

# SAFETY RELATED

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VIRGINIA ELECTRIC AND POWER COMPANY

1 -ST- 9

Revision No.: 0

Date:

STARTUP TEST PROCEDURE FOR NORTH ANNA POWER STATION UNIT # 1 & 2

TITLE: VOLTAGE PROFILE

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Date: 08-10-79

Engineering Recommended Approval:

Date: 8-10-79

STATION NUCLEAR SAFETY AND OPERATING COMMITTEE APPROVAL OF PROCEDURE:

Chairman's Signature:

Date: 8/24/79

All personnel conducting actual testing in accordance with this procedure will verify by their signature that they have read it in its entirety prior to commencing any testing:

NOT A CONTROLLED

DOCUMENT

AUG 24 1979

NOR NECESSARILY THE  
LATEST REVISION

TEST RESULTS REVIEWED BY ENGINEERING:

Date:

TEST RESULTS APPROVED BY STATION NUCLEAR SAFETY AND OPERATING COMMITTEE:

Chairman's Signature:

Date:

Comments:

7910120173

8

DISCREPANCIES (List by number):RESOLUTION OF DISCREPANCIES (List by number corresponding to above):

9

CRITIQUE:

10



VIRGINIA ELECTRIC AND POWER COMPANY  
NORTH ANNA POWER STATION  
UNIT NOS. 1 AND 2

VOLTAGE PROFILE

REFERENCES:

1. Vepco Plant Manual LSK-22-2B and LSK-22-10A
2. F.S.A.R. Section 8.3.1.1.1
3. Main One Line Diagram FE-1A-11
4. 1-OP-26.1, 2-OP-26.1
5. 1-EP-1, 2-EP-1
6. Unit 1 Technical Specification
7. Unit 2 Proposed Technical Specification

1.0 Purpose

The Purpose of this test is to:

- 1.1 Verify that plant equipment voltage profiles remain above an acceptable level during a transient initiated by one unit tripping simultaneously with a second unit starting up.

Initials2.0 Initial Conditions

Date Started: \_\_\_\_\_

- \_\_\_\_\_ 2.1 Immediately prior to the performance of this test, the test engineer has reviewed the latest revisions of the applicable references in order to improve his familiarity with this procedure and insure that it is still valid for performance of the test. (i.e. changes to the systems, equipment or component since the procedure was approved will not affect its testing).
- \_\_\_\_\_ 2.2 Unit 2 is on station service transformers and has one feedwater pump operating. Unit 2 is operating normally with Rx power  $\leq$  30% power and H.P. and L.P. condensate heater drain pumps on recirculation.
- 2.3 Unit 1 is in Mode 2 or Mode 3 (on reserve station service).
- 2.4 VEPCO A & C has been notified of the impending test.
- 2.5 Notify the Shift Supervisor for Units 1 and 2 of this impending test and coordinate its performance through them.
- 2.6 All recorders and test equipment have been accepted by North Anna Quality Control Department and are in a current state of calibration.
- 2.7 Notify system operator at least 1 day in advance of this impending test and coordinate its performance through him. Place the load shed logic switch in the Unit 1 startup position.

Initials

3.0 Precautions

- \_\_\_\_\_ 3.1 Precautions should be taken to insure safety while making all connections to the high voltage busses.
- \_\_\_\_\_ 3.2 Should the undervoltage setpoint for a piece of equipment be reached and automatic shedding does not occur, the equipment should be manually shed to prevent damage to that equipment.
- \_\_\_\_\_ 3.3 If Unit #2 is accidentally tripped during the fast transfer from Station Service to Reserve Station Service, emergency procedure 2-EP-1 should be used to restore unit to normal operating conditions.
- \_\_\_\_\_ 3.4 When both units are on Station Reserve Power, it may be difficult to synchronize the reserve and station busses as per 2-OP-26.1 due to the heavy loading of the Reserve Station Service Transformers. It may be necessary to manually shed non-essential Reserve Station Service loads in order to transfer the loads back to the Station Service Busses.

Initials

4.0 Instructions

- 4.1 Verify that initial conditions have been met.
- 4.2 Install test switch to simultaneously open station service breakers 25A2, 25B2 and 25C2.
- 4.3 Install recorders to monitor the voltage profiles on the following busses:

|                          |                         |
|--------------------------|-------------------------|
| _____ 4160V Bus 1A       | _____ 4160V Bus 2A      |
| _____ 4160V Bus 1B       | _____ 4160V Bus 2B      |
| _____ 4160V Bus 1C       | _____ 4160V Bus 2C      |
| _____ 4160V Emer. Bus 1H | _____ 4160 Emer. Bus 2H |
| _____ 4160V Emer. Bus 1J | _____ 4160 Emer. Bus 2J |
| _____ 480V Emer. Bus 1J  | _____ 480V Emer. Bus 2H |
| _____ Control Voltage    | _____ 480V Emer. Bus 2H |
| _____ 480V Emer. Bus 1J  | _____ Control Voltage   |
| _____ 125V Vital Bus     | _____ 125V Vital Bus    |

- 4.4 An oscillograph recorder has been installed by VEPCO A & C. As specified in Attachment 6.4.

- 4.5 Load busses as per Attachment 6.3.

- 4.5.1 Record 500KV and 34.5KV Grid Voltages below.

|             |                     |
|-------------|---------------------|
| _____ 500KV | _____ 34.5KV Bus #3 |
| _____ 500KV | _____ 34.5KV Bus #4 |

- 4.6 Start all recorders and record date, time, and bus #'s.

- 4.7 Initiate a trip on all three Station Service breakers using the test switch. This will simulate a trip on Unit #2.

- 4.7.1 Record 500KV and 34.5KV Grid Voltages below.

|             |                     |
|-------------|---------------------|
| _____ 500KV | _____ 34.5KV Bus #3 |
| _____ 500KV | _____ 34.5KV Bus #4 |

Initials

4.0 Instructions (cont.)

\_\_\_\_\_ 4.8 After voltages have stabilized, return Unit #2 to Station  
Service as per 2-OP-26.1.

\_\_\_\_\_ 4.9 Turn off all recorders.

\_\_\_\_\_ 4.10 Remove recorders from their respective busses.

\_\_\_\_\_ 4.11 Remove test switch (by VEPCO A & C).

\_\_\_\_\_ 4.12 Record Data on Attachment 6.1.

\_\_\_\_\_ 4.13 Inform the Shift Supervisor of Units 1 and 2 that this test has  
been completed.

Completed by: \_\_\_\_\_

Date: \_\_\_\_\_



5.0 Acceptance Criteria

The results of this test shall be considered acceptable if:

5.1 The load from both units remains on the Reserve Station Power.

6.0 Attachments

6.1 Voltage Data Sheet

6.2 Lead Voltage Drops

6.3 Bus Loads

6.4 Installation of the Oscillograph

6.5 Safety Analysis

VOLTAGE DATA SHEET

| BUS      | A <sup>1</sup><br>LOWEST<br>BUS VOLTAGE | WORST B <sup>2</sup><br>LEAD<br>VOLTAGE DROP | C <sup>3</sup><br>ACTUAL<br>VOLTAGE AT LUG.<br>(A-B) |
|----------|---|--|--|
| 4KV 1A   |   | 50 VOLTS                                     |  |
| 4KV 1B   |   | 50 VOLTS                                     |  |
| 4KV 1C   |   | 50 VOLTS                                     |  |
| 4KV 1H   |   | 50 VOLTS                                     |  |
| 4KV 1J   |   | 50 VOLTS                                     |  |
| 480V 1H  |   | 5 VOLTS                                      |  |
| 480V 1J  |   | 5 VOLTS                                      |  |
| 25 VITAL |   |  |  |
| 4KV 2A   |   | 50 VOLTS                                     |  |
| 4KV 2B   |   | 50 VOLTS                                     |  |
| 4KV 2C   |   | 50 VOLTS                                     |  |
| 4KV 2H   |   | 50 VOLTS                                     |  |
| 4KV 2J   |   | 50 VOLTS                                     |  |
| 480V 2H  |   | 5 VOLTS                                      |  |
| 480V 2J  |   | 5 VOLTS                                      |  |
| 25 VITAL |   |  |  |

1. This is the lowest voltage that the profile reaches during the transient.
2. This is the worst case voltage drop for the most restrictive lead.  
(See Attachment 6.2).
3. Actual voltage is measured voltage minus the worst lead voltage drop.  
This number indicates the minimum voltage at the equipment.

## LEAD VOLTAGE DROPS

The design basis for all 4KV equipment is to have A voltage drop of less than 50 volts. This maximum of 50 volts is what will be used as a conservative estimate of the worst lead voltage drop.

The worst case voltage drops were calculated based on the impedance of the longest lead for each case and a conservatively high value for maximum current. Some representative voltage drops are listed below.

|                      |          |
|----------------------|----------|
| Reactor Coolant Pump | 30 Volts |
| Feedwater Pump       | 20 Volts |
| Condensate Pump      | 15 Volts |
| Charging Pump        | 12 Volts |

BUS LOADS

UNIT #2

BUS 2A

\_\_\_\_\_ 2-RC-P-1A

\_\_\_\_\_ 2-CN-P-1A

\_\_\_\_\_ 2-SD-P-1A (Recirc)

\_\_\_\_\_ 2-SD-P-2A (Recirc)

\_\_\_\_\_ 480-SS-2A1 & A2

BUS 2B

\_\_\_\_\_ 2-RC-P-1B

\_\_\_\_\_ 2-FW-P-1B1

\_\_\_\_\_ 2-FW-P-1B2

\_\_\_\_\_ 2-BC-P-1A

\_\_\_\_\_ 2-CN-P-1B

\_\_\_\_\_ 2-SD-P-1B (Recirc)

\_\_\_\_\_ 480-SS-2B1 & B2

BUS 2C

\_\_\_\_\_ 2-RC-P-1C

\_\_\_\_\_ 2-FW-P-1C1

\_\_\_\_\_ 2-FW-P-1C2

\_\_\_\_\_ 2-CN-P-1C

\_\_\_\_\_ 2-SD-P-1C (Recirc)

\_\_\_\_\_ 2-SD-P-2B (Recirc)

\_\_\_\_\_ 480 SS 2C1 & C2

BUS 2H

\_\_\_\_\_ 2-SW-P-1A

\_\_\_\_\_ 2-CH-P-1A

\_\_\_\_\_ 2-CC-P-1A

\_\_\_\_\_ 480 SS-2H & 2H1

BUS 2J

\_\_\_\_\_ 480 SS-1J & 1J1

BUS 2G

\_\_\_\_\_ 2-CW-1A

\_\_\_\_\_ 2-CW-1B

\_\_\_\_\_ 2-CW-1C

\_\_\_\_\_ 2-CW-1D

\_\_\_\_\_ 480 SS-2G1

BUS LOADS (cont.)

UNIT 1

BUS 1A

\_\_\_\_\_ 1-RC-P-1A

\_\_\_\_\_ 1-FW-P-1A1

\_\_\_\_\_ 1-FW-P-1A2

\_\_\_\_\_ 1-CN-P-1A

\_\_\_\_\_ 480-SS-1A1 & A2

BUS 1B

\_\_\_\_\_ 1-RC-P-1B

\_\_\_\_\_ 1-BC-P-1A

\_\_\_\_\_ 480 SS-1B1 & B2

BUS 1C

\_\_\_\_\_ 1-RC-P-1C

\_\_\_\_\_ 480 SS-1C1 & C2

BUS 1H

\_\_\_\_\_ 480 SS-2H & 2H1

BUS 1J

\_\_\_\_\_ 1-SW-P-1B

\_\_\_\_\_ 1-CH-P-1B

\_\_\_\_\_ 1-CC-P-1B

\_\_\_\_\_ 480 SS-1J & 1J1

BUS 2G

\_\_\_\_\_ 1-CW-1A

\_\_\_\_\_ 1-CW-1B

\_\_\_\_\_ 1-CW-1C

\_\_\_\_\_ 1-CW-1D

\_\_\_\_\_ 480 SS-2G1

## INSTALLATION OF THE OSCILLOGRAPH

### Oscillograph Connection

The oscillograph will be temporarily located in the normal switchgear room. It will be installed by A & C section

Channel 1 - B phase current from 15B1

Channel 2 - B phase current from 15B2

Channel 3 - Bus potential, secondary.

## SAFETY ANALYSIS

1. REVIEW OF THE TECHNICAL SPECIFICATIONS: The limiting conditions for operation and surveillance, requirements for the electrical power systems are stated in Unit 1 and Unit 2 proposed Technical Specifications 3/4.8. Performance of this special test does not change the design basis or operating procedures of the station and does not affect the Technical Specifications.
2. REVIEW OF THE FINAL SAFETY ANALYSIS REPORT: The description and analysis of the offsite power system are contained in Section 8.2 of the FSAR. Performance of this special test does not alter any commitment established in the FSAR.
3. UNREVIEWED SAFETY QUESTION EVALUATION: The performance of this special test does not create an "unreviewed safety question," as defined in 10CFR 50.59. The special test will demonstrate plant equipment voltage profiles remain above an acceptable level during a transient initiated by one unit tripping simultaneously with a second unit starting up. Thus, the special test does not:
  - a. Increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report.
  - b. Create a possibility for an accident or malfunction of a different type than evaluated previously in the safety analysis.
  - c. Reduce the margin of safety as defined in the basis for any technical specification.