

YANKEE | ATOMIC POWER COMPANY •

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January 25, 1985 MN-85-14

GDW-85-25

A055

Director of Nuclear Reactor Regulation United States Nuclear Regulatory Commission Washington, D. C. 20555

Attention: Mr. James R. Miller, Chief Operating Reactors Branch No. 3 Division of Licensing

References:

(a) License No. DPR-36 (Docket No. 50-309)

- (b) MYAPCo Letter to USNRC dated November 10, 1983, (MN-83-232) Required Actions Based on Generic Implication of Salem ATWS Events
- (c) MYAPCo Letter to USNRC dated May 4, 1984, (MN-84-74) Status Report on Reactor Trip Breakers
- (d) MYAPCo Letter to USNRC dated May 23, 1984, (MN-84-81) Reactor Trip Breakers: Revised RTB Testing and Maintenance Program
- (e) USNRC Letter to MYAPCo dated June 5, 1984, Trip Breaker Testing and Maintenance Program (CAL 84-5)
- (f) MYAPCo Letter to USNRC dated June 19, 1984 (MN-84-104) Trip Breaker Testing and Maintenance Program
- (g) USNRC Letter to MYAPCo dated December 20, 1984, Request for Additional Information Concerning Preventive Maintenance for Reactor Trip Breakers

Subject: Additional Information Regarding Generic Letter 83-28

Gentlemen:

In Reference (g) you raised several questions regarding specific aspects of our reactor trip breaker (RTB) maintenance and testing program as a follow-up to the information supplied in Reference (b). Most of these questions have been addressed in subsequent communications with the NRC Office of Inspection and Enforcement (I & E) as our understanding of the operation and problems associated with General Electric AK-2 breakers has matured. The pertinent communications are listed as References above.

Our responses to the specific matters you raised in Reference (g), are provided below.

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United States Nuclear Regulatory Commission Attention: Mr. James R. Miller, Chief Page Two MN-85-14

## NRC Item 1.1

Criteria for Evaluating Compliance with [Generic Letter 83-28] Item 4.2.1.

### Maine Yankee Comments

Maine Yankee has incorporated the advice provided by General Electric for AK-2 breakers including recent supplements, in the latest revision of our Procedure 5-77-33. Data are taken on trip torque, pickup and dropout voltages for the undervoltage device and breaker insulation resistence (measured at refueling intervals).

Presently, the preventive maintenance on RTB's is carried out quarterly and at refueling intervals in conformance with the program submitted in Reference (d).

1. At the end of the current fuel cycle, we will re-evaluate this program and data to determine whether or not to extend the interval.

## NRC Item 1.2

Issues relating to Item 4.2.1.

## Maine Yankee Comments

Your letter requests confirmation of coverage of nine matters. As indicated above, Procedure 5-77-33 (Rev. 9) covers 1-6, 8 and 9.

Number 7 -- Lubrication of the trip shaft and latch roller bearings with Mobil 28 lubricant -- deserves some specific comment. Maine Yankee has eight reactor trip breaker positions with, as of this writing, a total of eleven AK-2 breakers available for possible use as RTB's. Of these, nine are (a) new or (b) have had new front frame assemblies installed, or (c) have been refurbished using bearings containing Mobil 28 lubricant. One breaker is in the process of refurbishment at General Electric's Atlanta service center and one, which is ordinarily in service as the bus tie, has yet to be refurbished. The bus tie breaker is not required to open to allow the control rods to fall into the reactor core, even though it is equipped with the same tripping devices as the RTBs.

One pair of front frame assemblies now in service was ordered in late 1983 and received in 1984. These assemblies were manufactured prior to February 13, 1984 when General Electric began to include Mobil 28 in all bearings. Hence, these two have Mobil 28 in the shaft bearings and Lubriko in the latch roller bearings.

 It is our plan to have the latch roller bearings in these breakers replaced using Mobil 28 when we have completed refurbishing all of the other breakers. United States Nuclear Regulatory Commission Attention: Mr. James R. Miller, Chief Page Three MN-85-14

All test data provided by General Electric and industry experience shows that the Lubriko grease provides excellent service for five to eight years before hardening begins to slow breaker response time.

A person unfamiliar with the current state of knowledge regarding lubrication might construe your letter to mean that the bearings should be relubricated with Mobil 28 at six month intervals. The bearings are protected by dust caps and the lubricant (Mobil 28) should last the life of the breaker. Users are strongly advised by General Electric not to attempt either relubrication or to apply any other substance to the bearings in the field. For these reasons, we are not planning to relubricate these bearings.

## NRC Item 2.1

Criteria for evaluating compliance with Items 4.2.2, and

#### NRC Item 2.2

Issues relating to item 4.2.

### Maine Yankee Comments

Maine Yankee has installed the capability to independently time test breaker opening from both the undervoltage device and the shunt device on line. We have been doing this testing since late 1983. Beginning in December, 1983 and through the end of Cycle 7, we measured opening times via the shunt trip at the same interval we tested the undervoltage device. However, because of the excellent performance of the shunt trip device, we have altered this schedule and now test the shunt trip on a refueling interval basis as described in Reference (d). Our Procedure 3-6.2.2.20 is attached for your review. Trending of the undervoltage device performance has been carried out by our Instrumentation and Controls Section since late 1983. Criteria for acceptable performance of the undervoltage device and steps to be taken should one of the breakers fail to pass, are covered in the attached procedure.

Other data taken during preventive maintenance (trip shaft torque, pickup and dropout voltage and breaker resistance) are compared with acceptance criteria. If unacceptable, appropriate adjustments or repairs are made before the breaker is placed back in service, according to the procedure.

We currently plot and trend data for breaker opening time. Additionally, as described to the NRC staff at the joint meeting with the B & W Owner's Group ATWS Standing Committee and the CE Owner's Group RTB Subcommitee on October 10, 1984, we plan to collect and distribute data and trends on other parameters as part of the long term resolution of the problems associated with AK-2 breakers. United States Nuclear Regulatory Commission Attention: Mr. James R. Miller, Chief Page Four MN-85-14

Beginning in January, 1985, Maine Yankee, along with other participating owners of CE plants, will provide information to Combustion Engineering on time tests, trip shaft torque and pickup and Gropout voltage for the undervoltage device. These data will be compiled, trended, and distributed as part of CE's Availability Data Program. This activity will continue for a period of at least two years. It should be noted that occasional random failures are to be expected and should not necessarily be of particular concern. However, adverse trends or clusters of failures warrant prompt attention.

We do not consider insulation resistence measurements to be a useful predictor of poor performance of the breakers. As a passive element, unless subjected to adverse environmental conditions or prolonged excess loads, there is no reason to believe that the insulation should degrade over the life of the breaker. Therefore, we are not planning to trend such data.

We have found that a Visicorder trace of current through the undervoltage coil as it is actuated produces a characteristic signature which is indicative of incipient failure. Since this "blip" is either present or absent, it is not trendable in the usual sense. When observed, the coil is replaced.

We hope this summary and the references provided will aid you in the completion of your review of our November 10, 1983 submittal.

Very truly yours,

MAINE YANKEE ATOMIC POWER COMPANY

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G. D. Whittier Licensing Section Head

GDW/bjp

cc: Dr. Thomas E. Murley Mr. Cornelius F. Holden

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Proc. No.	3-6.2.2.20
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PCR No. 84-453

## 3-6.2.2.20 REACTOR TRIP BREAKER UNDERVOLTAGE TEST

## 1.0 DISCUSSION

The Reactor Trip Breakers automatically open by de-energizing the undervoltage relays or energizing the Shunt Trip Relays. Testing the Reactor Trip Breakers is normally done on a monthly basis using procedure 3-6.2.2.11. However, actual determination of which device, undervoltage or shunt, opens the Reactor Trip Breakers is not possible using procedure 3-6.2.2.11 and installed test circuitry.

#### 2.0 OBJECTIVE

Completion of this procedure will check the tripping of the Reactor Trip Breakers as follows:

Section A times Reactor Trip Breaker opening from point of only undervoltage device de-energization.

Section B times Reactor Trip Breaker opening from point of only shunt trip device energization.

Procedure 3-6.2.2.20 will address the requirements of IEB 83-04, dated March 11, 1983.

#### 3.0 PRECAUTIONS

3.1 Do not deviate from the sequential steps.

#### 4.0 REFERENCES

- 1. Reactor Protective System Technica' Manuals one and two.
- Notification of event or unusual occurrence, PNO-Y-83-11, dated March 3, 1983.
- Drawings: "DRAWINGS NOT INCLUDED"

E-4467-411-012 RPS Terminal Block Wiring Diagram, sheet 1 of 4 E-4467-411-012 RPS Terminal Block Wiring Diagram, sheet 2 of 4 E-4467-411-012 RPS Terminal Block Wiring Diagram, sheet 3 of 4 E-4467-411-012 RPS Terminal Block Wiring Diagram, sheet 4 of 4 E-4467-411-013 Reactor Protective System Schematic, sheet 4 of 4

- 4. I E Information Notice 83-76.
- 5. M.Y. to NRC letter MN 83-244 of December 1, 1983.

### PCR #84-453

M.Y. to NRC letter (GGW 84-110) of 5/23/84.
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### 5.0 PREREQUISITES

#### INITIALS

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- 5.1 At least one rod drive MG set is operating and tie breaker TCB-9 is closed. This requirement is for "at power" operation or other conditions where CEDM power is required.
- 5.2 PSS/SOS permission to commence testing of Reactor Trip Breakers per section \_\_\_\_\_\_ of this procedure.

PSS/SOS Signature

Date

5.3 This procedure is divided into two sections. Section A tests undervoltage relay operation and also times Reactor Trip Breaker opening from point of undervoltage relay de-energization to point of TCB opening. Section B times Reactor Trip Breaker opening from point of shunt trip device actuation. This is accomplished by timing the Reactor Trip breaker opening from the point at which the shunt trip coil receives voltage. Check off and proceed to the applicable section to be performed.

Section A Section B

5.4 Check each Reactor Trip Breaker's UVD armature to be in contact with the adjusting screw. Depress armature as required to make contact.

TCB 1\_\_\_\_\_ TCB 2\_\_\_\_ TCB 3\_\_\_\_ TCB 4\_\_\_\_

TCB 5 TCB 6 TCB 7 TCB 8

5.5 If any Reactor Trip Breakers are inoperable or removed for maintenance, review the breakers to be tested to ensure that the testing sequence will not result in an inadvertent plant trip.

#### PCR #84-97

5.6 Verify proper breakers are being tested per the schedule.

#### PCR #84--594

- 5.7 If maintenance has been performed on a breaker, Attachment B of Maint. Proc. 5-77-3 must be provided to the I&C Section.
- 6.0 PROCEDURE (Section A) Undervoltage Device Timing Check.
  - 6.1 Precautions have been reviewed and prerequisites met.
  - 6.2 Verify the undervoltage relay light is energized and shunt trip relay light de-energized for:

TCB-1	TCB-2	TCB-3	TCB-4
TCB-5	TCB-6	TCB-7	TCB-8

6.3 Utilizing an external 125VDC test power supply, program two operable Visicorder channels to clearly display 0 and 125VDC. Visicorder amplifier gain settings of 0.02 are recommended.

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#### INITIALS

6.4 Adjust Visicorder time intervals and speed as follows.

Time - .01 sec

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Speed - 30"/sec

6.5 Op-check the Visicorder by alternately energizing and de-energizing the external test power supply and fine tune the trace placement. Remove the external test power supply in preparation for "live" test.

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## INITIALS As Found As Left

TCB-1

- 6.6 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K1 contact. The slide link location for TCB-1 undervoltage relay is TB(A)3-16 located in RPS panel A. Refer to Figure 1 for test equipment arrangement.
- 6.7 Install second channel of Visicorder across the green trip breaker status lamp slide link, IT3 (+) and IT 4 (-) for TCB-1. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.8 Verify the external test switch is closed and then open slide link TB(A) 3-16 located in RPS panel A
- 6.9 Check visicorder connections and trace availability in preparation for timing test.
- 6.10 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-1.
- 6.11 Allow the Visicorder to run until TCB-1 indicates open on the breaker mimic panel and MCB. Verify TCB-1 open.
- 6.12 Reset the breaker and repeat timing test two additional times per steps 6.10 and 6.11, ensuring UVD armature is in contact with adjusting screw prior to each timing test.
- 6.13 Using the trace data, calculate the times required for TCB-1 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-1 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 100 milliseconds, complete the test, declare the breaker inoperable, and continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 milliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 milliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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		INIT	IALS
		As Found	As Left
6.14	Carefully remove all Visicorder test leads and external test switch.		<u>.</u>
6.15	Close slide link TB(A) 3-16 located in RPS panel A.		
6.16	Verify undervoltage relay light for TCB-1 is energized.		
6.17	Request operator depress TCB-1 reset button and verify TCB-1 closed.		
6.18	Verify all reactor trip breakers indicate closed on the mimic panel and MCB.		
6.19	Verify all reactor trip breaker undervoltage relay lights are energized.		

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#### INITIALS As Found As Left

TCB-5

- 6.20 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K1 contact. The slide link location for TCB-5 undervoltage relay is TB(A)3-12 located in RPS panel A. Refer to Figure 1 for test equipment arrangement.
- 6.21 Install second channel of Visicorder across the green trip breaker status lamp slide link, IT 15 (+) and IT 16 (-) for TCB-5. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.22 Verify the external test switch is closed and then open slide link TB(A) 3-12 located in RPS panel A
- 6.23 Check visicorder connections and trace availability in preparation for timing test.
- 6.24 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-5.
- 6.25 Allow the Visicorder to run until TCB-5 indicates open on the breaker mimic panel and MCB. Verify TCB-5 opens.
- 6.26 Reset the breaker and repeat timing test two additional times per steps 6.24 and 6.25, ensuring UVD armature is in contact with adjusting screw prior to each timing test.
- 6.27 Using the trace data, calculate the times required for TCB-5 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-5 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 100 milliseconds, complete the test, declare the breaker inoperable, a.d continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 milliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 milliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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# INITIALS As Found As Left

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6.28	Carefully remove all Visicorder test leads and external test switch.		
6.29	Close slide link TB(A) 3-12 located in RPS panel A.		<u>.</u>
6.30	Verify undervoltage relay light for TCB-5 is energized.		<u></u>
6.31	Request operator depress TCB-5 reset button and verify TCB-5 closed.		
6.32	Verify all reactor trip breakers indicate closed on the mimic panel and MCB.	<u> </u>	
6.33	Verify all reactor trip breaker undervoltage relay lights		

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are energized.

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### INITIALS As Found As Left

TCB-2

- 6.34 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K2 contact. The slide link location for TCB-2 undervoltage relay is TB(B)3-12 located in RPS panel B. Refer to Figure 1 for test equipment arrangement.
- 6.35 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 51 (+) and A 52 (-) for TCB-2. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.36 Verify the external test switch is closed and then open slide link TB(B) 3-12 located in RPS panel B
- 6.37 Check visicorder connections and trace availability in preparation for timing test.
- 6.38 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-2.
- 6.39 Allow the Visicorder to run until TCB-2 indicates open on the breaker mimic panel and MCB. Verify TCB-2 opens.
- 6.40 Reset the breaker and repeat timing test two additional times per steps 6.38 and 6.39, ensuring UVD armature is in contact with adjusting screw prior to each timing test.
- 6.41 Using the trace data, calculate the times required for TCB-2 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-2 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 100 milliseconds, complete the test, declare the breaker inoperable, and continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 miliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 miliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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		INIT	IALS
		As Found	As Left
6.42	Carefully remove all Visicorder test leads and external test switch.		
6.43	Close slide link TB(B) 3-12 located in RPS panel B.		
6.44	Verify undervoltage relay light for TCB-2 is energized.		
6.45	Request operator depress TCB-2 reset button and verify TCB-2 closed.		
6.46	Verify all reactor trip breakers indicate closed on the mimic panel and MCB.		
6.47	Verify all reactor trip breaker undervoltage relay lights are energized.		

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> INITIALS As Found As Left

TCB-6

- 6.48 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K2 contact. The slide link location for TCB-6 undervoltage relay is TB(B)3-16 located in RPS panel B. Refer to Figure 1 for test equipment arrangement.
- 6.49 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 63 (+) and A 64 (-) for TCB-6. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.50 Verify the external test switch is closed and then open slide link TB(B) 3-16 located in RPS panel B
- 6.51 Check visicorder connections and trace availability in preparation for timing test.
- 6.52 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-6.
- 6.53 Allow the Visicorder to run until TCB-6 indicates open on the breaker mimic panel and MCB. Verify TCB-6 opens.
- 6.54 Reset the breaker and repeat timing test two additional times per steps 6.52 and 6.53, ensuring UVD armature is in contact with adjusting screw prior to each timing test.
- 6.55 Using the trace data, calculate the times required for TCB-6 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-6 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 10C milliseconds, complete the test, declare the breaker inoperable, and continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 milliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 milliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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		INIT	IALS
		As Found	As Left
6.56	Carefully remove all Visicorder test leads and external test switch.		
6.57	Close slide link TB(B) 3-16 located in RPS panel B.		-
6.58	Verify undervoltage relay light for TCB-6 is energized.		
6.59	Request operator depress TCB-6 reset button and verify TCB-6 closed.		
6.60	Verify all reactor trip breakers indicate closed on the mimic panel and MCB.		
6.61	Verify all reactor trip breaker undervoltage relay lights are energized.		

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#### INITIALS As Found As Left

TCB-3

- 6.62 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K3 contact. The slide link location for TCB-3 undervoltage relay is TB(C)3-16 located in RPS panel C. Refer to Figure 1 for test equipment arrangement.
- 6.63 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 3 (+) and A 4 (-) for TCB-3. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.64 Verify the external test switch is closed and then open slide link TB(C) 3-16 located in RPS panel C
- 6.65 Check visicorder connections and trace availability in preparation for timing test.
- 6.66 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-3.
- 6.67 Allow the Visicorder to run until TCB-3 indicates open on the breaker mimic panel and MCB. Verify TCB-3 opens.
- 6.68 Reset the breaker and repeat timing test two additional times per steps 6.66 and 6.67, ensuring UVD armature is in contact with adjusting screw prior to each timing test.
- 6.69 Using the trace data, calculate the times required for TCB-3 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-3 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 100 milliseconds, complete the test, declare the breaker inoperable, and continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 milliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 milliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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6.70	Carefully remove all Visicorder test leads and external test switch.		
6.71	Close slide link TB(C) 3-16 located in RPS panel C.		
6.72	Verify undervoltage relay light for TCB-3 is energized.		
6.73	Request operator depress TCB-3 reset button and verify TCB-3 closed.		
6.74	Verify all reactor trip breakers indicate closed on the mimic panel and MCB.		
6.75	Verify all reactor trip breaker undervoltage relay lights are energized.		

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### INITIALS As Found As Left

TCB-7

- 6.76 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K3 contact. The slide link location for TCB-7 undervoltage relay is TB(C)3-12 located in RPS panel C. Refer to Figure 1 for test equipment arrangement.
- 6.77 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 15 (+) and P 16 (-) for TCB-7. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.78 Verify the external test switch is closed and then open slide link TB(C) 3-12 located in RPS panel C
- 6.79 Check visicorder connections and trace availability in preparation for timing test.
- 6.80 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-7.
- 6.81 Allow the Visicorder to run until TCB-7 indicates open on the breaker mimic panel and MCB. Verify TCB-7 opens.
- 6.82 Reset the breaker and repeat timing test two additional times per steps 6.80 and 6.81, ensuring UVD armature is in contact with adjusting screw prior to each timing test.
- 6.83 Using the trace data, calculate the times required for TCB-7 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-7 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 100 milliseconds, complete the test, declare the breaker inoperable, and continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 miliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 miliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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			INITIALS	
		As Found	As Left	
6.84	Carefully remove all Visicorder test leads and external test switch.			
6.85	Close slide link TB(C) 3-12 located in RPS panel C.			
6.86	Verify undervoltage relay light for TCB-7 is energized.			
6.87	Request operator depress TCB-7 reset button and verify TCB-7 closed.			
6.88	Verify all reactor trip breakers indicate closed on the mimic panel and MCB.			
6.89	Verify all reactor trip breaker undervoltage relay lights are energized.			

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> INITIALS As Found As Left

TCB-4

- 6.90 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K4 contact. The slide link location for TCB-4 undervoltage relay is TB(D)3-12 located in RPS panel D. Refer to Figure 1 for test equipment arrangement.
- 6.91 Install second channel of Visicorder across the green trip breaker status lamp slide link, IT 51 (+) and IT 52 (-) for TCB-4. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.92 Verify the external test switch is closed and then open slide link TB(D) 3-12 located in RPS panel D
- 6.93 Check visicorder connections and trace availability in preparation for timing test.
- 6.94 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-4.
- 6.95 Allow the Visicorder to run until TCB-4 indicates open on the breaker mimic panel and MCB. Verify TCB-4 opens.
- 6.96 Reset the breaker and repeat timing test two additional times per steps 6.94 and 6.95, ensuring UVD armature is in contact with adjusting screw prior to each timing test.
- 6.97 Using the trace data, calculate the times required for TCB-4 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-4 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 100 milliseconds, complete the test, declare the breaker inoperable, and continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 miliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 miliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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		INIT	IALS	
		MS Found	HS LETT	
6.98	Carefully remove all Visicorder test leads and external test switch.			
6.99	Close slide link TB(D) 3-12 located in RPS panel D.			
6.10	O Verify undervoltage relay light for TCB-4 is energized.			
6.10	Request operator depress TCB-4 reset button and verify TCB-4 closed.			
6.10	2 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.			
6.10	3 Verify all reactor trip breaker undervoltage relay lights are energized.			

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#### INITIALS As Found As Left

TCB-8

- 6.104 Install first channel of Visicorder and external test switch across closed slide link between undervoltage coil and K4 contact. The slide link location for TCB-8 undervoltage relay is TB(D)3-16 located in RPS panel D. Refer to Figure 1 for test equipment arrangement.
- 6.105 Install second channel of Visicorder across the green trip breaker status lamp slide link, IT 63 (+) and IT 64 (-) for TCB-8. These links are located in MCB Section C walkways. Refer to Figure 2 for test equipment arrangement.
- 6.106 Verify the external test switch is closed and then open slide link TB(D) 3-16 located in RPS panel D
- 6.107 Check visicorder connections and trace availability in preparation for timing test.
- 6.108 Start the Visicorder and open the external test switch de-energizing the undervoltage coil for TCB-8.
- 6.109 Allow the Visicorder to run until TCB-8 indicates open on the breaker mimic panel and MCB. Verify TCB-8 opens.
- 6.110 Reset the breaker and repeat timing test two additional times per steps 6.108 and 6.109, ensuring UVD armature is in cortact with adjusting screw prior to each timing test.
- 6.111 Using the trace data, calculate the times required for TCB-8 opening. This will be from the time the undervoltage coil is de-energized (opening test switch, trace #1) until TCB-8 indicates open (trace #2). Calculate and enter timing data in table 3.
  - <u>NOTE</u>: If the first of the three times is greater than 100 milliseconds, complete the test, declare the breaker inoperable, and continue with the next scheduled breaker tests.

If the first of the three times is less than 100 milliseconds, but the second and/or third greater than 100 miliseconds, repeat timing checks three additional times. If any of these next three times are greater than 100 miliseconds, declare the breaker inoperable and continue with next scheduled breaker tests.

Notify PSS and Shift Engineer of all timing results.

Refer to Acceptability Criteria section as necessary.

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		INIT	IALS
		As Found	As Left
6.11	2 Carefully remove all Visicorder test leads and external test switch.		
6.1	3 Close slide link TB(D) 3-16 located in RPS panel D.		
6.1	4 Verify undervoltage relay light for TCB-8 is energized.		
6.1	5 Request operator depress TCB-8 reset button and verify TCB-8 closed.		
6.1	6 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.		
6.1	7 Verify all reactor trip breaker undervoltage relay lights		

\*

are energized.

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#### 7.0 ACCEPTABILITY CRITERIA

- 7.1 100 miliseconds or less from point of UVD de-energization to TCB opening.
- 7.2 If the 100 miliseconds criteria is not met in the first of the three timing traces proceed as follows:
  - Complete the other two timing traces and declare the breaker inoperable.
- 7.3 If the first timing trace is in spec. but the second or third is out of spec., repeat three more timing traces on breaker. If all are in spec., proceed. If any of the three are out of spec., declare breaker inoperable.
- 7.4 When a breaker or breakers are declared INOPERABLE:
  - a. Notify the PSS

PSS \_\_\_\_\_ Date\_

Breakers inoperable

b. Notify the Shift Engineer and request notification of Senior Resident NRC Inspector.

S.E.\_\_\_\_Date\_\_\_\_

- c. Complete testing of all other scheduled breakers including shunt trip section.
- Request PSS trip and tag tripped inoperable breakers. Ensure any tripped breakers do not result in Reactor Trip.
- e. Notify PSS to schedule breaker refurbishment or change-out.
- 7.5 Request DRs be forwarded to Electrical Maintenance Department for any breakers that don't meet acceptability criteria.
- 7.6 Repeat applicable sections of this procedure following corrective action to verify acceptability criteria is met.

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	Accentability anitania is not	
	Acceptability criteria is met.	-
	All Reactor Trip Breakers are closed.	_
	Reactor Trip Breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.	_
•	Test Equipment	
	Visicorder Cal. due	
5	Re-check all UVD armatures in contact with adjusting screws.	
	TCB 1 TCB 2 TCB 3 TCB 4	
	TCB 5 TCB 6 TCB 7 TCB 8	
•	PSS/SOS informed that testing is completed and breakers	
	follows:	
	follows:	
	PSS/SOS Signature Date	
	PSS/SOS Signature Date Route a copy of Table 3 Timing Data to site Electrical Engineering Department and Maine Yankee Licensing Department.	
	PSS/SOS Signature Date Route a copy of Table 3 Timing Data to site Electrical Engineering Department and Maine Yankee Licensing Department. Comments:	
,	PSS/SOS Signature Date Route a copy of Table 3 Timing Data to site Electrical Engineering Department and Maine Yankee Licensing Department. Comments:	
,	PSS/SOS Signature Date Route a copy of Table 3 Timing Data to site Electrical Engineering Department and Maine Yankee Licensing Department. Comments:	
7	PSS/SOS Signature Date Route a copy of Table 3 Timing Data to site Electrical Engineering Department and Maine Yankee Licensing Department. Comments:	
7	PSS/SOS Signature Date Route a copy of Table 3 Timing Data to site Electrical Engineering Department and Maine Yankee Licensing Department. Comments:	failure.

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## FIGURE 1

			TABLE	1 (UVC/	К –	к	Slide	e Link)
					1	4		
	UVC		TCB-1	TB(A)	3-16	RPS	Pnl.	"A"
UVC	Status		TCB-2	TB(B)	3-12	RPS	Pnl.	"B"
	Lamp	External Test	TCB-3	TB(C)	3-16	RPS	Pnl.	"C"
		Switch	TCB-4	TB(D)	3-12	RPS	Pnl.	"D"
Slide			TCB-5	TB(A)	3-12	RPS	Pnl.	"A"
Link		To Visicorder	TCB-6	TB(B)	3-16	RPS	Pnl.	"B"
See Table			TCB-7	TB(C)	3-12	RPS	Pnl.	"C"
			TCB-8	TB(D)	3-16	RPS	Pn1.	"D"
$K_1 - K_4$								

FIGURE 2

Slide Link (See Table 2)

TABLE 2 (Trip Bkr. Status Lamp)

......

		ICB-1	IIS(+), 4(-) MCB-C-Walkway
		TCB-2	A51(+), 52(-) MCB-C-Walkway
To Aux.		TCB-3	A3(+), A4(-) MCB-C-Walkway
Contacts on	To Visicorder	TCB-4	IT51(+), IT52(-) MCB-C-Walkway
Trip		TCB-5	IT15(+), IT16(-) MCB-C-Walkway
Breaker		TCB-6	A63(+), A64(-) MCB-C-Walkway
		TCB-7	A15(+), A16(-) MCB-C-Walkway
		TCB-8	IT63(+), IT64(-) MCB-C-Walkway

Slide Link (See Table 2)

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Tech

\*

Date

# TABLE 3

Undervoltage Device Timing Data

Functional Location (Breaker Cubicle)	Installed Breaker	"As Found" Time	Second "As Found" (As Applicable)	"As Left" Times
TCB-1	TC9			
TCB-2	TCB			
ТСВ-3	тсв			
TCB-4	ТСВ			
TCB-5	ТСВ			· · · · · · · · · · · · · · · · · · ·
TCB-6	TCB			
TCB-7	ТСВ			
TCB8	TCB			

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> INITIALS As Found As Left

- 9.0 PROCEDURE (Section B) Shunt Trip Device Timing Check.
  - 9.1 Precautions have been reviewed and prerequisites met.
  - 9.2 Verify the undervoltage relay light is energized and shunt trip relay light de-energized for:

TCB-1	TCB-2	TCB-3	TCB-4
TCB-5	TCB-6	TCB~7	TCB-8

9.3 Utilizing an external 125VDC test power supply, program two operable Visicorder channels to clearly display 0 and 125VDC. Visicorder amplifier gain settings of 0.02 are recommended.

9.4 Adjust Visicorder time intervals and speed as follows.

Time - .01 sec

Speed - 30"/sec

9.5 Op-check the Visicorder by alternately energizing and de-energizing the external test power supply and fine tune the trace placement. Remove the external test power supply in preparation for "live" test.

		P Ri Pi Pi	roc. No. <u>3-6</u> ev. No. <u>1</u> age 25 of 36 CR No. 84-22	7	
		TCD 1		INITIALS	3
	9.6	<u>Double check</u> external test switch is <u>open</u> and instal channel of Visicorder and external test switch on K1 links for shunt trip coil. The slide links for TCB- trip K1 contacts, are TB(A) 3-14(-) and 3-15(+) in Ri A. Refer to Figure 3 for test equipment arrangement	As F l first slide 1, shunt PS Panel	ound <u>As</u>	<u>Left</u>
	9.7	Install second channel of Visicorder across the green breaker status lamp slide link, IT 3 (+) and IT 4 (- TCB-1. These links are located in MCB Section C wall Refer to Figure 4 for test equipment arrangement.	n trip ) for kways		
	9.8	Check visicorder connections and trace availability preparation for timing test.	in		
q	49A-23	27			
UN	9.9	Start the Visicorder and close the external test swi energizing the shunt trip coil for TCB-1.	tch		
	9.10	Allow the Visicorder to run until TCB-1 indicates op the breaker mimic panel and MCB. Verify TCB-1 opens	en on ·		
	9.11	Verify shunt trip relay light for TCB-1 energized.			
	9.12	Using the trace data, calculate the time required for TCB-1 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace # until TCB-1 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.	r 1) d		
	9.13	If timing is greater than 100 miliseconds, repeat times the traces two more times and enter data in Table 4.	ming		
		NOTE: If timing is greater than 100 miliseconds:			
		<ul> <li>a. Declare the breaker inoperable and comple the testing of scheduled breakers.</li> <li>b. Notify PSS and Shift Engineer of all timi</li> </ul>	te	_	
		<ul> <li>c. Refer to acceptability criteria section a necessary.</li> </ul>	ng results. S	_	
	9.14	Open external test switch. Carefully remove visicor leads and test switch from circuit.	der		
	9.15	Request operator depress TCB-1 reset button and veri TCB-1 closed.	fy		
	9.16	Verify all reactor trip breakers indicate closed on mimic panel and MCB.	the		
	9.17	Verify all reactor trip breaker undervoltage relay 1 are energized and shunt trip relay lights de-energized	ights ed.		
564	4L-FWS				

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As Found As Left

TCB-5

- 9.18 <u>Double check</u> external test switch is <u>open</u> and install first channel of Visicorder and external test switch on K1 slide links for shunt trip coil. The slide links for TCB-5, shunt trip K1 contacts, are TB(A) 3-10(-) and 3-11(+) in RPS Panel A. Refer to Figure 3 for test equipment arrangement.
- 9.19 Install second channel of Visicorder across the green trip breaker status lamp slide link, IT 15 (+) and IT 16 (-) for TCB-5. These links are located in MCB Section C walkways. Refer to Figure 4 for test equipment arrangement.
- 9.20 Check visicorder connections and trace availability in preparation for timing test.
- 9.21 Start the Visicorder and close the external test switch energizing the shunt trip coil for TCB-5.
- 9.22 Allow the Visicorder to run until TCB-5 indicates open on the breaker mimic panel and MCB. Verify TCB-5 opens.
- 9.23 Verify shunt trip relay light for TCB-5 energized.
- 9.24 Using the trace data, calculate the time required for TCB-5 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace #1) until TCB-5 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.
- 9.25 If timing is greater than 100 miliseconds, repeat timing traces two more times and enter data in Table 4.

NOTE: If timing is greater than 100 miliseconds:

- Declare the breaker inoperable and complete the testing of scheduled breakers.
- b. Notify PSS and Shift Engineer of all timing results.
- Refer to acceptability criteria section as necessary.
- 9.26 Open external test switch. Carefully remove visicorder leads and test switch from circuit.
- 9.27 Request operator depress TCB-5 reset button and verify TCB-5 closed.
- 9.28 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.
- 9.29 Verify all reactor trip breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.

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TCB-2

- 9.30 <u>Double check external test switch is open</u> and install first channel of Visicorder and external test switch on K2 slide links for shunt trip coil. The slide links for TCB-2, shunt trip K2 contacts, are TB(B) 3-10(-) and 3-11(+) in RPS Panel B. Refer to Figure 3 for test equipment arrangement.
- 9.31 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 51 (+) and A 52 (-) for TCB-2. These links are located in MCB Section C walkways. Refer to Figure 4 for test equipment arrangement.
- 9.32 Check visicorder connections and trace availability in preparation for timing test.
- 9.33 Start the Visicorder and close the external test switch energizing the shunt trip coil for TCB-2.
- 9.34 Allow the Visicorder to run until TCB-2 indicates open on the breaker mimic panel and MCB. Verify TCB-2 opens.
- 9.35 Verify shunt trip relay light for TCB-2 energized.
- 9.36 Using the trace data, calculate the time required for TCB-2 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace #1) until TCB-2 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.
- 9.37 If timing is greater than 100 miliseconds, repeat timing traces two more times and enter data in Table 4.

NOTE: If timing is greater than 100 miliseconds:

- Declare the breaker inoperable and complete the testing of scheduled breakers.
- b. Notify PSS and Shift Engineer of all timing results.
- Refer to acceptability criteria section as necessary.
- 9.38 Open external test switch. Carefully remove visicorder leads and test switch from circuit.
- 9.39 Request operator depress TCB-2 reset button and verify TCB-2 closed.
- 9.40 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.
- 9.41 Verify all reactor trip breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.

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TCB-6

- 9.42 <u>Double check external test switch is open</u> and install first channel of Visicorder and external test switch on K2 slide links for shunt trip coil. The slide links for TCB-6, shunt trip K2 contacts, are TB(B) 3-14(-) and 3-15(+) in RPS Panel B. Refer to Figure 3 for test equipment arrangement.
- 9.43 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 63 (+) and A 64 (-) for TCB-6. These links are located in MCB Section C walkways. Refer to Figure 4 for test equipment arrangement.
- 9.44 Check visicorder connections and trace availability in preparation for timing test.
- 9.45 Start the Visicorder and close the external test switch energizing the shunt trip coil for TCB-6.
- 9.46 Allow the Visicorder to run until TCB-6 indicates open on the breaker mimic panel and MCB. Verify TCB-6 opens.
- 9.47 Verify shunt trip relay light for TCB-6 energized.
- 9.48 Using the trace data, calculate the time required for TCB-6 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace #1) until TCB-6 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.
- 9.49 If timing is greater than 100 miliseconds, repeat timing traces two more times and enter data in Table 4.

NOTE: If timing is greater than 100 miliseconds:

- Declare the breaker inoperable and complete the testing of scheduled breakers.
- b. Notify PSS and Shift Engineer of all timing results.
- Refer to acceptability criteria section as necessary.
- 9.50 Open external test switch. Carefully remove visicorder leads and test switch from circuit.
- 9.51 Request operator depress TCB-6 reset button and verify TCB-6 closed.
- 9.52 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.
- 9.53 Verify all reactor trip breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.

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TCB-3

- 9.54 <u>Double check external test switch is open and install first channel of Visicorder and external test switch on K3 slide links for shunt trip coil. The slide links for TCB-3, shunt trip K3 contacts, are TB(C) 3-14(-) and 3-15(+) in RPS Panel C. Refer to Figure 3 for test equipment arrangement.</u>
- 9.55 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 3 (+) and A 4 (-) for TCB-3. These links are located in MCB Section C walkways. Refer to Figure 4 for test equipment arrangement.
- 9.56 Check visicorder connections and trace availability in preparation for timing test.
- 9.57 Start the Visicorder and close the external test switch energizing the shunt trip coil for TCB-3.
- 9.58 Allow the Visicorder to run until TCB-3 indicates open on the breaker mimic panel and MCB. Verify TCB-3 opens.
- 9.59 Verify shunt trip relay light for TCB-3 energized.
- 9.60 Using the trace data, calculate the time required for TCB-3 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace #1) until TCB-3 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.
- 9.61 If timing is greater than 100 miliseconds, repeat timing traces two more times and enter data in Table 4.

NOTE: If timing is greater than 100 miliseconds:

- a. Declare the breaker inoperable and complete the testing of scheduled breakers.
- b. Notify PSS and Shift Engineer of all timing results.
- Refer to acceptability criteria section as necessary.
- 9.62 Open external test switch. Carefully remove visicorder leads and test switch from circuit.
- 9.63 Request operator depress TCB-3 reset button and verify TCB-3 closed.
- 9.64 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.
- 9.65 Verify all reactor trip breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.

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TCB-7

- 9.66 <u>Double check external test switch is open and install first channel of Visicorder and external test switch on K3 slide links for shunt trip coil. The slide links for TCB-7, shunt trip K3 contacts, are TB(C) 3-10(-) and 3-11(+) in RPS Panel C. Refer to Figure 3 for test equipment arrangement.</u>
- 9.67 Install second channel of Visicorder across the green trip breaker status lamp slide link, A 15 (+) and A 16 (-) for TCB-7. These links are located in MCB Section C walkways. Refer to Figure 4 for test equipment arrangement.
- 9.68 Check visicorder connections and trace availability in preparation for timing test.
- 9.69 Start the Visicorder and close the external test switch energizing the shunt trip coil for TCB-7.
- 9.70 Allow the Visicorder to run until TCB-7 indicates open on the breaker mimic panel and MCB. Verify TCB-7 opens.
- 9.71 Verify shunt trip relay light for TCB-7 energized.
- 9.72 Using the trace data, calculate the time required for TCB-7 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace #1) until TCB-7 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.
- 9.73 If timing is greater than 100 miliseconds, repeat timing traces two more times and enter data in Table 4.

NOTE: If timing is greater than 100 miliseconds:

- a. Declare the breaker inoperable and complete the testing of scheduled breakers.
- b. Notify PSS and Shift Engineer of all timing results.
- Refer to acceptability criteria section as necessary.
- 9.74 Open external test switch. Carefully remove visicorder leads and test switch from circuit.
- 9.75 Request operator depress TCB-7 reset button and verify TCB-7 closed.
- 9.76 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.
- 9.77 Verify all reactor trip breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.

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TCB-4

- 9.78 <u>Double check</u> external test switch is <u>open</u> and install first channel of Visicorder and external test switch on K4 slide links for shunt trip coil. The slide links for TCB-4, shunt trip K4 contacts, are TB(D) 3-10(-) and 3-11(+) in RPS Panel D. Refer to Figure 3 for test equipment arrangement.
- 9.79 Install second channel of Visicorder across the green trip breaker status lamp slide link, IT 51 (+) and IT 52 (-) for TCB-4. These links are located in MCB Section C walkways. Refer to Figure 4 for test equipment arrangement.
- 9.80 Check visicorder connections and trace availability in preparation for timing test.
- 9.81 Start the Visicorder and close the external test switch energizing the shunt trip coil for TCB-4.
- 9.82 Allow the Visicorder to run until TCB-4 indicates open on the breaker mimic panel and MCB. Verify TCB-4 opens.
- 9.83 Verify shunt trip relay light for TCB-4 energized.
- 9.84 Using the trace data, calculate the time required for TCB-4 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace #1) until TCB-4 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.
- 9.85 If timing is greater than 100 miliseconds, repeat timing traces two more times and enter data in Table 4.

NOTE: If timing is greater than 100 miliseconds:

- Declare the breaker inoperable and complete the testing of scheduled breakers.
- b. Notify PSS and Shift Engineer of all timing results.
- Refer to acceptability criteria section as necessary.
- 9.86 Open external test switch. Carefully remove visicorder leads and test switch from circuit.
- 9.87 F\_quest operator depress TCB-4 reset button and verify TCB-4 closed.
- 9.88 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.
- 9.89 Verify all reactor trip breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.

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TCB-8

- 9.90 <u>Double check external test switch is open and install first channel of Visicorder and external test switch on K4 slide links for shunt trip coil. The slide links for TCB-8, shunt trip K4 contacts, are TB(D) 3-14(-) and 3-15(+) in RPS Panel D. Refer to Figure 3 for test equipment arrangement.</u>
- 9.91 Install second channel of Visicorder across the green trip breaker status lamp slide link, IT 63 (+) and IT 64 (-) for TCB-8. These links are located in MCB Section C walkways. Refer to Figure 4 for test equipment arrangement.
- 9.92 Check visicorder connections and trace availability in preparation for timing test.
- 9.93 Start the Visicorder and close the external test switch energizing the shunt trip coil for TCB-8.
- 9.94 Allow the Visicorder to run until TCB-8 indicates open on the breaker mimic panel and MCB. Verify TCB-8 opens.
- 9.95 Verify shunt trip relay light for TCB-B energized.
- 9.96 Using the trace data, calculate the time required for TCB-8 opening. This will be from the time the shunt trip coil is energized (closing test switch, trace #1) until TCB-8 indicates open (trace #2). Calculate and enter timing data in Table 4. Notify PSS and Shift Engineer of results.
- 9.97 If timing is greater than 100 miliseconds, repeat timing traces two more times and enter data in Table 4.

NOTE: If timing is greater than 100 miliseconds:

- Declare the breaker inoperable and complete the testing of scheduled breakers.
- b. Notify PSS and Shift Engineer of all timing results.
- Refer to acceptability criteria section as necessary.
- 9.98 Open external test switch. Carefully remove visicorder leads and test switch from circuit.
- 9.99 Request operator depress TCB-8 reset button and verify TCB-8 closed.
- 9.100 Verify all reactor trip breakers indicate closed on the mimic panel and MCB.
- 9.101 Verify all reactor trip breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.

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### **10.0 ACCEPTABILITY CRITERIA**

- 10.1 100 miliseconds or less from point of shunt trip relay energization to TCB opening.
- 10.2 If the 100 miliseconds criteria is not met on the first timing trace proceed as follows:
  - a. Declare the breaker inoperable and complete two additional timing tests.
- When a breaker or breakers are declared INOPERABLE: 10.3
  - a. Notify the PSS

PSS Date

Breakers inoperable

Notify the Shift Engineer and request notification of b. Senior Resident NRC Inspector.

S.E. Date

c. Complete the timing of all other shceduled breakers.

- Request PSS trip and tag tripped inoperable breakers. d. Ensure any tripped breakers do not usult in Reactor Trip.
- e. Notify PSS to schedule breaker refurbishment or change-out.
- 10.4 Request DRs be forwarded to Electrical Maintenance Department for any breakers that don't meet acceptability criteria.
- Repeat applicable sections of this procedure following 10.5 corrective action to verify acceptability criteria is met. Three "as left" timing tests are required for refurbished shunt trip relays.

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INITIALS

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Acceptability criteria is met.
All Reactor Trip Breakers are closed.
Reactor Trip Breaker undervoltage relay lights are energized and shunt trip relay lights de-energized.
Re-check all UVD armatures in contact with adjusting screws.
TCB 1 TCB 2 TCB 3 TCB 4
TCB 5 TCB 6 TCB 7 TCB 8
Test Equipment
Visicorder Cal. due
Visicorder Cal. due PSS/SOS informed that testing is completed and breakers restored to service with any exceptions noted as follows:
Visicorder Cal. due PSS/SOS informed that testing is completed and breakers restored to service with any exceptions noted as follows:
Visicorder Cal. due PSS/SOS informed that testing is completed and breakers restored to service with any exceptions noted as follows:  PSS/SOS Signature Date
VisicorderCal. due PSS/SOS informed that testing is completed and breakers restored to service with any exceptions noted as follows: 

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## FIGURE 3

		Shunt Trip Coil/K		– K Sli		de Link)		
			(-)	1	4	+)		
Shunt Trip	Shunt Trip Coil	TCB-1	TB(A)	3-14	& 3-15	RPS	Pnl.	"A"
Coil	Status Lamp	TCB-2	TB(B)	3-10	& 3-11	RPS	Pnl.	"8"
		TCB-3	TB(C)	3-14	& 3-15	RPS	Pnl.	"C"
Slide Link		TCB-4	TB(D)	3-10	& 3-11	RPS	Pnl.	"D"
(See Table right)		TCB-5	TB(A)	3-10	& 3-11	RPS	Pnl.	"A"
		TCB-6	TB(B)	3-14	& 3-15	RPS	Pnl.	"B"
K1 - KA Contact		TCB-7	TB(C)	3-10	& 3-11	RPS	Pnl.	"C"
		TCB-8	TB(D)	3-14	& 3-15	RPS	Pnl.	"D"
Slide Link								1.0

# FIGURE 4

Slide Link (See Table right)

(See Table right)

To Aux. Contacts on Trip Breaker Trip Breaker Status Lamp Link

it)	TCB-1	IT3(+), 4(-) MCB-C-Walkway
	TCB-2	A51(+), 52(-) MCB-C-Walkway
To Visicord	er TCB-3	A3(+), A4(-) MCB-C-Walkway
	TCB-4	IT51(+), IT52(-) MCB-C-Walkway
	TCB-5	IT15(+), IT16(-) MCB-C-Walkway
	TCB-6	A63(+), A64(-) MCB-C-Walkway
	TCB-7	A15(+), A16(-) MCB-C-Walkway
	TCB-8	IT63(+), IT64(-) MCB-C-Walkway
and the second se		

Slide Link (See Table right)

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Tech

Date

# TABLE 4

Shunt Trip Device Timing Data

Functional Location (Breaker Cubicle)	Installed Breaker	"As Found" Time	Second "As Found" (As Applicable)	"As Left" Times
TCB-1	тсв			
TCB-2	ТСВ			
TCB-3	тсв			
TCB-4	ТСВ	· · · · ·		
TCB-5	ТСВ			
TCB-6	ТСВ	19. <u></u>		
TCB-7	тсв			
TCB-8	тсв			