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VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

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U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N. W.
Suite 2900
Atlanta, Georgia 30323

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Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
ELECTRICAL CABLE SEPARATION

In a telephone conference call on May 3, 1989, with Mr. T. Conlon of your staff and Mr. E. Grecheck of my staff, we were requested to provide your office with our program to assure separation of Appendix R cables. The attachment to this letter provides a description of that program, which includes prior to restart, short term, and long term action items.

Should you have any further questions, please call.

Very truly yours,



W. L. Stewart
Senior Vice President - Power

Attachment

cc: U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Mr. W. E. Holland
NRC Senior Resident Inspector
Surry Power Station

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ATTACHMENT 1
ELECTRICAL CABLE SEPARATION
ASSURANCE PROGRAM

ENGINEERING JUSTIFICATION/ANALYSIS DOCUMENT
ELECTRICAL SEPARATION
SURRY UNITS 1 AND 2

I. Problem

Lack of assurance of acceptable train and channel cable separation

Reason For Conclusion

Deviation S1-89-629 described specific potential separation problems and made statements indicating the potential for generic separation problems. Areas for potential separation problems are as follows:

1. Tray markings (color coding) disagreement between drawings and field conditions.
2. NUS 357 interpretation not consistent.
3. Justification for Black (non-safety) cables routed with two trains or channels is undocumented.
4. Lack of routing method clarity.
5. Specific cable schedule items which are currently being reviewed.
6. Purple cables noted in black tray.
7. Opposite train cables in same tray.
8. Lack of tray covers required for Appendix R.
9. Unscheduled cables in scheduled tray.
10. Non-fire retardant cable tray.

II. Purpose

A. Prior To Restart

1. Develop an acceptable level of assurance (95% confidence) of adequate (95% probability) train and channel separation per design criteria requirements for Unit 1 and 2 Appendix R cables. Resolve the specific items identified in Deviation S1-89-629 with respect to Appendix R cables.

B. Short Term

1. Review Unit 1 and 2 cable schedule (SE drawings) to verify train and channel separation.
2. Develop a reasonable assurance of the ability to ensure separation for future installations on Units 1 and 2 by upgrading the appropriate procedures and developing additional programmatic controls.

C. Long Term

1. Develop an increased assurance that safety related and non-safety related circuits are properly separated and scheduled through the company's configuration management program.

III. Methodology

A. Prior To Restart

1. Sampling of Appendix R circuits
 - a. The population of Appendix R cables for Unit 1 is 638 cables and for Unit 2 is 572 cables.
 - b. 60 cables (List Attached) have been randomly chosen to be physically traced end to end to verify acceptable separation. With zero cases of unacceptable routing, this quantity achieves a 95 percent confidence level with a 95 percent probability that the remaining cables are separated acceptably.
 - c. Any routing which cannot be shown to be acceptable by walkdown or analysis will result in expanding the number of cables to be traced to achieve the 95 percent confidence level and 95 percent acceptability. The sample size required for this assurance is 95 with one failure, 125 with two failures, etc. The specific routing errors will be resolved by rerouting, adding barriers with appropriate fire rating, etc.
2. Sample non-safety related cable routed with two trains or channels.
 - a. A partial review of cables (1200) on the cable schedule (Unit 1 SE drawings) identified a significant number of cables (120) potentially routed in this manner.

- b. 60 of these cables (20 power, 20 control, 20 instrumentation) were chosen to be analyzed to verify acceptable separation. With zero cases of unacceptable routing, this quantity achieves a 95 percent confidence level with a 95 percent probability that the criteria used for specifying routing with multiple trains had been met.
 - c. Any routing which cannot be shown to be acceptable will result in expanding the number of cables to be analyzed to achieve the 95 percent confidence level of 95 percent acceptability. The sample size required for this assurance is 95 with one failure, 125 with two failures, etc. The specific routing errors will be resolved by rerouting, adding barriers with appropriate fire rating, etc.
3. Ensure cable tray covers are properly installed on Unit 1 and Unit 2 where required or other mitigating measures taken (e.g. fire watch).
4. Walkdown Unit 1 and Unit 2 trays for potential non-fire rated cables.
 - a. Analyze each potential non-fire rated cable type for fire retardancy.
 - b. Remove unacceptable cables or provide alternative "coping" such as a fire watch.

B. Short Term

1. 100 percent review of Unit 1 and 2 Cable Schedules (SE drawing series) for routing errors or discrepancies which could compromise train separation.
 - a. Safety related color routed with another train or channel or in trays with a black designation.
 1. Identify population by SE drawing review (Unit 1 complete, 62 apparent discrepancies being analyzed).
 2. Analyze acceptability of routing for any anomalies noted.
 3. Correct unacceptable conditions found.
2. Provide/revise cable tray schematics for Units 1 & 2. Schematics will also address cable tray cover requirements.
3. Walkdown safety related trays to assure accuracy of cable tray schematics and correct tray designation in the field by:

- a. Verifying correct color code on trays and schematics.
 - b. Identifying change locations between color codes on trays and schematics.
 - c. Marking where covers are not required or special covers are required on trays and schematics.
 - d. Note on the tray schematics apparent separation exceptions which have been evaluated as acceptable.
4. Specification NUS 357 and station procedure EMP-C-EPH-99 will be revised to provide clarification of the Surry design requirements. These design requirements will be the basis for acceptability of both existing cable routings, including evaluation of situations identified with this effort, and future cable routing. Additionally, more specific requirements for tray cover installation will be provided.
 5. Items 2 and 3 above will be completed within two months of respective unit startups. Item 4 will be completed within two months of the Unit 1 startup.
- C. Long Term - Configuration Management Program
- The following items will be addressed on a long term basis. Specific programs and scheduling will be developed under the Configuration Management Program.
1. Continue to sample non-safety related cable routings, and additional safety-related cable routing, to result in increased assurance of correct (i.e. - separated or barriered) routing and scheduling.
 2. Improve procedures, standards, and specifications as necessary to assure that future routing is correct.
 3. Correct instances found of misrouting and discrepant data in cable routing schedule.

IV. EVALUATION CRITERIA FOR ASSURANCE OF SEPARATION

The evaluation performed to make an accept/reject judgement on specific potential separation problems utilizes a single failure criterion and analysis in accordance with design requirements to ensure train and channel functional redundancy is not lost. The following conditions are identified as reasons to conclude acceptable separation does not exist for the anomaly identified and to initiate sample size expansion and corrective action:

1. Separation is such that Appendix R compliance is not maintained.

2. Color coded cable routed in opposing train or channel and not analytically acceptable.
3. Color coded cable routed in black tray in which other trains' or channels' cables are routed and are not analytically acceptable.
4. Black cable routed with 2 trains or channels and not analytically acceptable.

V. SUMMARY

The activities described under methodology as Prior to Restart each increase the assurance that Appendix R cables are properly separated. The primary component of these activities are the samples of cables to be verified. The 95 percent confidence which will be attained by these samples, or expanded sampling as required, is further enhanced by the other activities listed.

The assurance provided by a 95 percent confidence level that at least 95 percent of Appendix R cables are properly separated is acceptable to allow restart. The programmatic activities described assure that future installations will not create separation violations after restart and increase the confidence of proper separation.

APPENDIX R CIRCUIT SAMPLE

CABLE NO.	TO	FROM
1H5PH10*	SWGR15H5	SIA RACK
1J2PH3	BENCHBD 1-1	SWGR-15J2
1J6PL118	BENCHBD 1-1	MCC 1J1-1-4D
1H10PL503*	MCC 1H1-2	UPS 1A-1
1B20*	SWGR 1H-15H1	DC DIST. PNL1A
1H5PH3*	BENCHBD 1-1	SWGR 1H-15H5
1J10PL434	MCC 1J1-2-4A	VERT.BD. 1-1
1J4PH1	1-FW-P-3B	SWGR 15J4
1H6PL327*	UPS 1A-2	MCC 1H1-1
1L16	LTG SWBD SECT-2	1S12 (LP)
1SOV292*	XMTR 196	BENCHBD 1-2
1SOV691*	RCPV 15C/6	PAMC-1
1SOV706	RCPV 1C/6	PAMC-1
1SOV688*	RCPV 15C/6	PAMC-1
1SOV703	RCPV 1C/6	PAMC-1
1SOV683*	-JB-	RCPC 15C/6
1SOV263	RCPV 10E/4	BENCHBD 1-1
1SOV264	-JB-	RCPC 10E/4
1H10PL406	MCC1H1-2-6A	BENCHBD 1-1
1H10PL404	RCPV 12C	MCC 1H1-2
1H10PL405	MOV 1535	RCPC-12C
1J10PL386	MCC 1J1-2	BENCHBD 1-1
1J10PL384	RCPV 5A/2	MCC 1J1-2
1J10PL385	RCPC 5A/2	MOV 1536
1SOV68	RCPV 7C/4	BENCHBD 1-1
1SOV69	JB	RCPC 7C/4
1NI183	RCPV 13E/2	BENCHBD 1-1
1NI184	RCPC 13E/2	E/P 1137
1NI401	AUX SHTUDN PNL	BENCHBD 1-1
1H10PL26	PS-VS-118A	VNTX-R

APPENDIX R CIRCUIT SAMPLE

CABLE NO.	TO	FROM
1J6PL70A	MCC 1J1-1-4B	BENCHBD 1-1
1J10PL185	LCV-1115D	MCC-1J1-2 5A
1H10PL374*	RPA-RK-3A	BENCHBD 1-2
1J4PH10	SIBRK #VI	MAIN BD REAR
1H4PH7*	SWGR 15HC	SWGR 15D3
15H6PL11*	MCC 1H1-1-5C	MAIN BD 1-1
1M374	MCC 1J1-2- 5A	RMT PNL
1J10PL183	LCV-WT-1115C	MCC-1J1-26A
1H6PH3	BENCHBD 1-1	15H6
1J5PH11	SIB-RACK COMP VI	15J5
1J5PH2	BENCHBD 1-1	15J5
1H6PL50	MCC 1H1-1D	1-SW-P10A
1J6PL46	MCC-1J1-1-4B	1-SW-P10B
1NIB126	PR-17 INST.RM	PT-1485
1NIW136	PR-18 INST.RM	PT-1474
1J16PL1	480SWGR 1J1-1	MCC-1J1-1
1H6PL327*	MCC 1H1-1	UPS 1A-2
1SOV-312	INST.RACK	BENCHBD 1-2
1SOV-309	SIA-RACK	BENCHBD 1-2
1H6PL10	MCC 1H1-1-5C	1-CC-P-2A
1J6PL117	MCC 1J1-4D	1-CC-P-2B
1NIB214	LT-1461	RCPC-13C
1NIB215	RCPC-13C	RK-20
1NIØ100	MB.RACK-3	BENCHBD 1-1
1J6PL118	BD 1-1	MCC 1J1-14D
1J10PL504	MCC 1J1-2	UPS1B-2
1J6PL37	JB EMER GEN RM	MCC 1J1-1-4C
1B60	SWGR 15J2	DC DIST PNL-1B
1J6PL65	VENT PNL U-2	MCC 1J1-1-6A
1M911	REPEATER BE	EMER PWR EXPER