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June 13, 1986

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: LaSalle County Station Unit 2
Cable Separation Concerns
NPF-18 License Condition 2.C.(10)
NRC Docket No. 50-374

References (a): November 15, 1983 letter from C. W. Schroeder to H. R. Denton.

(b): Section 7.3.3.2 and Appendix D, LaSalle SSER #7, NUREG-0519 dated December, 1983.

(c): February 21, 1986 letter from C. M. Allen to H. R. Denton.

(d): May 15, 1986 letter from E. G. Adensam to D. L. Farrar.

Dear Mr. Denton:

This letter is to resolve the deficiencies described in Appendix D to Supplemental Safety Evaluation Report #7 regarding cable separation in Unit 2. The concern for cable separation in Unit 2 comes out of the License Condition, Item 2.c(10). The results are equivalent to the Unit 1 review submitted in reference (c) and approved in reference (d).

A detailed review and analysis was performed of the cable separation for enclosures containing reactor protection system cables for Unit 2. Enclosed is Attachment A which contains a report of the analysis for Unit 1. Attachment A includes the criteria that has been used in the analysis and the justification on a panel-by-panel basis that the independence of the RPS circuits and channelization is not jeopardized.

Commonwealth Edison committed in Reference (a) to review the "Trip Report concerning cable separation concerns at LaSalle, Unit 2 (TIA-83-76)" and address Sections 4.1, 4.2, 4.3, and 4.5 of that report. The review and analyses contained in Attachment A address the concerns of Sections 4.1 and 4.3.

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Section 4.2 of Appendix D to reference (b), LaSalle SSER #7 has been carefully reviewed. The concerns indicated within this section have been identified, analyzed and accepted in the Regulatory Guide 1.75 response found in Appendix B of the LaSalle County Station FSAR. Attachment B to this letter identifies the applicable portion of the Reg Guide 1.75 response which covers Section 4.2 of Appendix D to the LaSalle SSER.

Section 4.5 of Appendix D of SSER 7 (reference (b)) discusses redundant division cable separation for the solenoids mounted on the Automatic Depressurization System (ADS) relief valves. The initial cable design for the ADS valves required one division cabling to be enclosed in zipper tubing and the redundant division cabling terminated to the solenoid with no additional barrier. Commonwealth Edison has resolved this concern by the addition of zipper tubing to all divisional cabling associated with the ADS valves. We are sure that this satisfactorily addresses the concerns identified in Section 4.5 of the SSER.

If you have any further questions on this matter, please contact this office.

One signed original and ten (10) copies of this letter and its attachments are being sent for your review.

Very truly yours,

C M Allen

C. M. Allen
Nuclear Licensing Administrator

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Attachments A: Reactor Protection System (RPS) Cable Separation Analyses for LaSalle Unit 2.
B: LaSalle County Station FSAR, Appendix B, Response to Reg Guide 1.75, Pages B.1-95 and B.1-95a

cc: Dr. A. Bournia - NRR
LaSalle Resident Inspector

1774K

Commonwealth Edison Company
La Salle County Station - Unit 2

Reactor Protection System (RPS) Cable Separation Analysis

The following is a discussion of the analysis that was performed to justify the NRC Trip Report, concerning cable separation, dated November 4, 1983. Specifically, this discussion addresses Items 4.1(2)b, 4.2(2)c, 4.3(2):

The independence of Reactor Protection System (RPS) circuits/channelization is not compromised for the following reasons:

A. RPS cables of each channel are routed in separate raceways outside of control panels. The separation criteria for these raceways is provided on Sargent & Lundy Drawing 1E-0-3333. The separation of RPS cables from cables associated with safety-related divisions and non-safety-related cables inside control panels may be less than that dictated by IEEE-384. An analysis was performed to justify the lesser separation of RPS cables from other cables inside of control panels. This analysis is discussed later.

B. All cables used to interconnect RPS are the same high quality as that used in Class 1E circuits, associated circuits, and non-safety related circuits. These types of cable comply with the requirements of IEEE 383-1974 and have been proven to be highly fire retardent by testing.

C. The cables that are a concern to the NRC are constrained to control and instrumentation circuits, which by their very nature, are low energy circuits. Control circuits are generally 120Vac or 125Vdc, whereas the insulation rating of the cable utilized at LSCS for these applications is 600V.

D. There are no power cables in contact with the control and instrumentation cables that are in question. Also, there are no high energy sources located within control panels that contain RPS cables.

The independence of RPS circuits/channelization is not jeopardized inside control panels as demonstrated by an analysis, which was performed for LSCS Unit 2. The following procedure was used to analyze all cables of the RPS system:

Type 1 — Identify non-safety-related cables (both those that are routed in non-safety raceways and those that are routed in safety raceways) that are terminated in the same enclosure as an RPS channels cables and verify that they are not terminated with any redundant RPS channels cables on the other end.

Type 2 — Identify Class 1E cables that are terminated in the same enclosure as an RPS Channels cable and verify that they are not terminated with any redundant RPS channels cables on the other end.

If in either Types 1 or 2 above, redundant RPS channels are potentially jeopardized by the presence of a non-safety or Class 1E cable, a specific review was performed taking into consideration the function of the circuits, location of the circuits, and Items A, B, C, and D above, regarding the types of cables used for these circuits.

In the La Salle County FSAR Appendix B response to regulatory Guide 1.75, the separation of non-RPS cables is discussed. As indicated the types, ratings, energy limitations are discussed for the control and instrumentation cables that are a part of this analysis. For the reasons provided in the La Salle Response to Regulatory Guide 1.75, cables that are routed with non-safety and Class 1E cables (that are Type 1 or 2) are not required to be analyzed. Only cables, which are terminated in the same enclosure with RPS cables and have the potential or bridging redundant RPS subchannels, were reviewed in the analysis. See Figure 1 for an example of the analysis that was performed.

The results of this analysis ar summarized as follows:

I. Reactor Building

NRC Trip Report Items 4.1(2)b, 4.1(2)c

1. 2H22-P004 Local Instrument Rack

RPS Subchannel - A1

There are no other cables terminated in the same enclosure with the RPS cables at this instrument rack.

2. 2H22-P005 Local Instrument Rack

RPS Subchannel - A2

The single Type 1 cable in this panel is not terminated with any RPS cables at its other end.

3. 2H22-P006 Local Instrument Rack

RPS Subchannel - A2

There are no other cables terminated in the same enclosure with the RPS cables at this Instrument Rack.

4. 2H22-P009 Local Instrument Rack

RPS Subchannel - B1

There are no other cables terminated in the same enclosure with the RPS cables at this instrument rack.

5. 2H22-P010 Local Instrument Rack

RPS Subchannel - B2

The single Type 1 cable in this panel is not terminated with RPS cables at its other end.

6. 2H22-P015 Local Instrument Rack

RPS Subchannel - A1

There are no other cables terminated in the same enclosure with the single RPS cable at this instrument rack.

7. 2H22-P022 Local Instrument Rack

RPS Subchannel - A1

There are no other cables terminated in the same enclosure with the RPS cables at this instrument rack.

8. 2H22-P025 Local Instrument Rack

RPS Subchannel - B2

There are no other cables terminated in the same enclosure with the single RPS cable at this instrument rack.

9. 2H22-P026 Local Instrument Rack

RPS Subchannel - B2

The single Type 1 cable in this panel is not terminated with RPS cables at its other end.

10. 2H22-P027 Local Instrument Rack

RPS Subchannel - B1

There are two Type 2 cables in this panel, which are not terminated with RPS cables at their other ends.

11. 2PLF5J Suppression Pool Temperature Monitoring Power Supply Cabinet

RPS Subchannels - A1 and B1

There are no Type 1 and/or Type 2 cables in this panel.

12. 2PLF6J Suppression Pool Temperature Monitoring Power Supply Cabinet

RPS Subchannels - A2 and B2

There are no Type 1 and/or Type 2 cables in this panel.

13. 2LV96E Electrical Penetration (E-10)

There are two Type 1 and one Type 2 cables within this penetration. Zipper tubing has been applied to each of these cables and each of the RPS cables within the penetration for a separation barrier.

II. Auxiliary Building - Auxiliary Electric Equipment Room and Control Room

NRC Trip Report Item 4.3(2)

1. 2PA13J Div. 1 Isolation Logic Cabinet

RPS Subchannel - A1

There are four Type 1 cables that are terminated with RPS cables of opposite numerical divisions on their other ends. All four of these cables are protected by a fuse as well as a redundant circuit breaker. There is only a single RPS cable terminated at 2PA13J.

2. 2PA14J Div. 2 Isolation Logic Cabinet

RPS Subchannel - B2

The Type 1 cables in this panel are not terminated with RPS cables at their other ends. There is only a single RPS cable terminated at 2PA14J.

3. 2H13-P601 Reactor Core Cooling Panel

RPS Subchannels - A1 and A2 (Note 1)

The Type 1 cables in this panel are not terminated with RPS cables at their other ends.

4. 2H13-P603 Reactor Control Panel

RPS Subchannels - A1, A2, B1, B2 (Note 2)

The Type 1 cables in this panel terminated with RPS cables are not terminated with RPS cables at their other ends.

5. 2H13-P608 Power Range Monitoring Cabinet Bays 1-5

RPS Subchannels - A1, A2, B1, and B2 (Note 3)

There are Type 1 cables that terminate at their other end with RPS cables within 2H13-P603. However, all RPS cables at 2H13-P603 are terminated within separate metallic enclosures and do not come in contact with these Type 1 cables.

6. 2H13-P609 Reactor Protection System Channel A1

RPS Subchannels - A1, B1, and A2 (Note 4)

There is a single Type 1 cable that on the other end terminates with cables of the redundant RPS Divisions A2 and B2. However, this 125Vdc control circuit is protected by a fuse as well as a redundant circuit breaker.

7. 2H13-P609 Reactor Protection System Channel A2

RPS Subchannels - A2 and B2

There is a single Type 1 cable terminated at its other end with a single RPS cable of redundant RPS division (B1), however, this cable is not redundant in function to those of this panel.

8. 2H13-P611 Reactor Protection System Channel B1

RPS Subchannels A1 and B1

a. There is a single Type 2 cable terminated at the other end with a single RPS cable of redundant division (B2), however this cable is not redundant is function to those of this panel, and furthermore, this Type 2 cable is protected by a fuse as well as a redundant circuit breaker.

b. There is a single Type 1 cable terminated at the other end with a single opposite division RPS cable. This Type 1 cable is protected by a fuse as well as a redundant circuit breaker.

c. There are four Type 1 cables terminated at the other end with RPS cables. These cables are used for alarm circuits at the main annunciator and are of low energy.

9. 2H13-P611 Reactor Protection System Channel B2

RPS Subchannels B2 and A2

a. There are two Type 1 cables terminated at the other end with opposite numerical division RPS cables. These Type 1 cables are protected by fuses as well as redundant circuit breakers.

b. There is one Type 2 cable terminated at the other end with opposite numerical division RPS cables. This Type 2 cable is protected by a fuse as well as a redundant circuit breaker.

c. There are four Type 1 cables terminated at the other end with RPS cables. These cables are used for alarm circuits feeding the main annunciator and are low energy.

10. 2H13-P632 Leak Detection Div. 1 Panel

RPS Subchannels - A1 and A2 (Note 5)

There is a single Type 1 and single Type 2 cable terminated on the other end at Panel 2H13-P642, which has RPS subchannels B1 and B2. Both these cables are protected by a fuse as well as a redundant circuit breaker.

11. 2H13-P642 Leak Detection Div. 2 Panel

RPS Subchannels - B1 and B2 (Note 5)

a. There is a single Type 1 and single Type 2 cable terminated on the other end at Panel 2H13-P636, which has RPS Subchannels A1 and A2. Both these cables are protected by a fuse as well as a redundant circuit breaker.

b. There is a single Type 1 cable, which is not terminated with RPS cables at its other end.

12. 2H13-P635 Radiation Monitoring Div. 1 Panel

RPS Subchannels - A1 and B1

a. There are two Type 1 cables that are terminated at their other end Panel 2H13-P636 with opposite division RPS cables. These Type 1 cables are used for low energy alarm circuits only at the main annunciator.

b. There are six Type 1 cables that are terminated at their other end with RPS cables of opposite numerical division. However, these 24Vdc control circuits are protected by a fuse as well as a redundant circuit breaker.

13. 2H13-P636 Radiation Monitoring Div. 2 Panel

RPS Subchannels - A2 and B2

a. There are two Type 1 cables that are terminated at their other end Panel 2H13-P635 with opposite division RPS cables. These Type 1 cables are used for low energy alarm circuits only at the main annunciator.

b. There are six Type 1 cables that are terminated at their other end with RPS cables of opposite numerical division. However, these 24Vdc control circuits are protected by a fuse as well as a redundant circuit breaker.

14. 2H13-P654 MSIV Leakage Div. 2

RPS Subchannels B1 and B2

There are no Type 1 or Type 2 cables terminated on their other end with the redundant RPS cables. The four RPS cables terminated in this panel (two B1 and two B2) are used for the scram discharge volume redundant level instrumentation. For this system the two redundant RPS subchannels are A1 and A2 located in Panel 2H13-P655. Each other end of the RPS cables located in this panel are terminated in their respective subchannel section of Panel 2H13-P611. If a single short bridged channels B1 and B2 within this panel (2H13-P654) the redundant Scram Discharge Volume level instrumentation would still provide the required scram signal.

15. 2H13-P655 MSIV Leakage Div. 1

RPS Subchannels - A1 and A2

There are no Type 1 and Type 2 cables terminated on their other end with the redundant RPS cables. The four RPS cables terminated in this panel (two B1 and two B2) are used for the scram discharge volume redundant level instrumentation. For this system the two redundant RPS subchannels are B1 and B2 located in Panel 2H13-P654. Each other end of the RPS cables located in this panel are terminated in their respective subchannel section of Panel 2H13-P609. If a single short bridge Channels A1 and A2

within this panel (2H13-P655) the redundant scram discharge volume level instrumentation would still provide the required scram signal.

Notes:

1. These redundant subchannels exist in separate sections of this main control room panel.

2. These redundant RPS subchannels are terminated in separate metallic enclosures.

3. These redundant RPS subchannels have physical separation by their termination in five separate bays and separation within each bay.

4. A single A2 cable is terminated with redundant Subchannels A1 and B1; however, this cable is required for the backup scram valves, which is not redundant to any A1 and B1 cable terminated at this panel section.

5. The redundant RPS channels terminated in this panel are used for Main Steam Isolation Valve (MSIV) control circuits. This is acceptable per General Electric Separation Document No. 22A2988, Rev. 6.

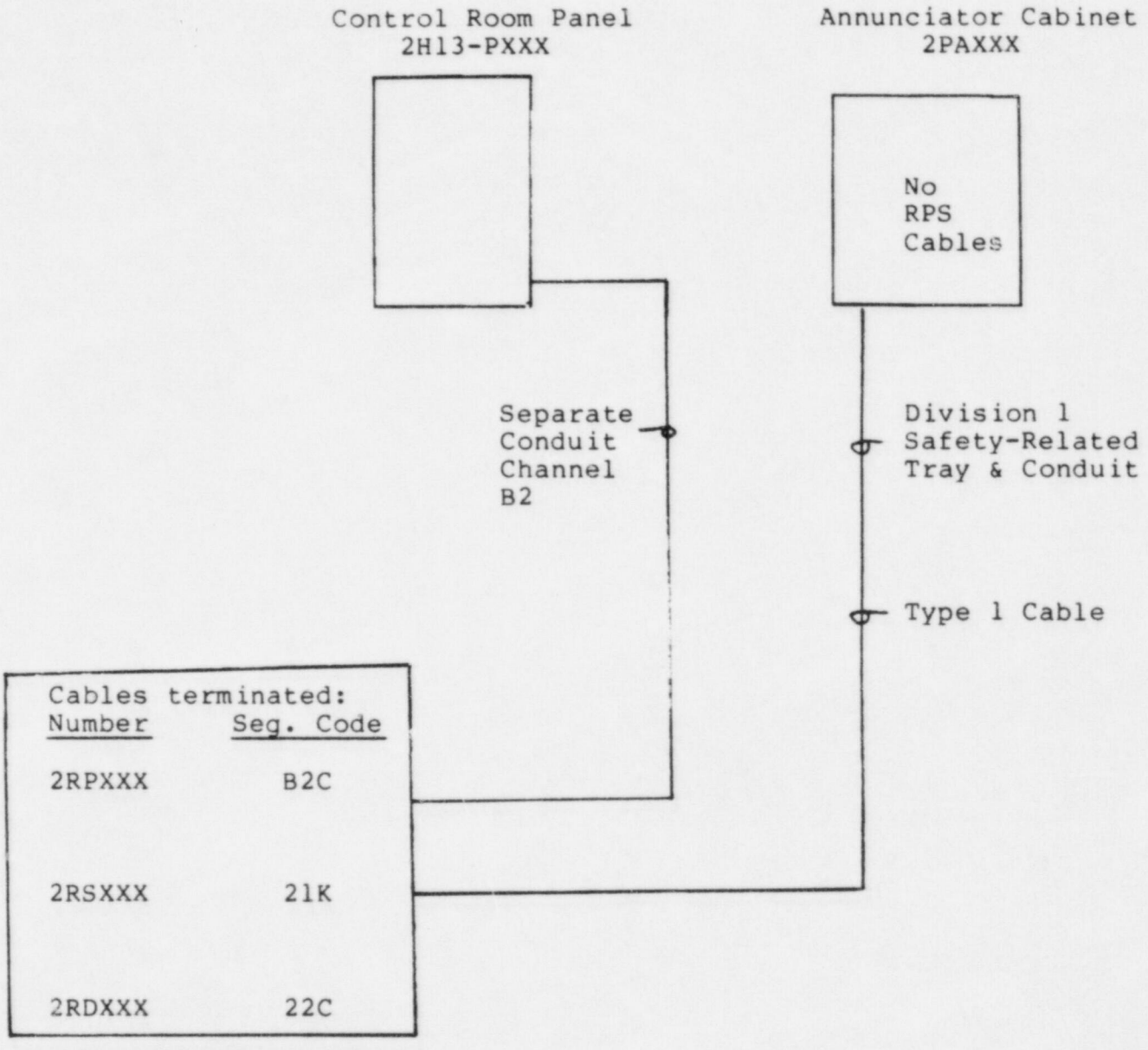

Figure 1 Example RPS Separation Analysis

Reactor Building Local Instrument Rack 2H22-P0XX

1 of 2 (Figure 1)

Discussion: In this example, 2 non-safety-related cables are terminated with a RPS subchannel B2 Cable 2RPXXX. Cable 2RDXXX Seg. Code 22C is of the same numerical division as of 2RPXXX and will not be considered because loss of a single division will not be capable of preventing a required RPS action. Cable 2RSXXX Seg. Code 21K is opposite numerical division to 2RPXXX (B2C) and for purposes of this analysis will be considered a Type 1 cable.

Result: The Type 1 cable in this panel is not terminated with RPS cables at its other end. RPS channelization has not been degraded (i.e., a fault in this cable cannot affect two redundant RPS subchannels).

IE-0-3333

CABLE SEGREGATION CHART

SEE NOTE (11) FOR UNIT 2 SEG CODES

CABLE SEGREGATION CODE	1YP	1YC	1YK	1BP	1BC	1BK	1GP	1GC	1GK	1WP	1WC	1WK	11P	11C	11K	12P	12C	12K	13P	13C	13K	A1C	B1C	A2C	B2C	A1K	B1K	A2K	B2K	NAK	NBK	NCK	NDK
1YP	Y																																
1YC	N6	Y																															
1YK	N6	N6	Y																														
1BP	N5	N5	N5	Y																													
1BC	N5	N5	N5	N6	Y																												
1BK	N5	N5	N5	N6	N6	Y																											
1GP	N5	N5	N5	N5	N5	N5	Y																										
1GC	N5	N5	N5	N5	N5	N5	N6	Y																									
1GK	N5	N5	N5	N5	N5	N5	N6	N6	Y																								
1WP	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y																							
1WC	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y																						
1WK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y																					
11P	Y	N6	N6	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y																				
11C	N6	Y	N6	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y																			
11K	N6	N6	Y	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y																		
12P	N1	N2	N3	Y	N6	N6	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y																	
12C	N2	N1	N4	N6	Y	N6	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y																
12K	N3	N4	N1	N6	N6	Y	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y															
13P	N1	N2	N3	N1	N2	N3	Y	N6	N6	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y														
13C	N2	N1	N4	N2	N1	N4	N6	Y	N6	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y													
13K	N3	N4	N1	N3	N4	N1	N6	N6	Y	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y												
A1C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	Y											
B1C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y										
A2C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N5	N5	Y									
B2C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N5	N5	N6	Y								
A1K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	N5	N5	Y							
B1K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	N5	N5	N6	Y						
A2K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N5	N5	N6	N6	N5	N5	Y					
B2K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N5	N5	N6	N6	N5	N5	N6	Y				
NAK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N4	N4	N5	N5	N1	N1	N5	N5	Y			
NBK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N4	N4	N5	N5	N1	N1	N5	N5	N5	Y		
NCK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N5	N5	N4	N4	N5	N5	N1	N1	N5	N5	Y	
NDK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N5	N5	N4	N4	N5	N5	N1	N1	N5	N5	N5	Y
G1C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4
G2C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4
G3C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4
G4C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4

SEE NOTE (11) FOR UNIT 2 SEG CODES

CABLES TO BE RUN IN CONDUIT ONLY

CABLES TO BE RUN IN COND

NOTES

Y) YES - MAY BE RUN TOGETHER IN SAME TRAY OR CONDUIT (NO SEPARATION REQUIRED)

N) NO - MAY NOT BE RUN TOGETHER IN SAME TRAY OR CONDUIT

1) MINIMUM SEPARATION BETWEEN LIKE BOP AND ESF TRAYS IS 3" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN LIKE BOP AND ESF CONDUITS, OR BETWEEN LIKE RPS AND ESF OR BOP CONDUITS, OR BETWEEN LIKE ESF OR RPS CONDUITS AND BOP TRAYS OR BETWEEN LIKE BOP OR RPS CONDUITS AND ESF TRAYS IS 1" HORIZONTAL AND VERTICAL.

2) MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND CONTROL TRAYS IS 3" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND CONTROL CONDUITS OR BETWEEN NON-REDUNDANT SYSTEM POWER OR CONTROL CONDUITS AND POWER OR CONTROL TRAYS IS 1" HORIZONTAL AND VERTICAL.

3) MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND INSTRUMENTATION TRAYS IS 3" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND INSTRUMENTATION CONDUITS OR BETWEEN NON-REDUNDANT SYSTEM POWER OR INSTRUMENTATION CONDUITS AND POWER OR INSTRUMENTATION TRAYS IS 1" HORIZONTAL AND VERTICAL. WHEN SHIELDED INSTRUMENTATION CABLES ARE USED AND PARALLEL RUN DOES NOT EXCEED 100', A MINIMUM SEPARATION OF 3" HORIZONTAL AND VERTICAL SHALL BE MAINTAINED. WHEN THE DISTANCE EXCEEDS 100', WHEN UNSHIELDED INSTRUMENTATION CABLES ARE USED IN CONDUITS OR TRAYS, A MINIMUM SEPARATION OF 20" HORIZONTAL AND VERTICAL SHALL BE MAINTAINED FROM POWER TRAYS OR CONDUITS.

4) MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM CONTROL AND INSTRUMENTATION TRAYS IS 3" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM CONTROL AND INSTRUMENTATION CONDUITS OR BETWEEN NON-REDUNDANT SYSTEM CONTROL OR INSTRUMENTATION CONDUITS AND CONTROL OR INSTRUMENTATION TRAYS IS 1" HORIZONTAL AND VERTICAL.

5) MINIMUM SEPARATION BETWEEN REDUNDANT DIVISIONAL TRAYS OR BETWEEN REDUNDANT DIVISIONAL TRAYS AND CONDUITS IS 3'-0" HORIZONTAL, 5'-0" VERTICAL EXCEPT AT CROSSINGS WHERE THE MINIMUM VERTICAL SEPARATION MAY BE 12" PROVIDED THE LOWER TRAY IS COVERED FOR A DISTANCE OF 5'-0" ON EACH SIDE OF THE INTERSECTION OF THE CENTERLINES. MINIMUM SEPARATION BETWEEN REDUNDANT DIVISIONAL CONDUITS IS 3'-0" HORIZONTAL, 5'-0" VERTICAL EXCEPT AT CROSSINGS WHERE THE VERTICAL SEPARATION MAY BE 12".

6) RECOMMENDED SEPARATION BETWEEN TRAYS OF THE SAME DIVISION IS 3" HORIZONTAL 12" VERTICAL. RECOMMENDED SEPARATION BETWEEN CONDUITS OR BETWEEN CONDUITS AND TRAYS OF THE SAME DIVISION IS 1" HORIZONTAL AND VERTICAL.

7) CABLES OF REDUNDANT DIVISIONS MUST BE SEPARATED BY EITHER 20 OR BY SUITABLE BARRIERS IN POTENTIAL LARGE MISSILE OR CONFLAGRATION AREAS FOR IDENTIFICATION OF THESE AREAS, SEE FSAR, SECTION 9.5.1 & 2.1.

8A) HORIZONTAL SEPARATION BETWEEN CABLE TRAYS IS DEFINED AS THE SHORTEST DISTANCE FROM THE SIDE OF ONE CABLE TRAY TO THE SIDE OF ANOTHER CABLE TRAY (METAL TO METAL, SIDE TO SIDE.)

8B) HORIZONTAL AND VERTICAL SEPARATION BETWEEN CONDUITS IS DEFINED AS THE SHORTEST DISTANCE BETWEEN THE TWO CONDUITS, METAL TO METAL NOT CENTERLINE TO CENTERLINE.

8C) VERTICAL SEPARATION BETWEEN CABLE TRAYS IS DEFINED AS THE VERTICAL DISTANCE FROM THE BOTTOM OF THE UPPER TRAY TO THE TOP OF THE LOWER TRAY, METAL TO METAL.

8D) A CROSSING IS DEFINED AS THE INTERSECTION OF TWO PATHS OF TRAYS OR CONDUITS IN WHICH THE ACUTE ANGLE BETWEEN THE CENTERLINES OF THE CONVERGING PATHS IS 45° OR GREATER.

9) CABLE SEGREGATION CODES SHOWN ON CHARTS

DIVISION	CABLE CODE	DIVISION	CABLE CODE
ESS 1	(1P,1C,1K (2P,2C,2YK)	RPS TRIP SYSTEM A1	A1C, A1K
ESS 2	(2P,2C,2K (2P,2C,2BK)	RPS TRIP SYSTEM A2	A2C, A2K
ESS 3	(3P,3C,3K (2P,2C,2GK)	RPS TRIP SYSTEM B1	B1C, B1K
NON-SAFETY (NS)	(NP,NC,NK (2P,NC,2WK)	RPS TRIP SYSTEM B2	B2C, B2K
NS WITH ESS 1	(1P,1C,1K (2P,2C,2K)	LPRM INPUTS	NAC, NBK, NCK, NDK
NS WITH ESS 2	(2P,2C,2K (2P,2C,2ZK)	RPS MG SET OUTPUT VALVE SOLENOIDS	G1C, G2C, G3C, G4C
NS WITH ESS 3	(3P,3C,3K (3P,2C,2SK)		

NOTE: 'P' STANDS FOR POWER, 'C' STANDS FOR CONTROL, 'K' STANDS FOR INSTRUMENTATION.

10) THE TERMS "LIKE TRAYS" OR "LIKE CONDUITS" SHALL BE CONSTRUED TO MEAN RACEWAYS DESIGNATED FOR CABLES OF THE SAME FUNCTIONAL TYPE (POWER IS POWER, CONTROL TO CONTROL, INSTRUMENTATION TO INSTRUMENTATION).

11) ALL SEG. CODES SHOWN ARE FOR UNIT 1, FOR UNIT 2, SEG CODES ASSUME PREFIX 1 TO BE 2.

12) THIS DRAWING APPLIES ONLY TO CABLES ROUTED IN RACEWAYS WHICH ARE DESIGNATED AND DEFINED AS FOLLOWS:

RACEWAY	PLACE DESIGNATED & DEFINED
CABLE TRAYS	ELECTRICAL INSTALLATION DRAWINGS (IE-0-3045, 3051-3054, IE-1-3300 SERIES, IE-1-3400 SERIES, IE-1-3501-3518 SERIES, IE-2-3300 SERIES, IE-2-3400 SERIES, IE-2-3501 SERIES, 3519-3527)
CONDUITS	CABLE TABULATION DRAWINGS (IE-1-3000 SERIES, IE-2-3000 SERIES) AND ELECTRICAL INSTALLATION DRAWINGS (SEE ABOVE)
JUNCTION BOXES	JUNCTION BOX SCHEDULE DRAWINGS (IE-0-3053, 3053A, IE-1-3501 SERIES, #1-3542E-3542A, IE-1-3409 SERIES, IE-1-3438 SERIES, IE-1-3513, -3513A, -3534B, -3550, -3409, IE-2-3501 SERIES, IE-2-3520, -3520A, 3542-3542A, IE-2-3409 SERIES, IE-2-3438 SERIES, IE-2-3513, -3520, -3409)

13) ALL FIELD ROUTED CONDUITS (SUCH AS LIGHTING) SHALL BE CONSIDERED AS HAVING A NON-SAFETY (W) SEGREGATION CODE.

8606240184-01

NUCLEAR SAFETY RELATED EQUIPMENT IS SHOWN ON THIS DRAWING.

REV.	DATE	DESCRIPTION	DRAWN / CHECKED / ENGR. APPROVAL
A	5-9-79	FOR INSTALL SPEC J-2559	
B	9-21-79	REVISED NOTE 10 FOR INSTALL SPEC J-2559	
C	6-4-81	ADDED NOTE 12 & REVISED TITLE SPEC J-2559	
D	10-12-82	ADDED NOTE #13 & REVISED AS NOTED SPEC J-2559	

CABLE IN RACEWAY SEGREGATION CHART

LA SALLE COUNTY STATION UNIT 1 & 2
COMMONWEALTH EDISON CO.
CHICAGO, ILLINOIS

SCALE: NONE
DRAWN: J.A. Pena 3-21-79
CHECKED: 5-7-79
ENGINEER: C.M. Johnson 4-6-79
APPROVED: 5-9-79

SARGENT & LUNDY ENGINEERS CHICAGO

DRAWING NO. IE-0-3333

JOB NO. 4766 4767

APERTURE CARD
Also Available On Aperture Card

IE-0-3333

CABLE SEGREGATION CHART

SEE NOTE (11) FOR UNIT 2 SEG. CODES

	1YP	1YC	1YK	1BP	1BC	1BK	1GP	1GC	1GK	1WP	1WC	1WK	11P	11C	11K	12P	12C	12K	13P	13C	13K
1YP	Y																				
1YC	N6	Y																			
1YK	N6	N6	Y																		
1BP	N5	N5	N5	Y																	
1BC	N5	N5	N5	N6	Y																
1BK	N5	N5	N5	N6	N6	Y															
1GP	N5	N5	N5	N5	N5	N5	Y														
1GC	N5	N5	N5	N5	N5	N5	N6	Y													
1GK	N5	N5	N5	N5	N5	N5	N6	N6	Y												
1WP	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y											
1WC	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y										
1WK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y									
11P	Y	N6	N6	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y								
11C	N6	Y	N6	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y							
11K	N6	N6	Y	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y						
12P	N1	N2	N3	Y	N6	N6	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y					
12C	N2	N1	N4	N6	Y	N6	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y				
12K	N3	N4	N1	N6	N6	Y	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y			
13P	N1	N2	N3	N1	N2	N3	Y	N6	N6	N1	N2	N3	N1	N2	N3	N1	N2	N3	Y		
13C	N2	N1	N4	N2	N1	N4	N6	Y	N6	N2	N1	N4	N2	N1	N4	N2	N1	N4	N6	Y	
13K	N3	N4	N1	N3	N4	N1	N6	N6	Y	N3	N4	N1	N3	N4	N1	N3	N4	N1	N6	N6	Y
A1C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4
B1C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4
A2C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4
B2C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4
A1K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
B1K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
A2K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
B2K	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
NAK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
NBK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
NCK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
NDK	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1	N3	N4	N1
G1C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4
G2C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4
G3C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4
G4C	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4	N2	N1	N4

	A1C	B1C	A2C	B2C	A1K	B1K	A2K	B2K	NAK	NBK	NCK	NDK	G1C	G2C	G3C	G4C
A1C	Y															
B1C	N6	Y														
A2C	N5	N5	Y													
B2C	N5	N5	N6	Y												
A1K	N6	N6	N5	N5	Y											
B1K	N6	N6	N5	N5	N6	Y										
A2K	N5	N5	N6	N6	N5	N5	Y									
B2K	N5	N5	N6	N6	N5	N5	N6	Y								
NAK	N4	N4	N5	N5	N1	N1	N5	N5	Y							
NBK	N4	N4	N5	N5	N1	N1	N5	N5	N5	Y						
NCK	N5	N5	N4	N4	N5	N5	N1	N1	N5	N5	Y					
NDK	N5	N5	N4	N4	N5	N5	N1	N1	N5	N5	N5	Y				
G1C	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4	Y			
G2C	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4	N1	Y		
G3C	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4	N1	N1	Y	
G4C	N1	N1	N1	N1	N4	N4	N4	N4	N4	N4	N4	N4	N1	N1	N1	Y

SEE NOTE (11) FOR UNIT 2 SEG. CODES

CABLES TO BE RUN IN CONDUIT ONLY

CABLES TO BE RUN IN CONDUIT ONLY

"D"

NOTES

Y) YES- MAY BE RUN TOGETHER IN SAME TRAY OR CONDUIT (NO SEPARATION REQUIRED)

N) NO- MAY NOT BE RUN TOGETHER IN SAME TRAY OR CONDUIT.

1) MINIMUM SEPARATION BETWEEN LIKE BOP AND ESF TRAYS IS 3" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN LIKE BOP AND ESF CONDUITS, OR BETWEEN LIKE RPS AND ESF OR BOP CONDUITS, OR BETWEEN LIKE ESF OR RPS CONDUITS AND BOP TRAYS OR BETWEEN LIKE BOP OR RPS CONDUITS AND ESF TRAYS IS 1" HORIZONTAL AND VERTICAL.

2) MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND CONTROL TRAYS IS 3" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND CONTROL CONDUITS OR BETWEEN NON-REDUNDANT SYSTEM POWER OR CONTROL CONDUITS AND POWER OR CONTROL TRAYS IS 1" HORIZONTAL AND VERTICAL.

3) MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND INSTRUMENTATION TRAYS IS 5" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM POWER AND INSTRUMENTATION CONDUITS OR BETWEEN NON-REDUNDANT SYSTEM POWER OR INSTRUMENTATION CONDUITS AND POWER OR INSTRUMENTATION TRAYS IS 1" HORIZONTAL AND VERTICAL WHEN SHIELDED INSTRUMENTATION CABLES ARE USED AND PARALLEL RUN DOES NOT EXCEED 100'. A MINIMUM SEPARATION OF 5" HORIZONTAL AND VERTICAL SHALL BE MAINTAINED WHEN THE DISTANCE EXCEEDS 100'. WHEN UNSHIELDED INSTRUMENTATION CABLES ARE USED IN CONDUITS OR TRAYS, A MINIMUM SEPARATION OF 20" HORIZONTAL AND VERTICAL SHALL BE MAINTAINED FROM POWER TRAYS OR CONDUITS.

4) MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM CONTROL AND INSTRUMENTATION TRAYS IS 3" HORIZONTAL, 12" VERTICAL. MINIMUM SEPARATION BETWEEN NON-REDUNDANT SYSTEM CONTROL AND INSTRUMENTATION CONDUITS OR BETWEEN NON-REDUNDANT SYSTEM CONTROL OR INSTRUMENTATION CONDUITS AND CONTROL OR INSTRUMENTATION TRAYS IS 1" HORIZONTAL AND VERTICAL.

5) MINIMUM SEPARATION BETWEEN REDUNDANT DIVISIONAL TRAYS OR BETWEEN REDUNDANT DIVISIONAL TRAYS AND CONDUITS IS 3'-0" HORIZONTAL, 5'-0" VERTICAL EXCEPT AT CROSSINGS WHERE THE MINIMUM VERTICAL SEPARATION MAY BE 12" PROVIDED THE LOWER TRAY IS COVERED FOR A DISTANCE OF 5'-0" ON EACH SIDE OF THE INTERSECTION OF THE CENTERLINES. MINIMUM SEPARATION BETWEEN REDUNDANT DIVISIONAL CONDUITS IS 3'-0" HORIZONTAL, 5'-0" VERTICAL EXCEPT AT CROSSINGS WHERE THE VERTICAL SEPARATION MAY BE 12".

6) RECOMMENDED SEPARATION BETWEEN TRAYS OF THE SAME DIVISION IS 3" HORIZONTAL, 12" VERTICAL. RECOMMENDED SEPARATION BETWEEN CONDUITS OR BETWEEN CONDUITS AND TRAYS OF THE SAME DIVISION IS 1" HORIZONTAL AND VERTICAL.

7) [illegible] REDUNDANT DIVISIONS MUST BE SEPARATED BY EITHER 20 [illegible] OR BY SUITABLE BARRIERS IN POTENTIAL LARGE MISSILE OR CONFLAGRATION AREAS. FOR IDENTIFICATION OF THESE AREAS SEE FSAR SECTION [illegible]

8a) HORIZONTAL SEPARATION BETWEEN CABLE TRAYS IS DEFINED AS THE SHORTEST DISTANCE FROM THE SIDE OF ONE CABLE TRAY TO THE SIDE OF ANOTHER CABLE TRAY (METAL TO METAL, SIDE TO SIDE).

8b) HORIZONTAL AND VERTICAL SEPARATION BETWEEN CONDUITS IS DEFINED AS THE SHORTEST DISTANCE BETWEEN THE TWO CONDUITS, METAL TO METAL, NOT CENTERLINE TO CENTERLINE.

8c) VERTICAL SEPARATION BETWEEN CABLE TRAYS IS DEFINED AS THE VERTICAL DISTANCE FROM THE BOTTOM OF THE UPPER TRAY TO THE TOP OF THE LOWER TRAY, METAL TO METAL.

8d) A CROSSING IS DEFINED AS THE INTERSECTION OF TWO PATHS OF TRAYS OR CONDUITS IN WHICH THE ACUTE ANGLE BETWEEN THE CENTERLINES OF THE CONVERGING PATHS IS 45° OR GREATER.

9) CABLE SEGREGATION CODES SHOWN ON CHART:

DIVISION	CABLE CODE	DIVISION	CABLE CODE
ESS 1	[illegible]	RPS TRIP SYSTEM A1	A1C, A1K
ESS 2	[illegible]	RPS TRIP SYSTEM A2	A2C, A2K
ESS 3	[illegible]	RPS TRIP SYSTEM B1	B1C, B1K
NON SAFETY (NS)	[illegible]	RPS TRIP SYSTEM B2	B2C, B2K
NS WITH ESS 1	[illegible]	LPRM INPUTS	NAK, NBK, NCK, NDK
NS WITH ESS 2	[illegible]	RPS SCRAM PILOT VALVE SOLENOIDS	G1C, G2C, G3C, G4C
NS WITH ESS 3	[illegible]		

NOTE: 'P' STANDS FOR POWER, 'C' STANDS FOR CONTROL, 'K' STANDS FOR INSTRUMENTATION.

10) THE TERMS "LIKE TRAYS" OR "LIKE CONDUITS" SHALL BE CONSTRUED TO MEAN RACEWAYS DESIGNATED FOR CABLES OF THE SAME FUNCTIONAL TYPE (POWER TO POWER, CONTROL TO CONTROL, INSTRUMENTATION TO INSTRUMENTATION).

11) ALL SEG. CODES SHOWN ARE FOR UNIT 1. FOR UNIT 2 SEG. CODES ASSUME PREFIX 1 TO BE 2.

12) THIS DRAWING APPLIES ONLY TO CABLES ROUTED IN RACEWAYS WHICH ARE DESIGNATED AND DEFINED AS FOLLOWS:

RACEWAY	PLACE DESIGNATED & DEFINED
CABLE TRAYS	ELECTRICAL INSTALLATION DRAWINGS [illegible]
CONDUITS	CABLE TABULATION DRAWINGS [illegible] AND ELECTRICAL INSTALLATION DRAWINGS (SEE ABOVE)
JUNCTION BOXES	JUNCTION BOX SCHEDULE DRAWINGS [illegible]

13) ALL FIELD ROUTED CONDUITS (SUCH AS LIGHTING) SHALL BE CONSIDERED AS HAVING A NON SAFETY (NS) SEGREGATION CODE.

"D" "D" "D"

NUCLEAR SAFETY RELATED
EQUIPMENT IS SHOWN ON THIS DRAWING

DRAWN & RELEASE RECORD			DRAWN / CHECKED / ENGR. APPROVAL
REV.	DATE	DESCRIPTION	
A	5-5-79	FOR INSTALL. SPEC. J-2559	[signatures]
B	7-21-79	REVISED NOTE [illegible] SPEC. J-2559	[signatures]
C	6-4-83	[illegible]	[signatures]
D	6-1-83	[illegible]	[signatures]

CABLE IN R/ "EWAY SEGREGATION CHART

LA SALLE COUNTY STATION UNIT 1 & 2
COMMONWEALTH EDISON CO.
CHICAGO, ILLINOIS

SCALE: NONE

SARGENT & LUNDY
ENGINEERS
CHICAGO

DRAWING NO.
IE-0-3333

28

IEEE-384, Class 1E circuits are not degraded below an acceptable level for the following reasons:

a. Cables associated with one safety-related division are never routed in cable trays or conduit containing cables of a redundant safety-related division. This is true for all general plant areas. Lesser separation than that dictated by IEEE-384 occurs only within control panels located in the control room and auxiliary equipment room.

b. All cables used to interconnect associated circuits are the same high quality as that utilized in Class 1E circuits, i.e., all associated cables comply with the requirements of IEEE 383-1974. Therefore, this cable has been proven to be highly fire retardant by testing.

c. Cables with separation less than that dictated by Sections 5.1.3 and 5.6.2 of IEEE-384 are constrained to control and instrumentation circuits which, by their very nature, are low energy circuits. Control circuits are generally 120-Vac or 125-Vdc, whereas, the insulation rating of the cable utilized at LSCS is 600-V.

d. There are no power cables in contact with the control and instrumentation cables in the cable spreading area or in the control room and auxiliary equipment room. Also, there are no high energy sources located within control panels installed in these areas.

e. Fire stops are installed in the bottom entrances of all control panels

With respect to the separation of non-Class 1E from Class 1E control and instrumentation circuits, LSCS complies with Section 4.6.2 of IEEE-384. Although the separation of non-Class 1E from Class 1E control and instrumentation circuits is in some cases, less than that required by Sections 5.1.3 and 5.6.2 of IEEE-384, these circuits have been analyzed to show that Class 1E circuits are not degraded below an acceptable level because:

a. Non-Class 1E cables are routed in separate cable trays from Class 1E and associated cables in general plant areas.

b. Non-Class 1E cables which come in close proximity to Class 1E and associated cables at one end do not come in contact with redundant Class 1E or associated circuits at their other end. This has been confirmed by a study of installed cables at LSCS.

c. All cables used to interconnect non-Class 1E circuits are the same high quality as that utilized in Class 1E circuits, i.e., all associated cables comply with the requirements of IEEE 383-1974. Therefore, this cable has been proven to be highly fire retardant by testing.

d. Cable separation less than that required by Sections 5.1 and 5.6 of IEEE-384 is limited to control and instrumentation circuits which by their very nature are low energy circuits. Control circuits are generally 120-Vac or 125-Vdc, whereas, the insulation rating of the cable utilized at LSCS is 600-V.

e. There are no power cables in contact with the control and instrumentation cables in the cable spreading area or in the control room and auxiliary equipment room. Also, there are no high energy sources located within control panels installed in these areas.

f. Fire stops are installed in the bottom entrances of all control panels.

Position 10 refers to Section 5.1.2 of IEEE 384-1974 concerning cable and raceway identification. The LSCS design utilizes cable trays with permanent colored identification markers at each routing point which are assigned and alphanumeric code per Table 8.3-6 of the LSCS-FSAR. Each cable is assigned a number and segregation code. This information is placed on a colored tag, of permanent design, which is affixed to each end of the cable. A similar tag is also affixed to the cable where it enters and exits a penetration.

The LSCS design complies with Positions 11, 12, 13, 14, 15, and 16.

IEEE 384-1974, Section 4.6, requires that Non-Class 1E cable trays be separated from Class 1E cable trays by the following minimum separation requirements:

a. 1 ft horizontally and 3 ft vertically in cable spreading areas.

b. 3 ft horizontally and 5 ft vertically in general plant areas.

The La Salle County Station (LSCS) criteria specifies that the minimum distance between safety-related and non-safety-related cable trays shall be 3 inches horizontally and 1 foot vertically. Cable trays at LSCS were installed to this specific criterion prior to issuance of IEEE-384.