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OPPD
Omaha Public Power District

444 South 16th Street Mall
Omaha NE 68102-2247

March 8, 2002
LIC-02-0028

U.S. Nuclear Regulatory Commission
ATTN.: Document Control Desk
Washington, DC 20555

References:
1. Docket No. 50-285
2. Letter from Omaha Public Power District (OPPD) (W. G. Gates) to NRC (Document Control Desk), Fort Calhoun Station Unit No. 1 License Amendment Request, "Revise Surveillance Requirements for Emergency Power System Periodic Tests," dated December 14, 2001 (LIC-01-0105)

SUBJECT: Supplemental Information Supporting the License Amendment Request, "Revise Surveillance Requirements for Emergency Power System Periodic Tests"

In Reference 2, Omaha Public Power District (OPPD) submitted an Application for Amendment of Facility Operating License to revise the Fort Calhoun Station (FCS) Unit No. 1 Technical Specifications (TS). In a telephone discussion with Mr. A. B. Wang (NRC Project Manager) on March 1, 2002, OPPD verbally communicated its intention to provide a description of the 13.8 kV testing performed to meet Technical Specification 3.7(4) requirements. Attached please find a description of the current testing technique and the proposed "at-power" testing methodology. Copies of the relevant process and instrumentation drawings (P&ID) and the current surveillance are also attached. These attachments are provided for background and informational purposes only.

If you have any questions or require additional information, please contact Dr. Richard Jaworski at (402) 533-6833.

Sincerely,

R. T. Ridenoure
Division Manager
Nuclear Operations

RTR/rrl

Attachment

c: E. W. Merschoff, NRC Regional Administrator, Region IV (w/o Attachment)
A. B. Wang, NRC Project Manager
W. C. Walker, NRC Senior Resident Inspector (w/o Attachment)
Winston & Strawn (w/o Attachment)

A001

13.8 kV Technical Specification 3.7(4) - Additional Information

Currently, the 13.8 kV test is conducted each refueling outage as follows:

The 13.8 kV power supply to 13.8 kV/480V transformer T1B-3C-1 is de-energized. The 480V secondary connection on transformer T1B-3C-1 is lifted, and the transformer secondary is connected to a load bank. Transformer T1B-3C-1 is then energized and load tested to just below its nameplate capacity. The load bank is then connected to the cable that normally connects T1B-3C-1 to load center (bus) 1B3C via 480V load center breaker 1B3C-4. Breaker 1B3C-4 is then closed, and the breaker and cable are load tested to just below the T1B-3C-1 nameplate capacity. The power for the test is supplied from bus 1B3C. After the load test is completed, breaker 1B3C-4 is opened, the load bank is removed, and the cable is re-landed on the T1B-3C-1 transformer secondary. See the drawings included with this submittal for more details on the connections and the 13.8 kV and plant distribution systems.

This test is considered an adequate test in that all components of the 13.8 kV supply to bus 1B3C are load tested from the 13.8 kV fused disconnect to the bus side of breaker 1B3C-4. The components associated with the 480V distribution system are in service either during normal power operation or used during a refueling outage and are considered to be adequately verified for proper operation. The 13.8 kV test need only verify the operation of the unused portion of the supply to bus 1B3C. It should be noted that during normal operation the 13.8 kV supply is energized up to the line side of breaker 1B3C-4. Breaker 1B3C-4 is the only component that must be placed in service to allow use of the 13.8 kV supply.

The test of transformer T1B-3C-1 is designed to load test the transformer, including the affects of thermal heating on the transformer. The transformer is not tested for the ability to start the charging pump associated with the emergency operating procedures that govern the use of the 13.8 kV supply. This is considered acceptable because of the inherent simplicity of design and rugged construction of the transformer. Transformer T1B-3C-1 has no rotating parts and is designed and constructed to withstand the affects of a short circuit on the secondary of the transformer. The starting of the charging pump, which was previously verified through testing, is well within the short circuit capability of the transformer.

The re-connection of the 480V cable on the secondary of T1B-3C-1 following testing is not considered to a condition where the 13.8 kV supply to bus 1B3C is left in an untested condition. The 480V connection at the transformer is a standard electrical connection similar to many such connections made throughout the plant and OPPD's distribution system. The connections are relatively simple, straight forward, and reliable. Application of standard work practices to the physical work and phase rotation testing assure that the 13.8 kV power supply will be available to perform its design function if required.

It should be noted that breaker 1B3C-4 receives periodic functional checks, cleaning, and calibration checks of its trip unit. This ensures that the breaker will function properly if required.

Proposed Testing During Power Operation:

The test of the 13.8 kV power supply to bus 1B3C during power operation is virtually identical to the test described above. The difference occurs during the load testing of breaker 1B3C-4 and the 480V cable that connects transformer T1B-3C-1 to the line side of the breaker. During power operation testing, containment spray pump SI-3A is removed from service. The removal of SI-3A ensures that in the event emergency diesel generator DG-1 operation is required, the load introduced by the load bank supplied from bus 1B3C will not cause an overload and unanalyzed condition. During the time SI-3A is out of service, the plant is in a limiting condition for operation (LCO) associated with SI-3A.

Entry into an LCO for SI-3A is considered similar to other tests or periodic maintenance associated with SI-3A that are performed during plant power operation. A probabilistic risk assessment (PRA) evaluation is conducted prior to testing during power operation to ensure that the safety systems are not degraded below a predetermined acceptable level.

Based on the above discussion, the proposed technical specification change is judged to be acceptable by OPPD.

Fort Calhoun Station
Unit No. 1

OP-ST-ESF-0008

SURVEILLANCE TEST

Title: 13.8 KV EMERGENCY POWER PERIODIC TEST

FC-68 Number: EC 26613

Reason for Change: Revised to test Transformer T1B-3C-1, and Breaker 1B3C-4 using a load bank.

Requestor: Steve Miller

Preparer: Daniel A Hochstein

13.8 KV EMERGENCY POWER PERIODIC TEST

SAFETY RELATED

1. PURPOSE

1.1 To satisfy, each Refueling, the requirements of Technical Specification 3.7(4) for 13.8 KV Emergency Power Supply.

2. REFERENCES/COMMITMENT DOCUMENTS

2.1 Technical Specification:

- 2.7, Electrical Systems
- 3.7, Emergency Power System Periodic Tests
- 2.1.1, Operable Components
- 2.4, Containment Cooling

2.2 USAR Section 8.0, Electrical Systems

2.3 SO-G-23, Surveillance Test Program

2.4 Ongoing Commitments

- AR 12818, LIC-9-20192

2.5

Drawings	File	Description
Figure 8.1-1	12234	Simplified One Line Diagram Plant Electrical System
11405-E-5	12241	480 Volt Auxiliary Power One Line Diagram
161F531, Sh 8A	09393	Main Three Line Diagram

3. DEFINITIONS

None

4. EQUIPMENT LIST

4.1 TEST EQUIPMENT REQUIRED/USED:

NOTE: During the course of this procedure, some portable or temporary test equipment may be used to prove operability of a plant component. All such equipment must be entered into the appropriate I&C Instrument Log.

EQUIPMENT	CALIBRATION OPPD NO. / DUE DATE	INITIALS/DATE
480V Phase Rotation Meter	/ N/A	/
Clamp-On Ammeter	/	/
Digital Voltmeter	/	/
	/	/
	/	/

4.2 Tools

- Load Bank cables rated for a minimum of 300 amps, 600 VAC
- Operating Handle for 480 volt Emergency Power Breaker 1B3C-4
- Resistive load bank rated 250 KW, 480 VAC minimum, ungrounded

5. PRECAUTIONS AND LIMITATIONS

5.1 All anomalies and deficiencies shall be reported immediately to the immediate Supervisor and the Shift Manager and noted on the Comment Sheet. An immediate check shall be made to verify Limiting Conditions for Operation, per Technical Specifications, have not been exceeded.

5.2 The System Engineer shall be notified within 24 hours of the completion of this test of any marginal, unexpected, or unacceptable results.

5.3 Electrical Maintenance Group support during this test requires a qualification of Electrical Category 5B.

5.4 Emergency Transformer maximum steady state secondary current is limited to 270 amps.

5.5 To prevent overloading bus 1B3C feeder breakers during the performance of this procedure 1B3C-6 (SI-3A) is tagged in the OPEN position. Observe SO-O-21 requirements for decay heat removal.

6. PREREQUISITES — INITIALS/DATE

6.1 Procedure Revision Verification:

Revision No. _____ ____/____

6.2 A pre-job briefing has been conducted prior to the start of this test. ____/____

6.3 All personnel initially participating in the performance of this test have completed the Surveillance Test Signature Sheet. ____/____

6.4 Calibration of test equipment has been verified. ____/____

6.5 Reactor Coolant System temperature is less than 300°F. ____/____

6.6 480 Volt Bus 1B3C is energized. ____/____

6.7 IF the 480 volt buses are not in their normal alignment, per OI-EE-2-CL-A (Reference P&ID Figure 8.1-1), THEN consult OI-EE-2B to ensure that any loads to be started by this test, will not exceed a breaker trip setpoint. **[AR 12818]** ____/____ SM

6.8 Shift Manager authorizes performance of this test:

Shift Manager _____ Date/Time ____/____

7. PROCEDURE

NOTE: Steps 7.1 and 7.2 can be performed at anytime and repeated as necessary.

7.1 IF this Surveillance Test is turned over, a prejob briefing must be conducted prior to the continuation of this test. ____/____

7.2 IF this Surveillance Test is turned over, all personnel participating in the continuation of this test have completed the Surveillance Test Signature Sheet. ____/____

7.3 Collect As Found phase-to-phase voltages and rotation sequence at 480 VAC breaker 1B3C-4 cubicle (with breaker removed and 1B3C and 13.8 kV energized).

7.3.1 Remove breaker from the 1B3C-4 cubicle. _____/_____
EM

WARNING

BREAKER STABS INSIDE THE BREAKER CUBICLE ARE ENERGIZED AT 480 VAC.

7.3.2 Measure and record phase to phase voltage of the Emergency Transformer secondary voltage from the bottom Breaker Stabs at 1B3C-4 (a nominal voltage of 480 VAC should exist):

AØ - BØ _____VAC

BØ - CØ _____VAC

CØ - AØ _____VAC _____/_____
EM

7.3.3 Measure and record the Emergency Transformer phase rotation from the bottom Breaker Stabs at 1B3C-4.

Rotation (CCW or CW) _____ left-to-right _____/_____
EM

7.3.4 Measure and record the Load Center 1B3C bus phase rotation from the top Breaker Stabs at 1B3C-4.

Rotation (CCW or CW) _____ left-to-right _____/_____
EM

CAUTION

Phase rotation for the Emergency Transformer and the 480V Bus must be the same or equipment damage will occur.

7.3.5 Verify phase rotation recorded in Steps 7.3.3 and 7.3.4 are the same. _____/_____
EM

7.4 Isolate Transformer T1B-3C-1

7.4.1 With the assistance of Electric Operations Tag Open 13.8 kV disconnect switch 1062 feeding 13.8kV/480VAC transformer T1B-3C-1. ____/____

7.4.2 Ensure that breaker 1B3C-4 is DANGER tagged OPEN and DISCONNECTED. ____/____
EM

7.5 Disconnect Secondary of transformer T1B-3C-1

7.5.1 Open transformer T1B-3C-1 to expose secondary connections. ____/____
EM

7.5.2 Verify that the secondary of transformer T1B-3C-1 is de-energized. ____/____
EM

7.5.3 Label leads and disconnect cable 231 from secondary side of transformer T1B-3C-1. ____/____
EM

7.6 Load Bank Connection

7.6.1 Position load bank in the vicinity of transformer T1B-3C-1. Ensure that location of load bank will not pose a threat to adjacent equipment when transformer is energized and loaded. ____/____
EM

7.6.2 Rope off /Post area with DANGER HIGH VOLTAGE signage to keep personnel clear of area when transformer is energized. ____/____
EM

7.6.3 Connect 3-phase 480 VAC resistive load bank to secondary terminals of transformer T1B-3C-1. ____/____
EM

NOTE: It is advised to leave an access point to take phase-to-phase voltage measurements on the transformer secondary.

7.6.4 Ensure that all cable connections are adequately insulated to prevent accidental shorts or grounding possibilities during the conduct of the load test. _____/_____ EM

7.6.5 Ground the chassis of the load bank. _____/_____ EM

7.7 Energize transformer T1B-3C-1 through Disconnect Switch 1062.

7.7.1 Ensure that personnel are clear of the T1B-3C-1 transformer and that load bank switches are positioned in the OFF position. _____/_____ EM

7.7.2 With the assistance of Electric Operations, remove Disconnect Switch 1062 Hold Order tags and close switch 1062 to energize transformer T1B-3C-1. _____/_____ EM

7.8 Load Test of Transformer T1B-3C-1 Secondary

7.8.1 Measure voltage at secondary of transformer T1B-3C-1 to ensure a nominal 480 VAC is present (432-528 VAC).

AØ - BØ _____ VAC

BØ - CØ _____ VAC

CØ - AØ _____ VAC _____/_____ EM

7.8.2 Using load bank, load transformer T1B-3C-1 secondary at 260 (250 to 270) amps. Record applied load using a calibrated clamp-on ammeter.

AØ _____ Amps

BØ _____ Amps

CØ _____ Amps _____/_____
EM

7.8.3 Measure voltage at secondary of transformer T1B-3C-1 to ensure a nominal 480 VAC is present (432-528 VAC).

AØ - BØ _____ VAC

BØ - CØ _____ VAC

CØ - AØ _____ VAC _____/_____
EM

7.8.4 Record Start Time of load testing of transformer: _____ _____/_____

CAUTION

Do not apply load in excess of transformer rating of 270 amps.

CAUTION

Do not leave transformer or load bank unattended during the load test due to the exposed transformer connections.

7.8.5 Apply constant load (260 {250 to 270} amps) to transformer for a minimum of 1 hour. _____/_____
EM

7.8.6 Take the following measurements at the end of the load test. Record applied load using a calibrated clamp-on ammeter.

AØ _____ Amps

BØ _____ Amps

CØ _____ Amps _____/_____
EM

7.8.7 Measure voltage at secondary of transformer T1B-3C-1 to ensure a nominal 480 VAC is present (432-528 VAC).

AØ - BØ _____ VAC

BØ - CØ _____ VAC

CØ - AØ _____ VAC _____/_____
EM

7.8.8 Record Time at End of load testing of transformer: _____ _____/_____

7.8.9 Open load bank disconnect switches to remove load from transformer T1B-3C-1. _____/_____
EM

7.9 De-energize transformer T1B-3C-1

7.9.1 With the assistance of Electric Operations, open disconnect switch 1062 to de-energize transformer T1B-3C-1. Establish Hold Order to keep switch Open. _____/_____

7.10 Disconnect load bank at secondary of transformer T1B-3C-1

7.10.1 Measure voltage at secondary of transformer T1B-3C-1 to ensure that transformer is de-energized. _____/_____
EM

7.10.2 Disconnect load bank from the secondary of transformer T1B-3C-1. _____/_____
EM

7.11 Connect load bank to cable 231 (at T1B-3C-1 end)

7.11.1 At transformer T1B-3C-1, connect 3-phase load bank to cable 231. _____/_____
EM

NOTE: It is advised to leave an access point to take phase-to-phase voltage measurements at the cable end (measurements can be taken at load bank as an alternative).

7.11.2 Ensure that all cable connections are adequately insulated to prevent accidental shorts or grounding possibilities during the conduct of the load test. _____/_____ EM

7.11.3 Rope off/Post area with DANGER HIGH VOLTAGE signage to keep personnel clear of area when cable 231 is energized. _____/_____ EM

7.12 To prevent overloading bus 1B3C feeder breakers during the performance of this procedure, tag breaker 1B3C-6 (SI-3A) in the OPEN position. Observe SO-O-21 requirements for decay heat removal. _____/_____

7.13 Install breaker at 1B3C-4 cubicle

7.13.1 Obtain operating handle for breaker 1B3C-4 and affix it to the breaker. _____/_____ EM

7.13.2 Remove DANGER tag and place breaker 1B3C-4 in the CONNECTED position. _____/_____ EM

7.14 Energize load bank from 480 VAC bus 1B3C

7.14.1 Ensure that personnel are clear of the T1B-3C-1 transformer and that load bank switches are positioned in the OFF position. _____/_____ EM

7.14.2 Inform Control Room that 480 Volt Bus 1B3C breaker 1B3C-4 will be closed and that bus 1B3C load will increase when load is applied through breaker 1B3C-4. _____/_____ EM

7.14.3 Close breaker 1B3C-4 and energize load bank located at transformer T1B-3C-1. _____/_____

7.15 Load Test of Breaker 1B3C-4 and Cable 231

7.15.1 Measure voltage at Cable 231 (load bank end) to ensure a nominal 480 VAC is present (432-528 VAC).

AØ - BØ _____ VAC

BØ - CØ _____ VAC

CØ - AØ _____ VAC

_____ / _____
EM

7.15.2 Using load bank, load Cable 231 at 260 (250 to 270) amps. Record applied load using a calibrated clamp-on ammeter.

AØ _____ Amps

BØ _____ Amps

CØ _____ Amps

_____ / _____
EM

7.15.3 Measure voltage at Cable 231 (load bank end) to ensure a nominal 480 VAC is present (432-528 VAC).

AØ - BØ _____ VAC

BØ - CØ _____ VAC

CØ - AØ _____ VAC

_____ / _____
EM

7.15.4 Record Start Time of load testing of Cable 231: _____ _____ / _____

CAUTION

Do not leave transformer or load bank unattended during the load test due to the exposed transformer connections.

7.15.5 Apply constant load (260 {250 to 270} amps) to Cable 231 for a minimum of 1 hour.

_____ / _____
EM

7.15.6 Take the following measurements at the end of the load test. Record applied load using a calibrated clamp-on ammeter.

AØ _____ Amps

BØ _____ Amps

CØ _____ Amps _____/_____
EM

7.15.7 Measure voltage at Cable 231 (load bank end) to ensure a nominal 480 VAC is present (432-528 VAC).

AØ - BØ _____ VAC

BØ - CØ _____ VAC

CØ - AØ _____ VAC _____/_____
EM

7.15.8 Record Time at End of load testing of Cable 231: _____ _____/_____

7.15.9 Open load bank disconnect switches to remove load from Cable 231. _____/_____
EM

7.16 De-energize Cable 231

7.16.1 Inform Control Room that load test of Cable 231 and Breaker 1B3C-4 is complete and that breaker 1B3C-4 will be removed from service to restore the circuit to its original configuration. _____/_____

7.16.2 Obtain a clearance for breaker 1B3C-4 and place the breaker in an OPEN and DISCONNECTED position. _____/_____

7.16.3 Remove breaker 1B3C-4 from its cubicle. _____/_____
EM

7.17 Disconnect load bank at Cable 231

7.17.1 Disconnect load bank from the secondary of transformer T1B-3C-1. _____/_____ EM

7.17.2 Measure voltage at secondary of transformer T1B-3C-1 to ensure that transformer is de-energized. _____/_____ EM

7.17.3 Observing labeling to ensure proper connection phase sequence, connect Cable 231 to transformer T1B-3C-1 secondary. _____/_____ EM

_____/_____ Ind Verif

7.17.4 Secure all covers at transformer T1B-3C-1. _____/_____ EM

7.18 Energize transformer T1B-3C-1

7.18.1 Ensure that personnel are clear of 480 volt cubicle 1B3C-4. _____/_____ EM

7.18.2 With the assistance of Electric operations, remove Hold Order tags and close T&D switch 1062 to energize transformer T1B-3C-1. _____/_____

7.18.3 Check the operation of the V/T1B-3C-1 voltmeter at 480 Volt bus 1B3C to ensure that voltage is displayed on the meter (this step ensures that the potential transformer and voltmeter fuses are intact following the test). _____/_____

7.19 Collect As Left phase-to-phase voltages and rotation sequence and compare against As Found information to ensure that connection has been properly established

WARNING

BREAKER STABS INSIDE THE BREAKER CUBICLE ARE ENERGIZED AT 480 VAC.

7.19.1 Measure and record phase to phase voltage of the Emergency Transformer secondary voltage from the bottom Breaker Stabs at 1B3C-4 (a nominal voltage of 480 VAC should exist):

AØ - BØ _____ VAC

BØ - CØ _____ VAC

CØ - AØ _____ VAC _____ / _____
EM

7.19.2 Measure and record the Emergency Transformer phase rotation from the bottom Breaker Stabs at 1B3C-4.

Rotation (CCW or CW) _____ left-to-right _____ / _____
EM

7.19.3 Measure and record the Load Center 1B3C bus phase rotation from the top Breaker Stabs at 1B3C-4.

Rotation (CCW or CW) _____ left-to-right _____ / _____
EM

7.19.4 Compare these results to the results recorded in Step 7.3 to ensure that circuit has been properly restored. If results are not as desired, consult System Engineer and proceed as directed. _____ / _____
EM

7.20 Restoring breaker 1B3C-4

7.20.1 Remove the operating handle from breaker 1B3C-4 and return it to Operations. _____ / _____
EM

7.20.2 Remove any DANGER tags associated with 1B3C-4. _____/_____

7.20.3 Ensure that the 1B3C-4 breaker is OPEN and then rack the breaker into the CONNECTED position. _____/_____

7.21 Ensure that tag has been released on breaker 1B3C-6 (SI-3A). _____/_____

7.22 Remove all task-related rope, signage and load bank. _____/_____
EM

8. RESTORATION

8.1 The Surveillance Test Signature Sheet has been completed. _____/_____

8.2 The Shift Manager has been notified the test is complete.

Shift Manager _____ Date/Time _____/_____

9. ACCEPTANCE CRITERIA

9.1 Transformer T1B-3C-1 secondary supplied 260 (250 to 270) amps to load bank for a minimum of one hour.

9.2 Breaker 1B3C-4 and cable 231 were loaded at 260 (250 to 270) amps for a minimum of one hour.

10. TEST RECORD

This entire procedure.

11. REVIEW

11.1 Test data shall be evaluated by the STA and reviewed by the Shift Manager for acceptability within 24 hours of completion of this test.

Evaluated by_____Date/Time_____/_____
STA

Reviewed by_____Date/Time_____/_____
Shift Manager

11.2 The System Engineer is responsible for reviewing the test data, trending, and identified deficiencies noted within the test. This test has been reviewed and found acceptable or deficiencies and actions taken have been noted on the Comment Sheet.

System Engineer_____Date/Time_____/_____
Signature

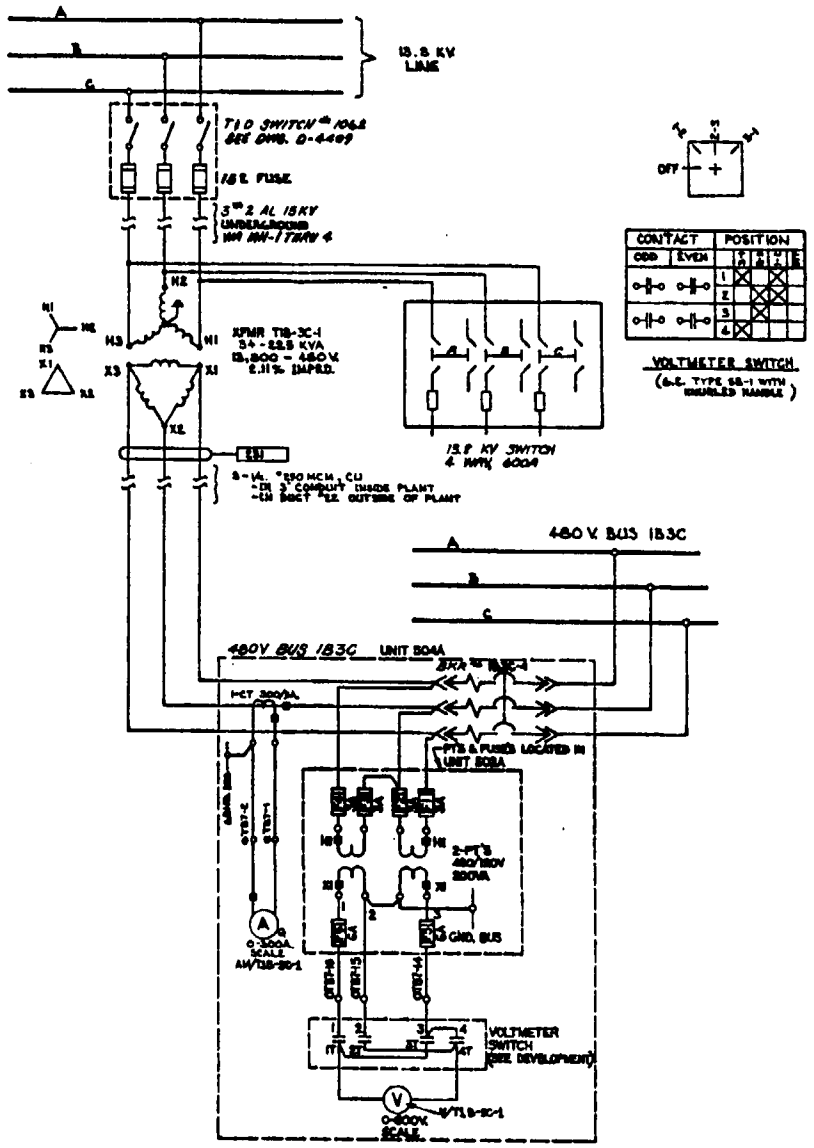
Surveillance Test Signature Sheet

All persons participating in the performance of this test shall enter their printed name, signature and initials below.

NAME (PRINT)	SIGNATURE	INITIALS

Comment Sheet

TITLE: 13.8 KV EMERGENCY POWER SUPPLY



13.8 KV EMERGENCY POWER SUPPLY SYS.

NOTES

1. WHEN BKR 1B3C-4 IS CLOSED ALL EQUIPMENT FED FROM BUSES 1B3C, 1B3C-4C & 1B4C WILL BE OPEN, AND THESE BUSES WILL BE UNENERGERIZED THE FOLLOWING LOADS WILL BE CLOSED ON THE 13.8 KV SOURCE AFTER BKR. 1B3C-4 IS CLOSED.
   A. PRESSURIZER BACKUP HTRS.-GROUP 4 ONLY (MCC-3C1)
   B. BATTERY CHARGER #3 (MCC-3C1)
   C. CIRCUITS ON NP-3 & NP-8 OF THE HEAT TRACING PANEL (MCC-3C2)
   D. CHARGING PUMP CH-1B (BKR. 1B4C-6)
2. TO BE USED ONLY DURING REACTOR SHUTDOWN. TRUCK MOUNTED FILTER UNIT TO FILTER OIL OF THE MAIN GEN. TRANSFORMER.

REFERENCE DRAWINGS:

1. @HDR 11405-E-3M TRANSFORMER YARD UNDERGROUND CONDUIT & CABLE TRENCH LAYOUT SECTIONS
2. 480 VOLT AUX. POWER ONE LINE DIAGRAM 11405-E-8, SH.1.
3. AKD-6 POWER MASTER INDOOR UNIT SUBSTATION.

REV. SH. 4298	APVD	REV
FILE 9393	4-17-09	37

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

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DRAWING NO. D-4409, "13.8KV ONE-LINE DIAGRAM P & ID", REV. 16

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NOTE: Because of these page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

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DRAWING NO. FIG 8.1-1, "SIMPLIFIED ONE LINE DIAGRAM PLANT ELECTRICAL SYSTEM P & ID", REV. 117

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