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UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

April 17, 1986

**MEMORANDUM FOR:** 

Lester S. Rubenstein. Director PWR Project Directorate #2 Division of PWR Licensing-A

FROM:

REGULA,

Leon B. Engle, Project Manager PWR Project Directorate #2 Division of PWR Licensing-A

SUBJECT:

SUMMARY OF MEETING WITH VIRGINIA ELECTRIC AND POWER COMPANY (VEPCO) REGARDING REACTOR TRIP BREAKER MAINTENANCE PROGRAM

#### Introduction:

A meeting was held on April 7, 1986, in Bethesda, Maryland with representatives of the NRC staff, VEPCO, and the Westinghouse Owners Group (WOG) regarding the subject as noted above. A listing of attendees is provided in Enclosure 1.

#### Background:

During the time period of January-February 1983, VEPCO requested Westinghouse to review the maintenance program for the DB-50 reactor trip switch gear. In February 1983, the Salem ATWS event took place and the NRC staff's Generic Letter 83-28, "Required Actions Based on Generic Implications of Salem ATWS Events," was issued in July 1983. In October 1983, the WOG "Maintenance Program for DB-50 Reactor Trip Switch," was issued and VEPCO responded to Generic Letter 83-28 in November 1983. During May 1984, the WOG maintenance program was initiated at VEPCO, and during Fall-1984 through 1985, installation of Auto Shunt Trip and Trip Breakers took place at the Surry and North Anna Power Stations. During November 1984, VEPCO formed its own reactor trip breaker committee to assess the WOG maintenance program for reactor trip breaker trip reliability and presented the assessment of this program at the subject meeting as noted above.

It is noted that the NRC requires that reactor trip breaker testing be done in accordance with the WOG recommendations and any changes in the maintenance and testing frequency for reactor trip breakers does not affect present or proposed specific plant Technical Specifications.

#### Discussion:

VEPCO's agenda and the salient points of VEPCO's presentation are provided in Enclosure 2. Presently, independent verification of operability is required for the undervoltage and shunt trip attachments as part of the monthly trip logic testing. Periodic maintenance is based on WOG "Maintenance Program for DB-50 Reactor Trip Switch Gear," (October 14, 1983). The WOG-recommendations presently include: (1) testing of the independent reactor trip breaker features, (2) the performance of lubricating the UVTA and operating mechanism, (3) the performance of tests for trending parameters, (4) the performance of a trip margin test, (5) the cleaning of the switchgear enclosure, and (6) a functional check (trip 10 cvcles) prior to returning the breaker to service.



VEPCO's concerns with the current WOG Maintenance Program include: (1) excessive cycling, (2) excessive handling, and (3) reliability of unit reactor trip breakers. Regarding excessive cycling, the breaker is required to trip 114 cycles for maintenance and 36 cycles for surveillance testing over an eighteen (18) month refueling interval. In summation, this amounts to 150 cycles for a given fuel cycle period. VEPCO stated that this cycling reduces the effectiveness of lubrication on UVTA and the operating mechanism as well as increasing the wear on breaker parts. For excessive handling, VEPCO indicated this handling increases the probability of handling damage and may cause possible alignment problems. Finally, unit reliability may be decreased because breaker operations on line as well as removing and reinstalling breakers increases the probability of a unit trip.

The salient points of VEPCO's proposed maintenance program for reactor trip breakers would include: (1) revised maintenance procedure to reduce the number of cycles or trips during maintenance, (2) extend the maintenance frequency from 6 to 12 months, and (3) trend breaker parameters and performance to determine the effectiveness of the maintenance program. Actual revisions to the present program include the reduction in maintenance procedure for breaker tripping from 38 to 27 cycles. Additionally, maintenance would be performed on an annual basis instead of the present 6 month interval. Also, vendor refurbishment (off-site vendor program to return breaker to "as new" condition) would be performed for at least 3 refueling cycles. Finally, the proposed program would reduce breaker cycles for maintenance from 114 to 37 per unit cycle.

VEPCO's justification for extending the maintenance period to 12 months is based on WOG criteria which states the maintenance period may be extended to 9-12 months based on experience and trending data and provided 200 breaker cycles are not exceeded. Also, unit breaker reliability would be increased by reducing the risk of on-line maintenance. In addition, trend data collected by VEPCO does not indicate any adverse trends in breaker performance over the past two years. The proposed maintenance program would reduce both the amount of handling and the amount of wear on breaker parts. And, reducing breaker operations increases the effectiveness of lubrication on UVTA and the operating mechanism.

#### Conclusions:

Based on the above, VEPCO in summary indicated that:

- (1) Excessive cycling reduces the effectiveness of lubrication and increases wear on breaker parts.
- (2) On-line maintenance increases the probability of reactor trip.
- (3) The proposed maintenance program reduces the number of breaker cycles by 67.5% while continuing to satisfy the WOG maintenance program requirements.
- (4) The proposed 12 month maintenance frequency reduces breaker handling and probability of reactor trip.

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#### Lester S. Rubenstein

- (5) Trending of past breaker performance coupled with breaker refurbishments for each refueling cycle justifies a 12 month maintenance frequency interval.
- (6) Improved maintenance program increases unit breaker reliability.

In conclusion, it is noted that the VEPCO proposal to change the maintenance frequency from 6 months to 12 months does not affect present proposed plant specific Technical Specification requirements. VEPCO will be submitting a supplemental response to Generic Letter 83-28 which addresses a periodic 12 month maintenance interval. For other Westinghouse plants, these matters will be handled on a generic basis between the WOG and specific utilities.

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Leon B. Engle, Project Manager PWR Project Directorate #2 Division of PWR Licensing-A Office of Nuclear Reactor Regulation

Enclosures: As stated

cc: See next page

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### **ENCLOSURE 1**

### LIST OF ATTENDEES

### FOR MEETING WITH

### VIRGINIA ELECTRIC AND POWER COMPANY

ON

### APRIL 7, 1986

<sup>-</sup>NRC

### VEPCO

- J. T. Beard V. Benaroya P. Boehnert S. Brown F. Burrows L. Engle J. Knight 0. Parr C. Patel F. Rosa E. Rossi N. Romney L. Rubenstein P. Shemanski
- S. Weiss

Westinghouse Corporation

A. Deb

J. Mesmeringer

Houston Lighting & Power

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### Commonwealth Edision

L. D. Butterfield (WOG)

# Virginia Power Reactor Trip Breaker

## **Presentation**

## April 7, 1986

## Agenda

I. Introduction and Background
II. Current Requirements
III. Description of Breaker Components
IV. Demonstration of Selected Procedural Steps
V. Concerns with Current Maintenance Program

VI. Proposed Maintenance Program

VII. Licensing Actions

VIII. Conclusions

IX. Hands-on Breaker Familiarization

## Introduction and Background

## History

1983

- Jan-Feb —— Westinghouse Reviews Breaker Programs at Virginia Power's Request
  - Feb —— Salem ATWS Event
  - July —— Generic Letter 83-28, "Required Actions Based on Generic Implications of Salem ATWS Events
  - Oct —— WOG "Maintenance Program from DB-50 Reactor Trip Switch Gear"
  - Nov —— Virginia Power Response to Generic Letter 83-28

## History

1984

May —— WOG Maintenance Program Initiated at Virginia Power

1985

- Fall'84 —Installation of Auto Shunt Trip and Tripthru '85Breaker Counters at Virginia Power Plants
  - Nov —— Virginia Power Reactor Trip Breaker Maintenance Committee Formed

1986

, April — — Meeting with NRC

## Current Requirements

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## **Regulatory Requirements**

- Independent verification of operability of undervoltage and shunt trip attachments as part of monthly trip logic testing
- Periodic maintenance based on Westinghouse Owners Group "Maintenance Program for DB-50 Reactor Trip Switch Gear" (10-14-83)

## **Regulatory Requirements**

- Maintenance performed at 6 month intervals — may be extended to 9-12 months as maintenance and test trends indicate
- Trending of UV trip attachment dropout voltage, trip force, breaker response time

## Vendor Recommendations

- Test Independent Trip Features
- Perform Lubrication Procedure on UVTA & Operating Mechanism
- Perform Tests for Trending Parameters

## Vendor Recommendations

- Perform Trip Margin Test
- Clean Switchgear Enclosure
- Functional Check Prior to Returning to Service

## Description of Breaker Components

Demonstration of Selected Procedural Maintenance Steps

## **Procedural Maintenance Steps**

- Manually close and trip breaker
- Point out areas of lubrication
- Illustrate how UVTA and shunt trip attachment trip breaker
- Restrain UVTA, close breaker, release UVTA to trip breaker

## **Procedural Maintenance Steps**

- Attach a 20 ounce weight to trip bar and repeat above step
- Point out trendable data parameters and points of measurements
- Cycle breaker 10 times for final check

## Virginia Power's Concerns with Current Maintenance Program

### Concerns

- Excessive Cycling
- Excessive Handling
- Unit Reliability

## **Excessive** Cycling

- 114 cycles/refueling for maintenance 36 cycles/refueling for surveilance testing 150 cycles/refueling total
- Reduces effectiveness of lubrication on UVTA and operating mechanism
- Increases wear on breaker parts

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## **Excessive Handling**

- Probability of handling damage
- Possible alignment problems

## Unit Reliability

- Breaker operations on line increases probability of unit trip
- Removing and reinstalling breakers increases probability of a unit trip

Virginia Power's Proposed Maintenance Program for Reactor Trip Breakers

## Major Goals of Program

- Revise maintenance procedure to reduce number of cycles during maintenance
- Extend maintenance frequency from 6 to 12 months
- Trend breaker parameters and performance to determine if future extensions are justified

## **Proposed Program Revision**

- Reduce maintenance procedure from 38 to 27 cycles
- Perform maintenance procedure annually
- Perform vendor refurbishment every refueling for at least 3 refueling cycles
- Proposed program reduces breaker cycles for maintenance from 114 to 37/refueling (two thirds reduction)

## Justification for 12 Month Maintenance

- WOG states "maintenance period may be extended to 9-12 months if experience indicates and providing 200 breaker cycles are not exceeded"
- Increases unit reliability by reducing risk of on line maintenance
- Trendable data has not indicated any adverse trends in breaker performance during the last 2 years of testing

## Proposed Maintenance Program

- Reduce the amount of handling on the breaker
- Reduce the amount of wear on breaker parts
- Reducing breaker operations increases effectiveness of lubrication on UVTA and operating mechanism

## Westinghouse Refurbishment Program

- Initially every refueling
- Future adjustments possible based on breaker performance
- Tolerance check on operating parts
- Tested to new breaker specifications
- Return breaker to "as new" condition

## Proposed Maintenance Program

Virginia Power Proposed Maintenance Schedule

## **Proposed Maintenance Program**

• Phase 1 6 Month Maintenance Intervals

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- Phase 2 12 Month Maintenance Intervals with Westinghouse Refurbishment Program every refueling
- Phase 3 Lengthen Maintenance Intervals and reduce Refurbishment Program when justified

## Licensing Actions

## **Licensing** Actions

• Supplemental response to Generic Letter 83-28 addressing periodic maintenance at 12 month intervals

- Excessive cycling reduces effectiveness of lubrication and increases wear on breaker parts
- On-line maintenance increases the probability of reactor trip

- Proposed maintenance program reduces number of breaker cycles by 67.5% while continuing to satisfy WOG maintenance program requirements
- Proposed 12 month maintenance frequency reduces breaker handling and probability of reactor trip

- Trending of past performance coupled with breaker refurbishments each refueling justifies 12 month maintenance frequency
- Change in maintenance frequency from 6 months to 12 months does not affect present or proposed Technical Specification requirements

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- Trended breaker parameters and performance from Phase 2 will be used to determine if further extensions are justified
- Improved maintenance program increases unit reliability