

Thomas M. Novak
Frank J. Miraglia

NOV 16 1983

use a shunt coil to trip the breaker, a relay to detect loss of voltage and connect to the same power source as the control rod drive system. No generic action is recommended until the results and recommendations of these four actions are available.

The breaker vendor representative (M. Fornwalt) at the October 12th meeting stated he is in agreement with the corrective actions taken by SCE. He would reduce the preventative maintenance interval from three months to two months for only the two UVTAs involved in the October 2nd and 3rd events instead of for all the UVTAs. Thus he believes SCE corrective actions are conservative.

James P. Knight, Assistant Director
Components & Structures Engineering
Division of Engineering

- cc: V. Stello, ROGR
Regional Adms.
- J. Taylor, I&E
- E. Jordan, I&E
- R. Baer, I&E
- E. Rossi, I&E
- R. DeYoung, I&E
- M. Villalva, I&E
- J. Heltemes, AEOD
- H. Denton, NRR
- E. Case, NRR
- R. Mattson, NRR
- H. Thompson, NRR
- T. Speis, NRR
- D. Eisenhut, NRR
- R. Vollmer, NRR
- G. Lainas, NRR
- G. Holahan, NRR
- R. Purple, NRR
- R. Wessman, NRR
- V. Noonan, NRR
- J. Beard, NRR
- J. P. Knight, NRR
- R. Wright, NRR
- F. Rosa, NRR
- G. Bagchi, NRR
- G. Toman, FRC
- T. Bishop, Region V

YA

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*SEE NEXT PAGE FOR PREVIOUS CONCURRENCES

OFFICE	*DE/EOB	*DE/EOB	DE/EOB	DE/CSE		
	<i>[Signature]</i>	GBagchi	VNoonan	JPKnight		
DATE	11/15/83	11/17/83	11/15/83	11/17/83		

TRIP/MEETING REPORT

Project No.: 5506-001, Assignment 14, Task 414

Date of Trip: October 12, 1983

Purpose of Trip: Meeting with Southern California Edison (SCE) to discuss San Onofre Unit 2 reactor trip circuit breaker malfunctions that occurred during testing on October 2, 1983.

Location of Meeting: San Onofre Nuclear Generating Station, Building M-41, Classroom 6

Attendees: NRC: H. Rood (Licensing)
R. Wright (EQB)
A. F. Chaffee (Region V, Resident Inspector)

PRC: G. J. Toman

Combustion Engineering (CE):

P. Yanosy
E. Kennedy
J. Hjesseh
A. Lavery

General Electric (GE):

M. Fornwalt

SCE: F. Nandy

R. M. Rosenblum
S. Stilwagon
M. Gutell
J. Redmon
G. Franklin
A. Guglietti

F. Ellic

D. Borchart
R. McPherson
C. Hand
L. Mayweather
J. J. Wambold

Background

In early March 1983, San Onofre tested the undervoltage attachments (UTA) of the GE AK-2-25 reactor trip circuit breakers for Units 2 and 3 in response to ATWS events at Salem Unit 1. Four of 16 circuit breakers were found to misoperate when tripped by the UTA. To remedy the problems, SCE instituted a program of quarterly preventive maintenance and monthly surveillance testing. During surveillance testing (timing of the opening of the circuit breaker) on October 2, 1983, prior to the performance of second quarterly preventive maintenance, two circuit breakers on Unit 2 misoperated, one failing to trip and the other opening slowly.

Discussion

Mr. Nandy opened the meeting by stating that the San Onofre Units 2 and 3 reactor trip circuit breakers are tripped by both the shunt and undervoltage

attachments and that at no time did any misoperation of the shunt attachments occur. Following Mr. Nandy's introduction, Mr. Stilwagon discussed the data taken during the surveillance testing and subsequent preventive maintenance and testing of the problem circuit breakers. Mr. Rosenblum then discussed the implications and evaluation of the results of the tests. Attachment 1 lists the handouts provided by SCE to FRC and NRC during the meeting.

Description of Failures

During the circuit breaker timing tests of October 2, 1983, reactor trip circuit breaker serial No. 256A4002-656-18 from compartment 4 (hereafter referred to as TCB-4 S/N-18) opened slowly with times of 91 msec, 104 msec, and 69 msec as recorded at the auxiliary switch. The acceptable times are 82 msec, a guideline that was determined by SCE during baseline tests, and 100 msec, the CE guideline. Since one of the tests exceeded the CE guideline, the circuit breaker was removed from service.

A second circuit breaker, SN 256A4002-656-8 from compartment 6 (hereafter referred to as TCB-6 S/N-8), failed to open on the first timing test. This failure was attributed to pulling of the wrong fuse by personnel performing the test. The test was repeated by pulling the correct fuse and proper operation occurred. However, the failure to trip was evaluated further and found to be a valid misoperation. The fuse pulled on the first attempt was in series with the UTA coil. A retest was performed and TCB-6 S/N-8 failed to trip a second time. The circuit breaker was removed from service.

The UTA on a third circuit breaker from compartment 7 would not reset, preventing closure of the circuit breaker. However, this would be expected on some circuit breakers when the UTA coil is hot. This is not considered to be a surveillance test failure.

Preventive Maintenance Results

Some data-taking problems occurred during the initial preventive maintenance tests. Initially, the coil resistance of TCB-6 S/N-8 was thought to be 2500 ohms, which is much too high; however, subsequent verification proved the resistance to be in the normal range. The trip torque measurements for the "as found" condition were found to be invalid because the force gauge batteries had not been charged prior to use. Spring scale tests had been performed on TCB-4 S/N-8; however, none were performed on TCB-4 S/N-18 and no "as found" trip torque data are available for it. (Note: Battery problem was recognized after revitalization of the trip shaft bearings had been performed.)

For TCB-4 S/N-18, the slow circuit breaker, the "as found" result of significance was a cold pickup of 99 Vdc (required range 106 \pm 2 Vdc). The trip torque in the "as found" condition is unknown because of the force gauge battery problem.

For TCB-6 S/N-8, the circuit breaker that failed to open, the "as found" result of significance was a trip torque of 1.5 lb-in, which is just at the maximum acceptable value. The cold pickup on the initial test was one volt below the required range; however, it was within the required range during subsequent tests. No failure to trip occurred during bench testing; however, it should be noted that during the preventive maintenance, the surge suppression diode was not in parallel with the UTA, allowing greater trip force to be available from the device. Following the preventive maintenance, further tests were performed with the diode in place; however, the trip shaft bearings had been revitalized by that time and the breaker had been exercised many times, which probably would have removed a tendency to misoperate.

The cold pickup of the circuit breaker that could not be readily reset was found to be 100 Vdc, which is below the required range.

Evaluation of Results by SCE

SCE evaluated the timing test data for problems with the circuit breakers and found no trend indicating an impending failure for either circuit breaker. For TCB-4 S/N-18, which opened slowly, the trend for the trip times of the preceding interval was downward. A much slighter downward trend was noted for the previous period for TCB-6 S/N-8 which failed to open. While some drift had occurred in cold pickup and trip torque, no definitive reasons for failures of the circuit breakers were found.

SCE Precautionary Actions

To prevent recurrence, SCE is taking the following actions:

1. TCB-6 S/N-8 will be permanently removed from service. SCE believes that its failures may be unique. It is one of the CBs that misoperated in March 1983. It will be kept in the reactor trip circuit breaker room and periodically tested as if it were in service in an attempt to gain further failure data.
2. The preventive maintenance interval for all reactor trip circuit breakers will be reduced from 3 months to 2 months.
3. The surveillance test for timing of the circuit breaker will remain at a 1-month interval. SCE has chosen not to increase the surveillance interval to 2 months as had been originally planned.

Possible Long-Term SCE Actions

SCE is considering the following for possible action. No commitment has been made to any of these actions:

1. Elimination or modification of the surge suppression diode so that more energy is available from the UTA when de-energized (Note: Rough data taken by SCE indicate the circuit breakers open more than twice as fast with the suppression diode out of the circuit when tripped by the UTA).

2. Change to a different UTA.
3. Change to a different reactor trip circuit breaker.
4. Determine methods to upgrade the reliability of the UTA.

Comments on SCE Program by GE

Mr. Fornwalt of GE stated that the preventive measures being taken by SCE were conservative. However, he believed that the 2-month interval for preventive maintenance should be applied to the circuit breakers that exhibited improper operation rather than the entire population. In this way, it could be determined if the entire population would eventually exhibit similar failures if maintained at 3-month intervals or if there are only a few real problem circuit breakers.

FRC Comments and Concerns Subsequent to the Meeting

1. The trended data for the reactor trip circuit breaker opening times only indicate when surveillance tests and preventive maintenance have occurred. FRC recommends that the time and number of circuit breaker openings for all reasons be recorded on the trend graphs. Exercising the circuit breakers appears to be significant in that subsequent opening times are generally shorter. Recording of the times of tripping of the circuit breakers for all reasons may show why the trends do not occur as expected.
2. A prime question resulting from a second episode of failures at SCE is: "Why have no other plants with GE AC-2-25 circuit breakers had similar problems?" Are no other plants reporting failures because there is something unique about the San Onofre application or is it that other licensees have not tested to the same criteria? Evaluation of test data and test methodology from other licensees may give an indication that the problem is specific to San Onofre or more generic in nature.
3. The test data taken on two of the circuit breakers (TCB-4 S/N-18 and TCB-7 S/N-45) indicated that the "as found" cold pickup voltages were low (99 Vdc and 100 Vdc, respectively) and not within the desired range of 104 to 106 Vdc. While these decreases in pickup voltage from the "as left" value of at least 104 Vdc may not be enough to cause circuit breaker misoperation, it is disturbing that the pickup voltages do drift in a nonconservative direction in a period of 3 months. The adjustment for setting the pickup voltage is relatively crude and may not prevent such drifting. The UTA should be evaluated to determine if a positive means of maintaining the cold pickup setting is possible. Since the misoperation of the circuit breaker is attributable to multiple contributors (e.g., dropping pickup voltage and increasing trip shaft bearing friction), it would seem reasonable to attempt to eliminate any contributors that are controllable.
4. The problem of being unable to reset some circuit breakers while the UTA is hot is not a direct safety concern; however, it is possible

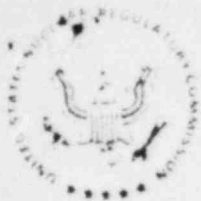
for a partial reset of the UTA to occur and the circuit breaker to be reclosable. In this case, the armature of the UTA partially travels to the energized position but does not completely extend the UTA spring. Because of partial armature travel, the circuit breaker latch mechanism may be able to engage, allowing closure of the circuit breaker. Two conditions could occur. In the first, a slight variation in ω voltage or a slight vibration would cause inadvertent circuit breaker operation. In the second case, the latch could be relatively firmly in place. De-energization of the UTA might not result in a tripping of the circuit breaker since the spring has been only partially extended and does not contain as much stored energy. FRC recommends that licensees verify that the armature of all UTAs have completed full travel after energization to prevent such problems when no period for cooldown of the UTA has occurred between de-energization and energization.

Prepared by G. J. Toman
10-13-83

ATTACHMENT

Handouts Provided to FRC and NRC During Meeting at San Onofre, October 2, 1983
Concerning Reactor Trip Circuit Breaker Failure Occuring on October 7, 1983

1. Maintenance data record form from Procedure SO23-I-4.66, Rev. 2, for 10-4-83 tests of Breaker 2-TCB-6, S/N 256A4002-656-8.
2. Maintenance data record form from Procedure SO23-I-4.66, Rev. 2, for 10-9-83 tests of Breaker S/N 256A4002-656-18.
3. Procedure SO23-II-11.161, Rev. 2, "Surveillance Requirement Reactor Breakers Undervoltage And Shunt Trip Device Circuit Test."
4. Procedure SO23-II-11.162, Rev. 0, "Reactor Breaker Response Time Testing."
5. Procedure SO23-I-4.66, Rev. 2, "General Electric AK-2-25 Circuit Breaker Maintenance."
6. Trend plots for Units 2 and 3 reactor trip circuit breakers opening times.
7. Recorded response time for Units 2 and 3 reactor trip circuit breakers. As corrected 10/11/83.
8. Maintenance orders for various tasks on circuit breakers.
9. Prompt Report, Docket 50-361, Licensee Event Report 83-125, San Onofre Unit 2, H. B. Ray (SCE) to J. B. Martin (Region V, NRC).
10. Rough trip time test data of 10-9-83 and 10-10-83 for circuit breakers S/N-8, -18, and -45 for UVT.
11. Hand out labeled - "Preventative Maintenance Procedure SO23-I-4.66."



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION III
 765 ROOSEVELT ROAD
 GLEN ELLYN, ILLINOIS 60137

325

Docket No. 50-373 - 84M
 Docket No. 50-374 - 84-25
 AUG 6 1984

Commonwealth Edison Company
 ATTN: Mr. Cordell Reed
 Vice President
 Post Office Box 767
 Chicago, IL 60690

Gentlemen:

This refers to the routine safety inspection conducted by Mr. N. C. Choules of this office on July 24-26, 1984, of activities at LaSalle County Station authorized by NRC Operating License NPF-11 and No. NPF-18 and to the discussion of our findings with Mr. R. D. Bishop and other members of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

No items of noncompliance with NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1). If we do not hear from you in this regard within the specified periods noted above, a copy of this letter and the enclosed inspection report will be placed in the Public Document Room.

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 PDC/PDC/50-373 4

AUG 6 1984

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

Original Signed by R.D.Walker

R. D. Walker, Chief
Operations Branch

Enclosure: Inspection Report
No. 50-373/84-19(DRS) and
No. 50-374/84-25(DRS)

cc w/encl:

D. L. Farrar, Director
of Nuclear Licensing

G. J. Diederich, Station
Superintendent

R. H. Holyoak, Project Manager
DMB/Document Control Desk (RIDS)

Resident Inspector, RIII

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Walker

RIII
Walker

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-373/84-19(DRS); 50-374/84-25(DRS)

Docket Nos. 50-373; 50-374

Licenses No. NPF-11; NPF-18

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: LaSalle County Station, Units 1 and 2

Inspection At: LaSalle Site, Marseilles, IL

Inspection Conducted: July 24-26, 1984

Inspector: *M.C. Charles*
N. C. Charles

8/6/84
Date

Approved By: *F.C. Hawkins*
F. C. Hawkins, Chief
Quality Assurance Programs Section

8/6/84
Date

Inspection Summary

Inspection on July 24-26, 1984 (Report No. 50-373/84-19(DRS); 50-374/84-25(DRS))

Areas Inspected: Routine unannounced inspection by one regional inspector of previous inspection findings and the startup testing audit program. The inspection involved 23 inspector-hours onsite.

Results: No items of noncompliance or deviations were identified.

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DETAILS

1. Persons Contacted

Commonwealth Edison Company

- *R. D. Bishop, Assistant Superintendent Administration
- *H. D. Studtman, QA Supervisor
- *W. R. Huntington, Technical Staff Supervisor
- *R. F. Jancek, Project Engineer
- *P. F. Manning, Assistant Technical Staff Supervisor
- *J. W. Gieseke, Assistant Technical Staff Supervisor
- *J. A. Ahlman, QA Engineer
- *M. Musser, QA Engineer

U.S. Nuclear Regulatory Commission

- *M. J. Jordan
- S. Guthrie

Other personnel were contacted as a matter of routine during the inspection.

*Denotes those attending the exit interview on July 26, 1984.

2. Action on Previous Inspection Findings

- a. (Closed) Unresolved Item (373/83-09-01): Adequacy of audits to verify adherence to the Technical Specifications provisions. A policy has been developed which addresses quality assurance audits of Technical Specification line items within prescribed time periods. The licensee had previously instituted a program that complies with this policy.
- b. (Open) Open Item (373/83-15-04, 374/83-13-03): There was no guidance which specified the types of documents which should be included in modification history packages. The licensee had not completed the development of this guidance.
- c. (Closed) Open Item (373/83-15-05, 374/83-13-04): There was no system to identify drawings changed by a modification in the history packages. The licensee had revised the plant modification procedure LAP 1300-2 to include an attachment C on which drawings changed by a modification or drawing change notice (DCNs) generated by a modification would be identified. Attachment C will be part of the modification history package.
- d. (Closed) Unresolved Item (373/83-35-01, 374/83-34-01): Marked up drawings were not provided to the control room when modifications were completed. The licensee has prepared a list of drawings and if a modification changes any of these drawings, the control room

copies are required to be marked with changes. The licensee has revised procedures LAP 810-9 ("Control of Drawing Modifications") and LAP 1300-2 ("Plant Modification") to require the above. Review of control room drawings indicated the requirements for marked up drawings had been implemented.

- e. (Closed) Noncompliance (373/83-41-01, 374/83-42-01): Failure to adequately review and evaluate the feedwater check valve disc modification and the change from molded to extruded/vulcanized seals. The licensee's corrective actions for this item are documented in their responses dated January 20 and February 9, 1984. The inspector verified that SNED procedure Q.6 had been revised to require revision of applicable stress reports and to identify environmental qualification requirements in the modification approval letter checklist. SNED procedure Q.28 had been revised to require documentation regarding stress report revisions from vendors. The extruded/vulcanized seals had been replaced on Unit 1 and Unit 2 as determined from review of the applicable purchase order and work requests as was stated in the licensee's response.
- f. (Open) Open Item (373/83-41-04, 374/83-42-04): The cause of the excessive leakage through the feedwater check valves had not been determined. During a Unit 1 shutdown in February, the licensee determined the leak rate for feedwater check valve 1B21-F010A was excessive as reported in LER 373-84-012. Leakage for check valve 1B21-F010E was acceptable. As stated in the LER, the licensee found an alignment problem with the check valves and believes this to be the cause of the excessive leakage problems. Corrective maintenance in the form of reducing the hinge pin shoulder to disc pushing clearances was performed on the four Unit 1 and 2 feedwater check valves. Until leak rate tests are performed during the refueling outage to confirm that the leakage was caused by misalignment, this item will remain open.

3. Quality Assurance for the Startup Test Program

The inspector reviewed the licensee's program for auditing and surveillance of startup testing. Audits and surveillances were reviewed to verify that they require the observation of testing, tracking of test deficiencies, review of test documentation and acceptance criteria, and review of the status of measuring and test equipment. Audits and surveillance reports were reviewed to verify that they documented the results of the above.

a. Documents Reviewed

- (1) Selected Audit Reports of Startup Testing
- (2) Selected Surveillance Reports of Startup Testing

b. Results of Inspection

The inspector's review revealed that the licensee was conducting audits and surveillances of startup testing. The licensee intends to perform audits or surveillances of all startup tests. A generic audit checklist had been developed which required the review of the items listed above. Audit reports documented the results of the reviews.

No items of noncompliance or deviations were identified.

4. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) on July 26, 1984, and summarized the purpose, scope, and findings of the inspection.