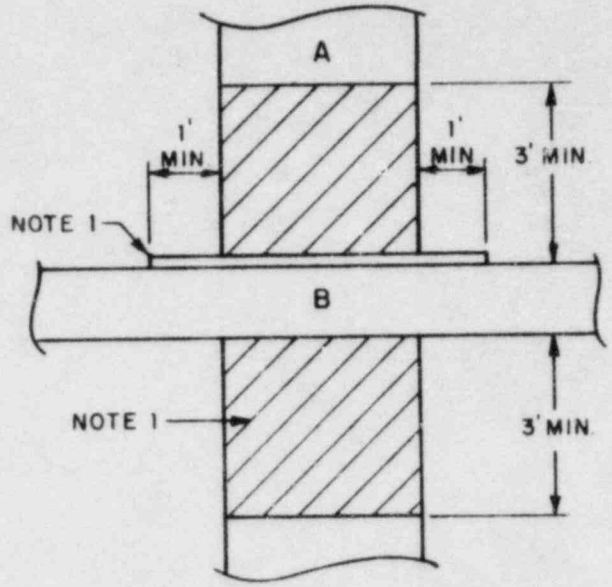
LEGEND
- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON-CLASS 1E RACEWAY

NOTES:
1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-22
CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY
CLASS 1E TO REDUNDANT CLASS 1E





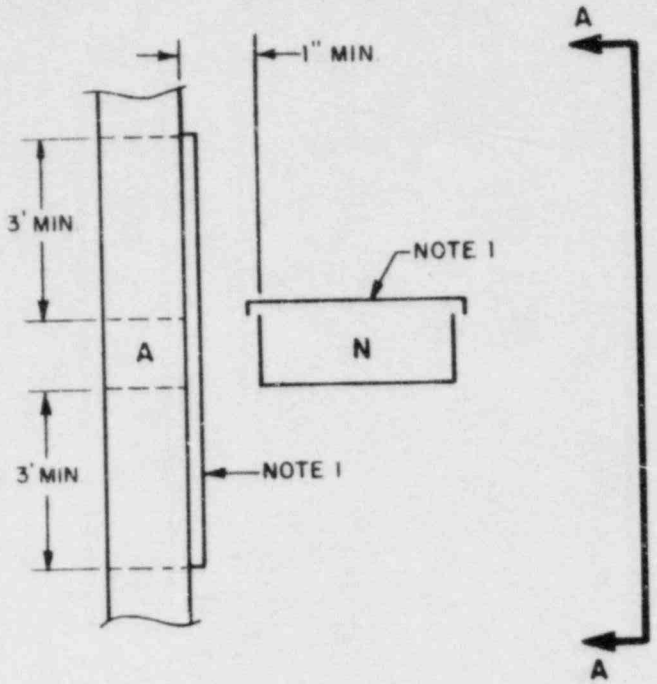
SECTION A-A

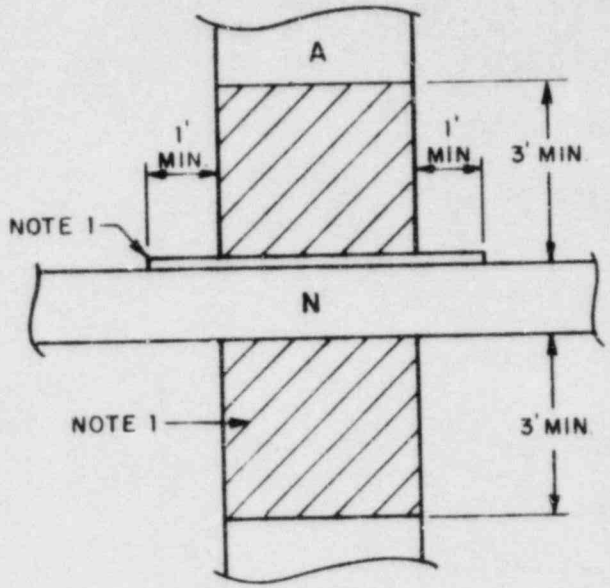
LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-23
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY
CLASS 1E TO NON-CLASS 1E





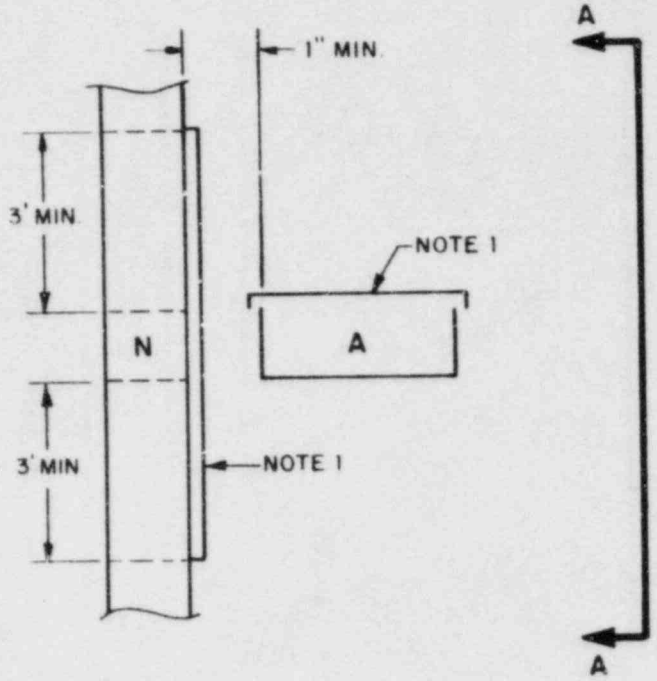
SECTION A-A

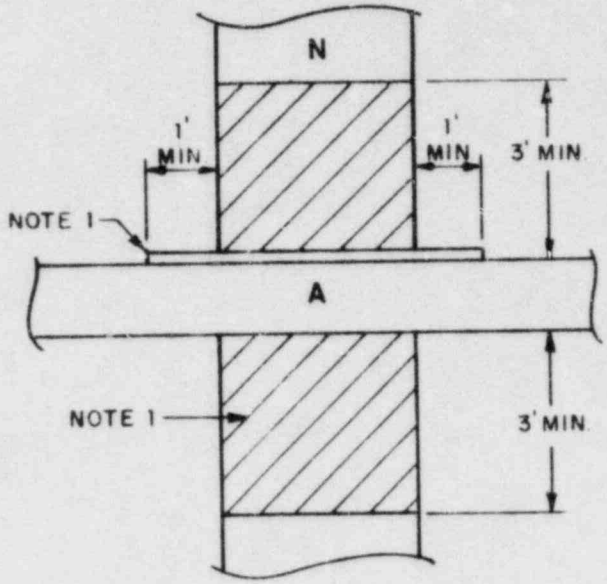
LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-24
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY
NON-CLASS 1E TO CLASS 1E





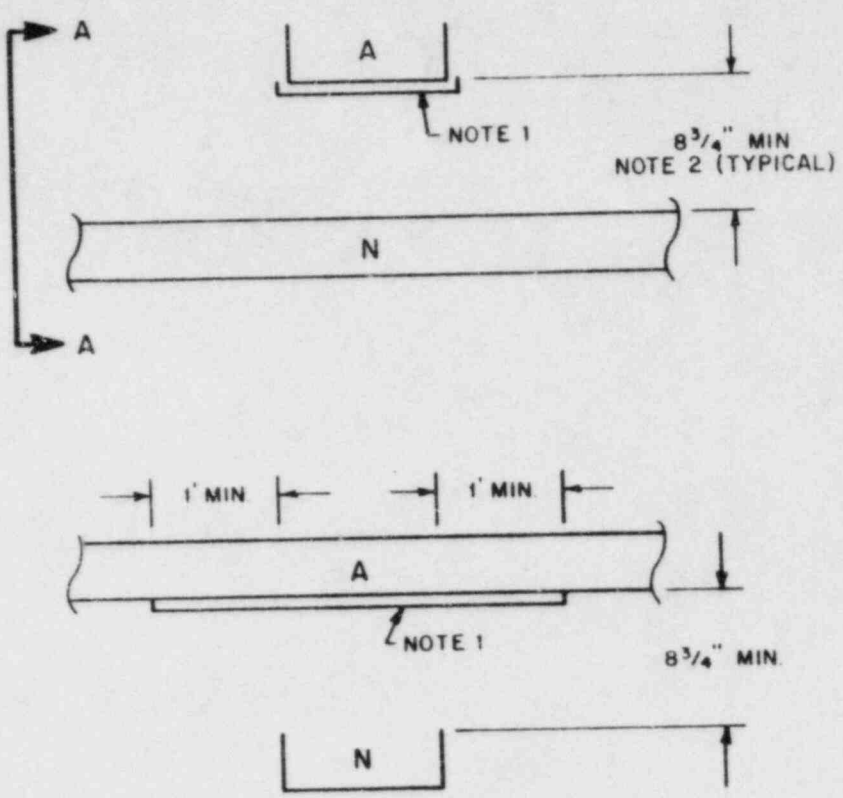
SECTION A-A

LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-25
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS
TRAY TO TRAY - PERPENDICULAR CROSSING
CLASS 1E TO NON-CLASS 1E



OR

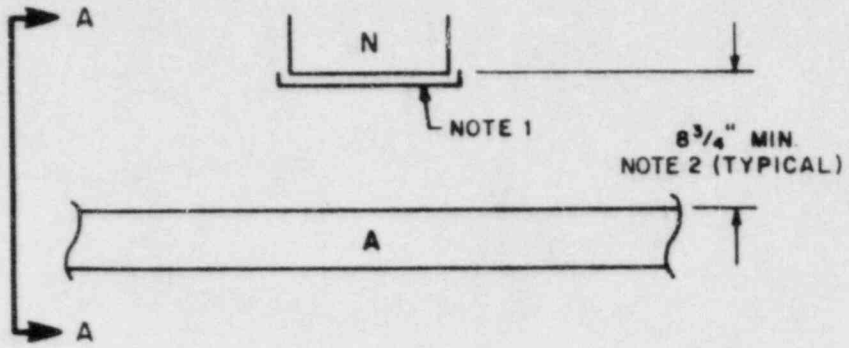
SECTION A-A

LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

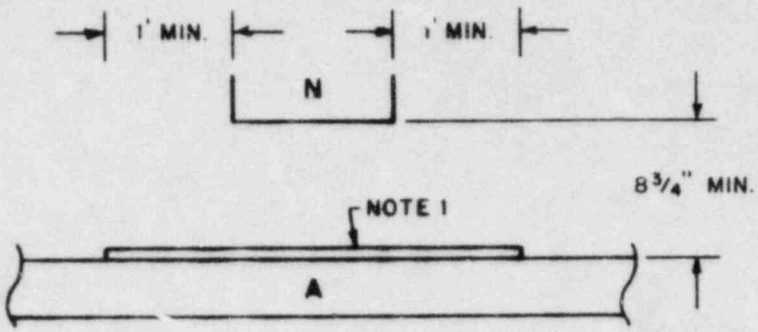
NOTES: 1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

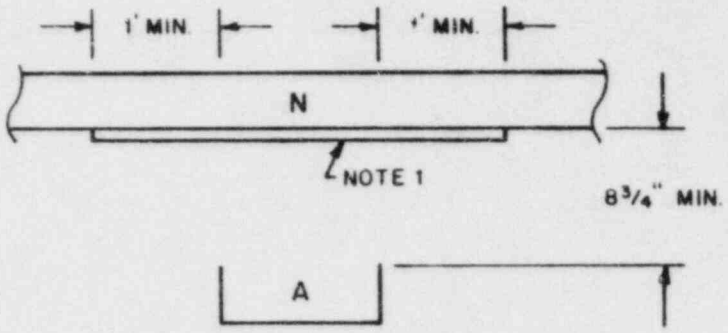
FIGURE 8.3-26
GENERAL PLANT AREAS (GPA) ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS
TRAY TO TRAY - PERPENDICULAR CROSSING
NON-CLASS 1E TO CLASS 1E



OR





SECTION A-A

LEGEND

A - CLASS 1E RACEWAY

B - REDUNDANT CLASS 1E RACEWAY

N - NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

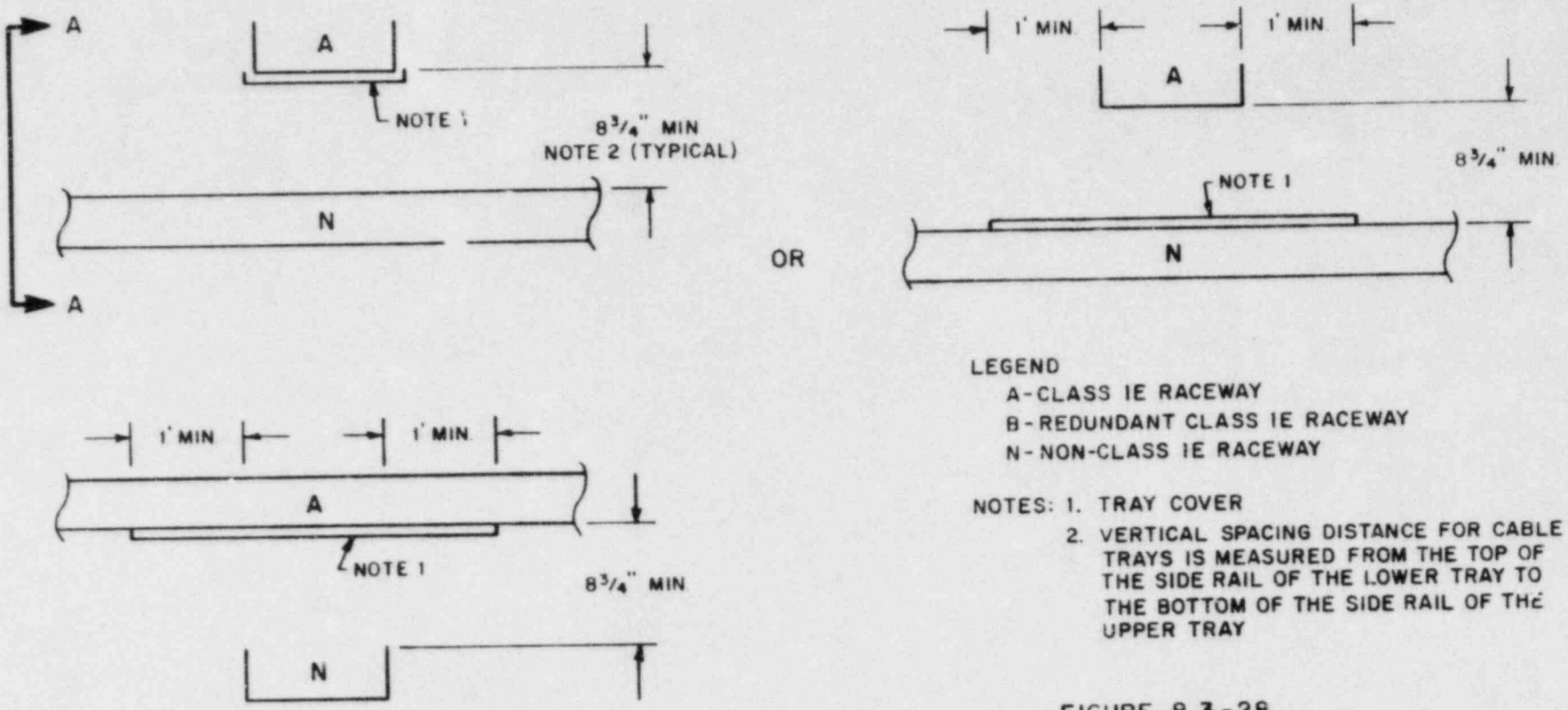
FIGURE 8.3-27

GENERAL PLANT AREAS (GPA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION - UNIT 2

FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
TRAY TO TRAY - PERPENDICULAR CROSSING
CLASS 1E TO NON-CLASS 1E

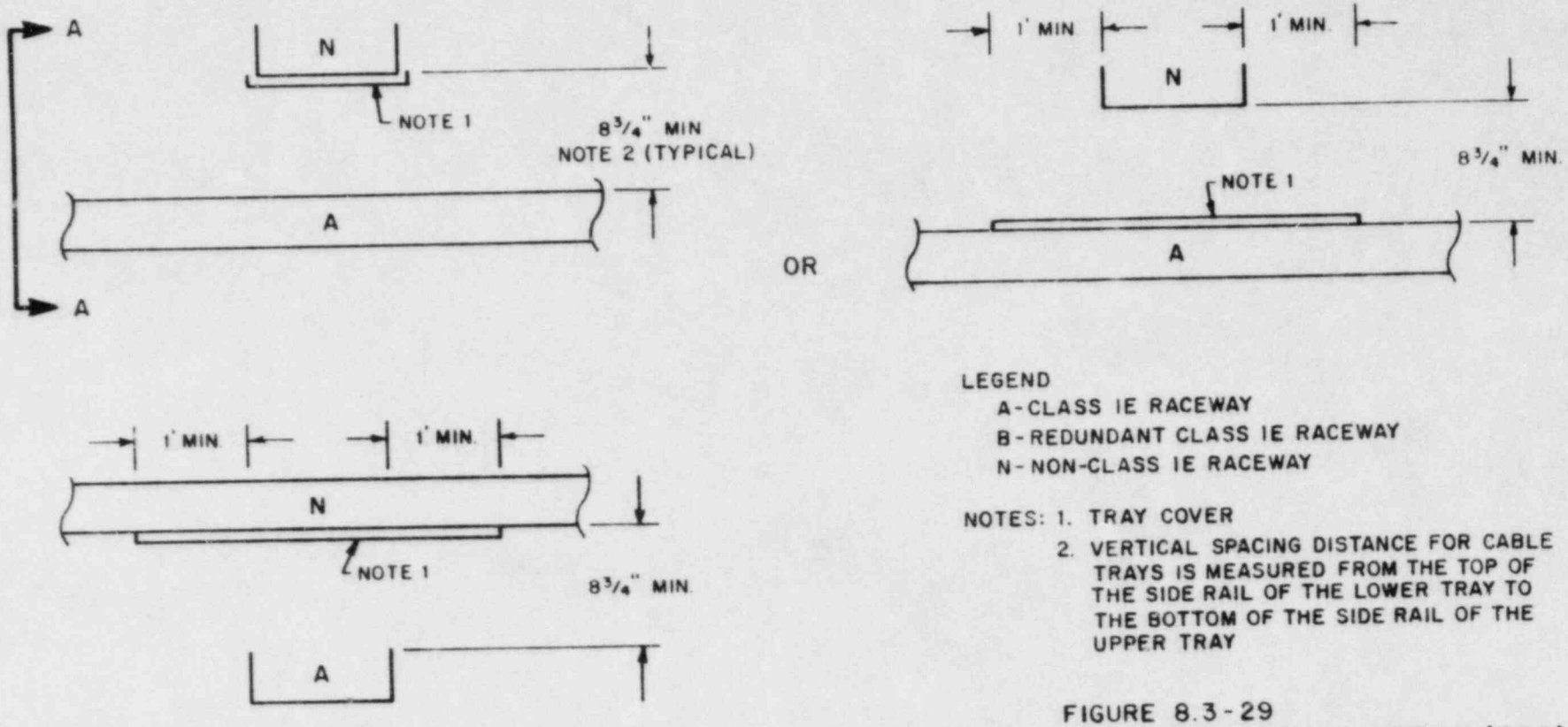


LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-28
CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
TRAY TO TRAY - PERPENDICULAR CROSSING
NON-CLASS 1E TO CLASS 1E



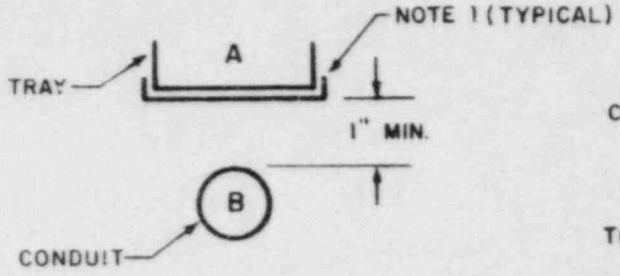
SECTION A-A

LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

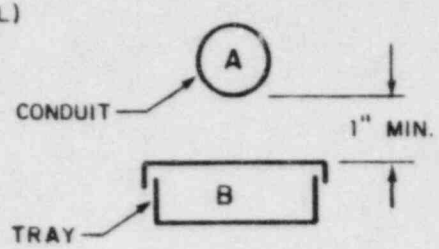
NOTES: 1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-29
CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

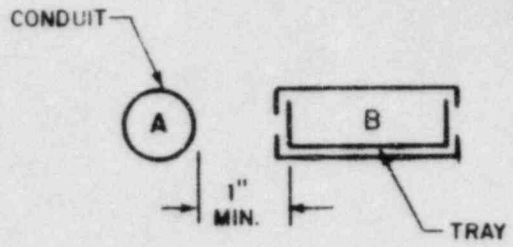
GENERAL PLANT AREAS-TRAY TO CONDUIT
CLASS 1E TO REDUNDANT CLASS 1E



DETAIL "A" - VERTICAL



DETAIL "B" - HORIZONTAL



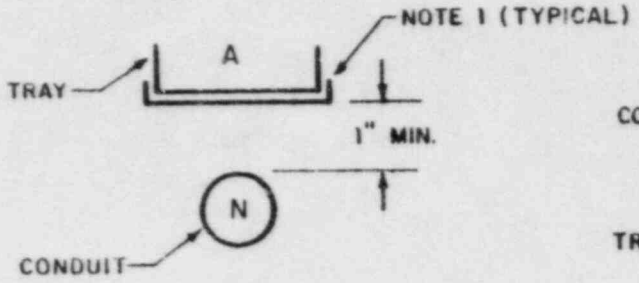
DETAIL "C" - VERTICAL

LEGEND
- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

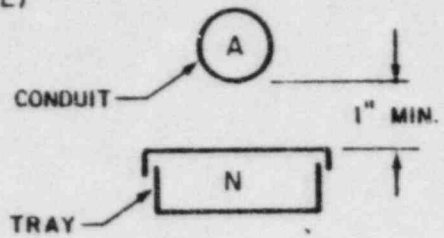
NOTE 1: TRAY COVER

FIGURE 8.3-30
GENERAL PLANT AREAS (GPA) ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

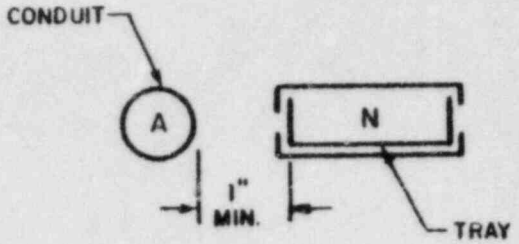
GENERAL PLANT AREAS-TRAY TO CONDUIT
CLASS 1E TO NON-CLASS 1E



DETAIL "A" - VERTICAL



DETAIL "B" - HORIZONTAL



DETAIL "C" - VERTICAL

LEGEND

A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

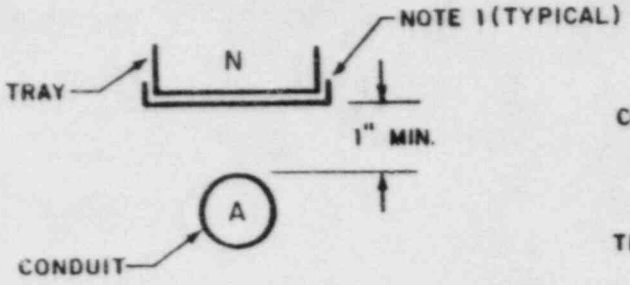
NOTE 1: TRAY COVER

FIGURE 8.3-31

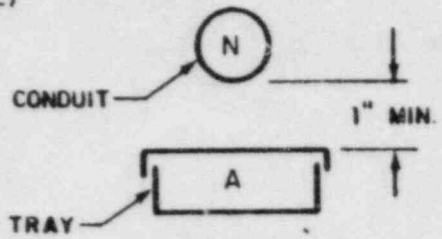
GENERAL PLANT AREAS (GPA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

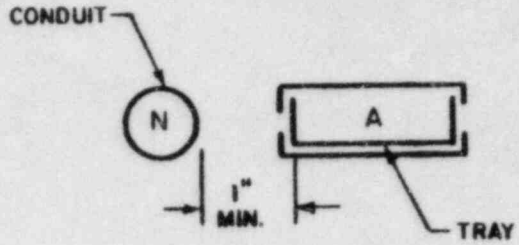
GENERAL PLANT AREAS-TRAY TO CONDUIT
NON-CLASS 1E TO CLASS 1E



DETAIL "A" - VERTICAL



DETAIL "B" - HORIZONTAL



DETAIL "C" - VERTICAL

LEGEND

A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

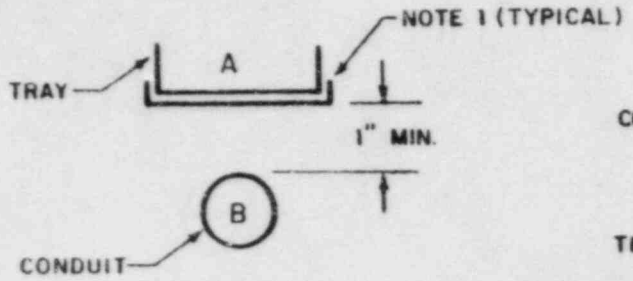
NOTE 1: TRAY COVER

FIGURE 8.3-32

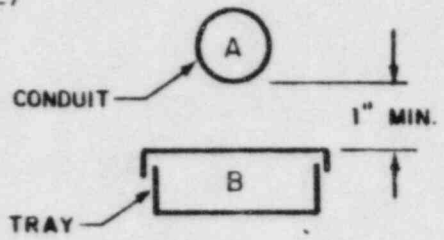
GENERAL PLANT AREAS (GPA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

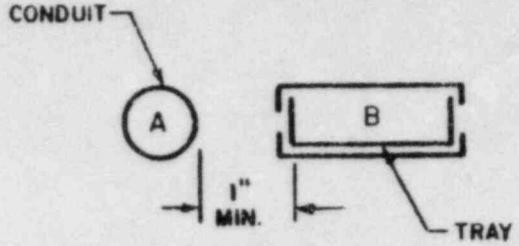
CABLE SPREADING AREAS - TRAY TO CONDUIT
CLASS 1E TO REDUNDANT CLASS 1E



DETAIL "A" - VERTICAL



DETAIL "B" - HORIZONTAL



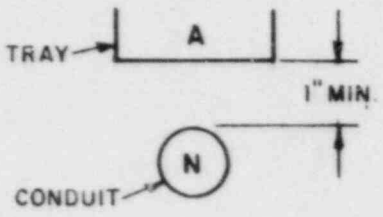
DETAIL "C" - VERTICAL

LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON CLASS 1E RACEWAY

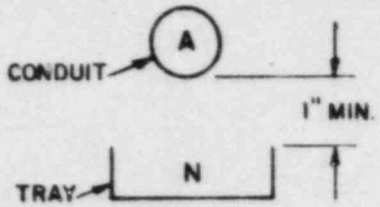
NOTE 1: TRAY COVER

FIGURE 8.3-33
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION
ARRANGEMENTS
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

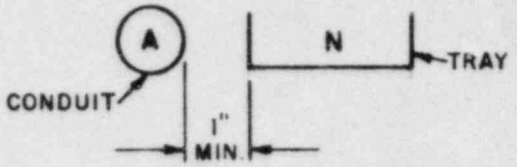
CABLE SPREADING AREAS - TRAY TO CONDUIT
CLASS 1E TO NON-CLASS 1E



DETAIL "A" - VERTICAL



DETAIL "B" - VERTICAL



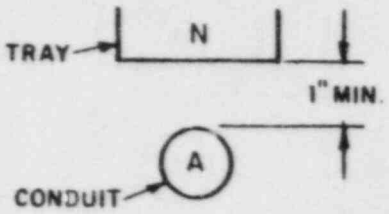
DETAIL "C" - HORIZONTAL

LEGEND

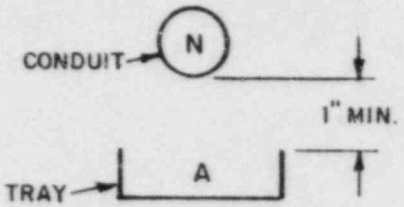
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

FIGURE 8.3-34
CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

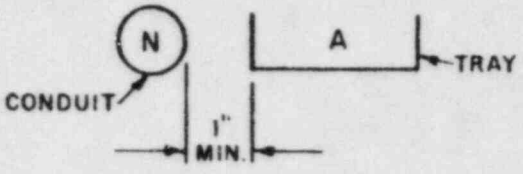
CABLE SPREADING AREAS - TRAY TO CONDUIT
NON-CLASS 1E TO CLASS 1E



DETAIL "A" - VERTICAL



DETAIL "B" - VERTICAL



DETAIL "C" - HORIZONTAL

LEGEND

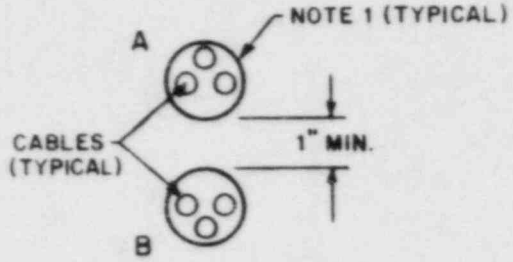
A - CLASS E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

FIGURE 8.3-35
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION
ARRANGEMENTS
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS
CABLE IN AIR TO CABLE IN AIR

CLASS 1E TO REDUNDANT CLASS 1E

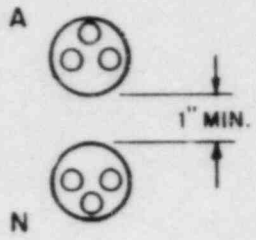
HORIZONTAL OR VERTICAL



DETAIL "A"

CLASS 1E TO NON-CLASS 1E

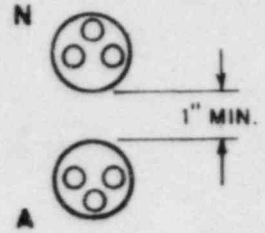
HORIZONTAL OR VERTICAL



DETAIL "B"

NON-CLASS 1E TO CLASS 1E

HORIZONTAL OR VERTICAL



DETAIL "C"

LEGEND

A - CLASS 1E RACEWAY/CABLES

B - REDUNDANT CLASS 1E RACEWAY/CABLES

N - NON-CLASS 1E RACEWAY/CABLES

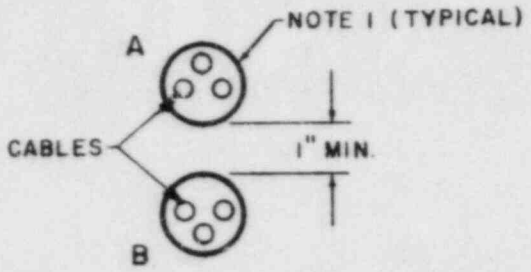
NOTE 1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE.

FIGURE 8.3-36
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION
ARRANGEMENTS
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
CABLE IN AIR TO CABLE IN AIR

CLASS IE TO REDUNDANT CLASS IE

HORIZONTAL OR VERTICAL



LEGEND

A - CLASS IE RACEWAY/CABLES

B - REDUNDANT CLASS IE RACEWAY/CABLES

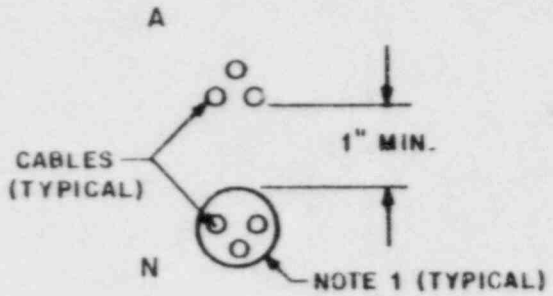
N - NON-CLASS IE RACEWAY/CABLES

NOTE 1: CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE.

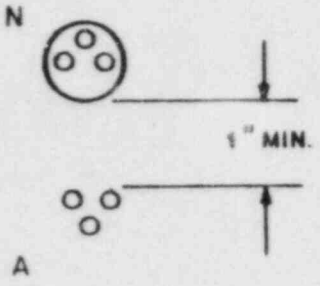
FIGURE 8.3-37
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
CABLE IN AIR TO CABLE IN AIR

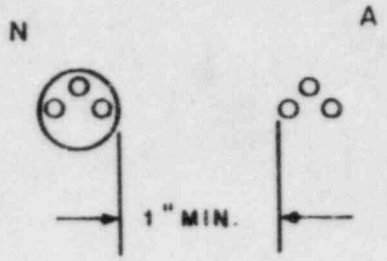
CLASS 1E TO NON-CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND:

A- CLASS 1E RACEWAY/CABLES

B -REDUNDANT CLASS 1E RACEWAY/CABLES

N- NON-CLASS 1E RACEWAY/CABLES

NOTE

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE.

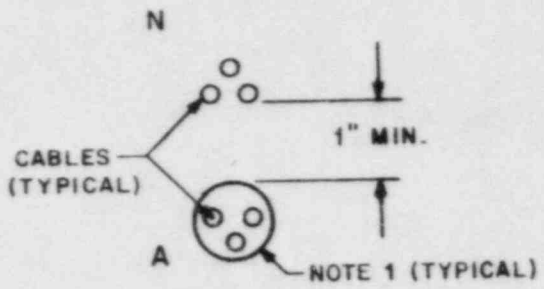
FIGURE 8.3-38

CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS

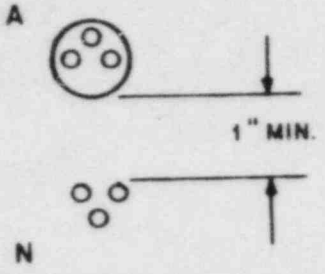
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
CABLE IN AIR TO CABLE IN AIR

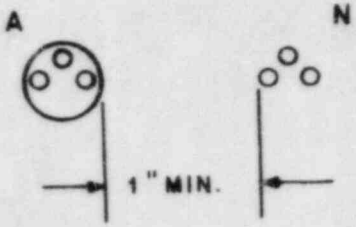
NON-CLASS 1E TO CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND:

A- CLASS 1E RACEWAY/CABLES

B-REDUNDANT CLASS 1E RACEWAY/CABLES

N-NON-CLASS 1E RACEWAY/CABLES

NOTE

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE.

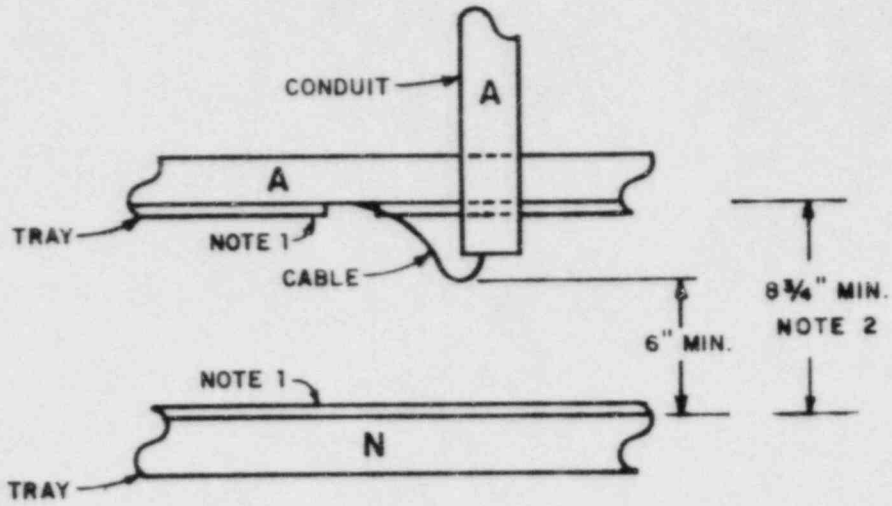
FIGURE 8.3-39

CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS
TRAY TO TRAY - CABLE ENTRY / EXIT

CLASS 1E TO NON-CLASS 1E



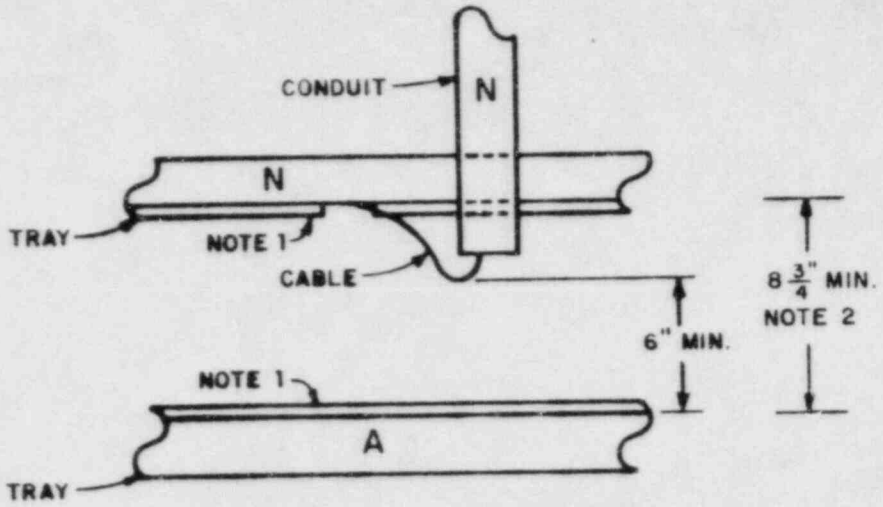
LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-40
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS
TRAY TO TRAY - CABLE ENTRY / EXIT

NON-CLASS 1E TO CLASS 1E



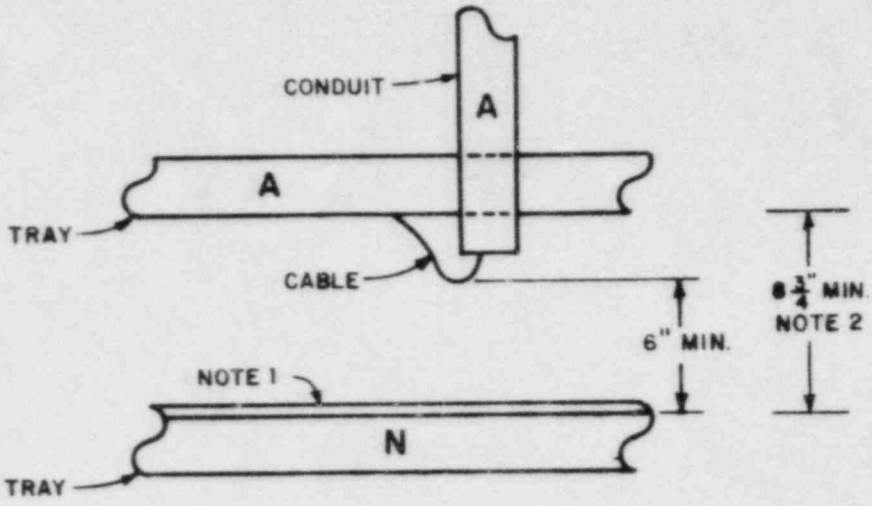
LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-41
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION - UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
TRAY TO TRAY - CABLE ENTRY / EXIT

CLASS 1E TO NON-CLASS 1E



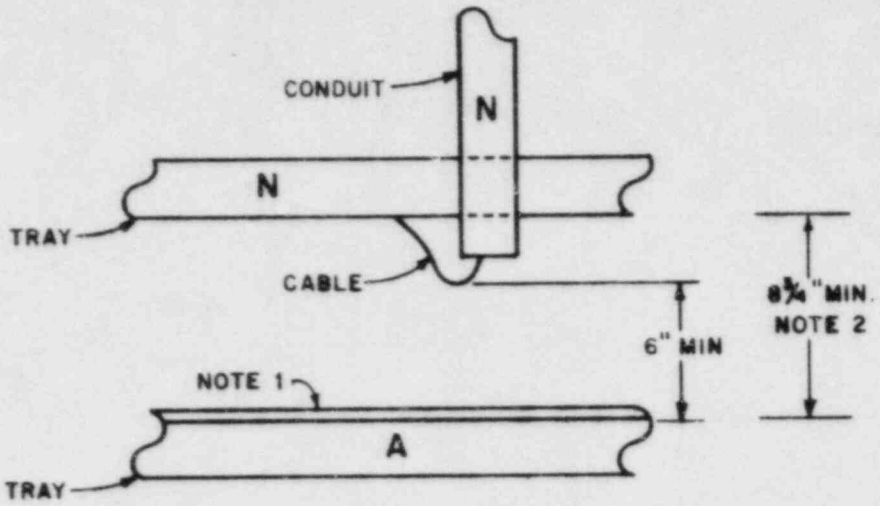
LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-42
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
TRAY TO TRAY - CABLE ENTRY / EXIT

NON-CLASS 1E TO CLASS 1E



LEGEND
A - CLASS 1E RACEWAY
B - REDUNDANT CLASS 1E RACEWAY
N - NON-CLASS 1E RACEWAY

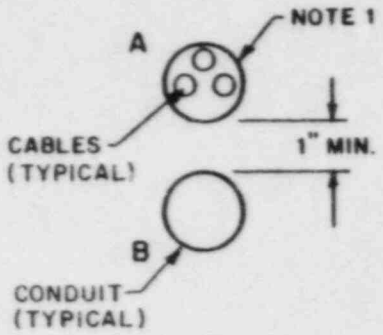
NOTES: 1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-43
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS
CABLE IN AIR TO CONDUIT

CLASS 1E TO REDUNDANT CLASS 1E

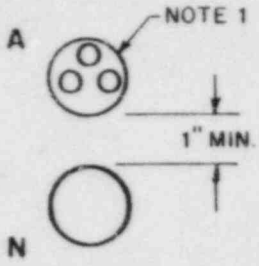
HORIZONTAL OR VERTICAL



DETAIL "A"

CLASS 1E TO NON-CLASS 1E

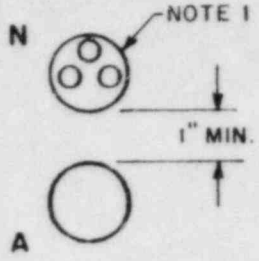
HORIZONTAL OR VERTICAL



DETAIL "B"

NON-CLASS 1E TO CLASS 1E

HORIZONTAL OR VERTICAL



DETAIL "C"

LEGEND

A - CLASS 1E RACEWAY/CABLES

B - REDUNDANT CLASS 1E RACEWAY/CABLES

N - NON-CLASS 1E RACEWAY/CABLES

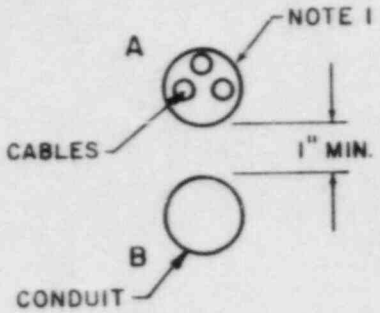
NOTE 1: CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE.

FIGURE 8.3-44
GENERAL PLANT AREAS (GPA)
ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
CABLE IN AIR TO CONDUIT

CLASS IE TO REDUNDANT CLASS IE

HORIZONTAL OR VERTICAL



LEGEND

A - CLASS IE RACEWAY/CABLES

B - REDUNDANT CLASS IE RACEWAY/CABLES

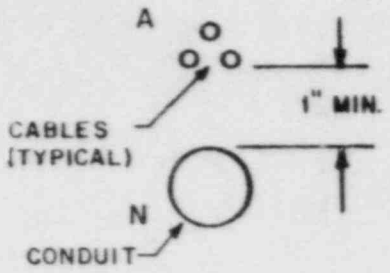
N - NON-CLASS IE RACEWAY/CABLES

NOTE 1: CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE.

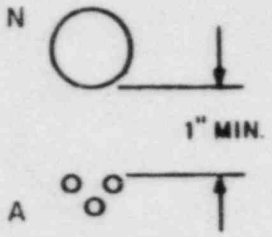
FIGURE 8.3-45
CABLE SPREADING AREAS (CSA)
ACCEPTABLE SEPARATION
ARRANGEMENT
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
CABLE IN AIR TO CONDUIT

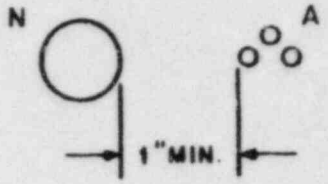
CLASS 1E TO NON-CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND:

A- CLASS 1E RACEWAY/CABLES

B- REDUNDANT CLASS 1E RACEWAY/CABLES

N- NON-CLASS 1E RACEWAY/CABLES

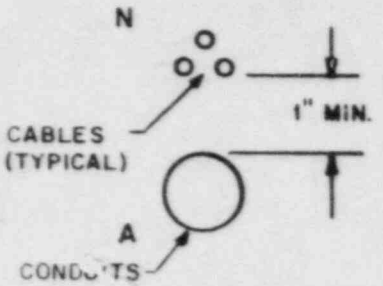
FIGURE 8.3-46

CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS

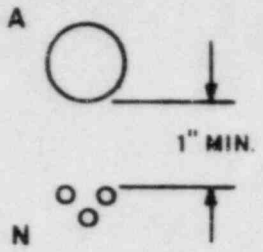
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS
CABLE IN AIR TO CONDUIT

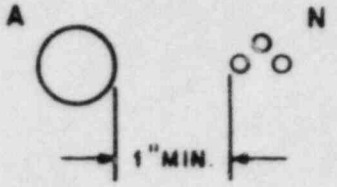
NON-CLASS 1E TO CLASS 1E



DETAIL "A"



DETAIL "B"

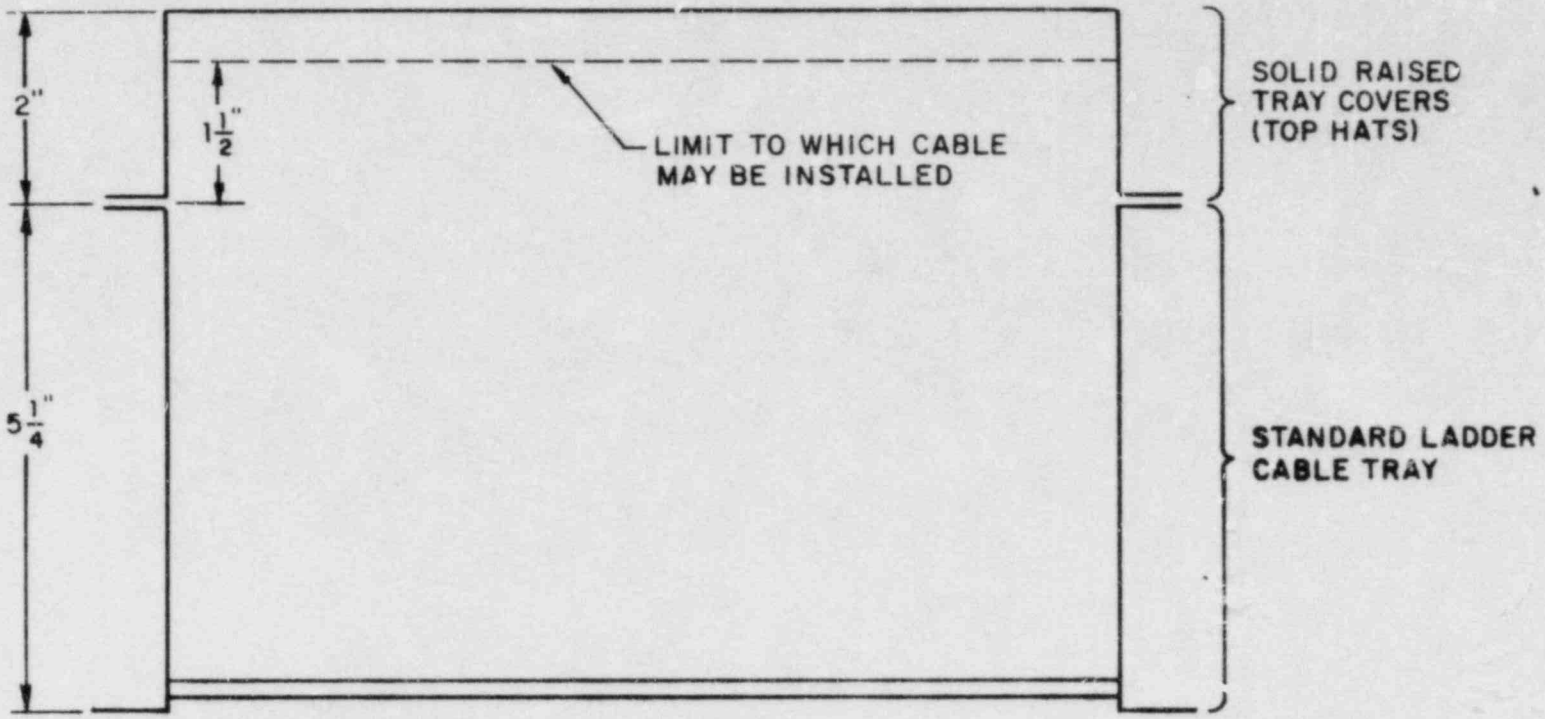


DETAIL "C"

LEGEND:

A- CLASS 1E RACEWAY/CABLES
B- REDUNDANT CLASS 1E RACEWAY/CABLES
N- NON-CLASS 1E RACEWAY/CABLES

FIGURE 8.3-47
CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT



CEX TRAYS ONLY

FIGURE 8.3-48
RAISED HIGH HAT TRAY COVER
BEAVER VALLEY POWER STATION-UNIT 2
FINAL SAFETY ANALYSIS REPORT