Entergy
Nuclear Northeast

Procedure Use Is:

- ☐ Continuous
- ■ Reference
- ☐ Information

Control Copy: _____

Effective Date: 4-05-07

0-XFR-401-ELC, REV. 0

STATION SERVICE AND LOAD CENTER TRANSFORMERS OUTAGE INSPECTION

Work Order No._____ Component No._____

Writer — Date: 1/3/5/07

Reviewer — Date: 1/3/5/07

Approved By:

Procedure Sponsor, DM/Designee — Date: 1/3/7/07

One Site, One Team, One Fleet
Indian Point Energy Center

MAINTENANCE PROCEDURE

NEW PROCEDURE

REVISION SUMMARY

(Page 1 of 1)

1.0 REASON FOR REVISION

1.1 NEW PROCEDURE developed per MTC-1416 to integrate EBD-P-004-A (SST Sections Only) and 3-XFR-001-ELC.

1.2 This procedure supersedes Unit 2 procedure EBD-P-004-A (SST Sections Only) and Unit 3 Procedure 3-XFR-001-ELC.

2.0 SUMMARY OF CHANGES

2.1 Incorporates best practices from both procedures.

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure establishes the requirements for an outage inspection of all Westinghouse Station Service transformers (SSTs) and the Load Center Transformer (3NGX01).

1.2 This procedure is applicable to both Unit 2 and Unit 3.

1.3 The sections of this procedure required to be performed have been identified by Engineering or Planning and have been indicated in the Work Order. The Supervisor shall initial those sections below.

X	*4.1	Recommended Equipment
	*4.2	Inspection and Cleaning
	*4.3	Transformer Micro-ohm Testing
	*4.4	Cooling Fan Inspection and Maintenance
	*4.5	Transformer Lightning Arrester Inspection and Testing
	*4.6	Replacement of Lightning Arrester(s)
	*4.7	Close out
X	*4.8	Procedure Complete

Steps within sections indicated by an asterisk "*" may be performed concurrently or in any sequence at the discretion of the Maintenance Supervisor.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Follow EN-IS-101, Industrial Safety and Health Program and EN-IS-111, General Industrial Requirements and any other applicable Industrial Safety Procedures.

2.2 Follow Electrical Safety Program and Electrical Safety Practices when working on energized equipment as per IP-SMM-IS-103, IP-SMM-IS-104 and EN-IS-123.

2.3 Follow IP-SMM-MA-106, Housekeeping Policy, to maintain system cleanliness.

2.4 Follow IP-SMM-MA-118, Foreign Material Exclusion, while performing maintenance. Cover all openings with appropriate covers when work is not in progress. Ensure all tools and other items used during maintenance are removed from the transformer enclosure, following completion of work activities.

2.5 The transformers cabinets may contain asbestos cabling and wiring. Observe handling requirements as applicable according to IP-SMM-IS-105, Asbestos Control.

_____
Mechanic/Date

_____
Mechanic/Date

_____
Maintenance Supervisor/Date

3.0 PREREQUISITES

3.1 Equipment Tagout No._____; ensure tags are hung and verified.

3.2 Notify Radiation Protection (Rad Pro) prior to the start of work in the Radiologically Controlled Area (RCA).

3.2.1 Comply with requirements and instruction of Radiation Work Permit (RWP) #_____.

3.3 Coordinate with Waste Management (WM) for disposal of any waste generated during this maintenance activity.

3.4 Transformer shall be deenergized during the performance of this procedure.

3.5 Maintenance procedure verified to be the latest approved revision, any inclusive DRNs verified to be attached as per IP-SMM-AD-102.

3.6 Establish a clean work area prior to the start of work per IP-SMM-MA-118.

3.7 Read through Attachment 2, Industry Experiences, prior to the start of work.

3.8 Unless otherwise noted, on steps marked with a double signature, Maintenance shall verify per step criteria.

3.9 External power supplies may be needed to test the fans on some transformers. Verify power supply voltage requirements for specific transformer applications prior to testing fans.

3.10 Qualified Inspection Personnel shall be notified prior to start of work for all activities performed by Supplemental / Contractor personnel. Addition of Inspection Hold Points will be added where appropriate.

IF Entergy personnel perform work activity, THEN N/A this step.

N/A /__/

_____
Maintenance Supervisor/Date

Hold Points Added: YES /__/ NO /__/

_____
Qualified Inspector/Date

3.11 This procedure requires the use of Maintenance Standard 0-MS-411 (Torquing of Mechanical Fasteners), TS-MS-016 (Torquing Procedure) and MS-104 (Inspection and cleaning of bus bars, contacts, ground connection, wiring and insulators). Acceptance criteria will be found in the standards Maintenance personnel involved in these activities must be familiar with the standards.

3.12 All prerequisites have been completed.

_____
Mechanic/Date

_____
Mechanic/Date

_____
Maintenance Supervisor/Date

4.0 PROCEDURE

4.1 Recommended Equipment

4.1.1 Test Equipment

- 220/110V Power Supply
- 1000V Megger
- Voltmeter or Voltage Tester
- Torque wrench capable of achieving 20 ft-lbs.
- Ohm-meter

4.1.2 Special Tools

- Vacuum Cleaner
- Step Ladder (8-10 ft.)

4.1.3 Supplies

- Lint free cloths
- Medium bristle brush
- Scotch-Brite
- Electrical Tape
- Demineralized water
- EP2 Grease
- Isopropyl Alcohol
- Light Oil
- Lightning Arrestor (contingency part)

4.2 Inspection and Cleaning

NOTE

1. **Steps within the body of this procedure may be worked out of sequence or concurrently, at the discretion of the Maintenance Supervisor or Responsible Engineer.**

2. **Minor repairs, adjustments, and corrections may be performed as stated in body of procedure or by Responsible Engineer.**

WARNING

Control and alarm power may still be present during internal inspections.

_____ mech 4.2.1 **CLEAN** transformer enclosure exterior including the top with lint free cloth and vacuum the ventilator ducts.

_____ mech 4.2.2 Temporary **LABEL** (as needed) AND **REMOVE** transformer case fasteners and panels as required for cleaning/inspection.

_____ mech 4.2.3 **BAG** OR **STORE** fasteners to prevent loss.

_____ mech 4.2.4 **VACUUM** the accessible portions, including the interior passages, of the transformer windings. **PAY** particular attention to the top including the interior passages AND bottom ends of the winding assembly.

CAUTION

Do NOT use liquid cleaners on transformer insulating surfaces as they may deteriorate the insulating materials. Use a brush or dry cloth.

_____ mech 4.2.5 **CLEAN** dirt AND dust from the transformer insulating surfaces, air passages, lightning arresters (IF installed) AND ventilating ducts.

_____ mech 4.2.6 **INSPECT** the transformer for physical damage. **EXAMINE** closely for damage occurring as a result of environmental conditions, rodents, or any other conditions which might interfere with normal operation. **RECORD** results of inspection.

_____

_____

_____

_____ mech 4.2.7 **INSPECT** transformer for signs of overheating AND voltage creepage over insulating surfaces as evidenced by tracking or carbonization. **RECORD** results of inspection:

_____

_____

_____

_____ mech 4.2.8 **INSPECT** transformer for: cracked, chipped, or damaged insulators; improper centering of insulators or missing insulators. **RECORD** results of inspection **(ACT #9032)**.

_____

_____

_____

_____ mech 4.2.9 **CHECK** the transformer for loose electrical connections or missing hardware. **TIGHTEN** OR **REPLACE** as required. **RECORD** results of inspection:

_____

_____

_____

_____ mech 4.2.10 **INSPECT** accessible transformer wiring for fraying, signs of cracking and/or overheating. **RECORD** results of inspection.

Inspection Results:_____

_____

_____ mech _____ mech 4.2.11 **INSPECT** ground system for adequate termination at all points. IF oxidized or corroded, THEN **CLEAN** termination points according to MS-104 requirements. **RECORD** results of inspection. **RECORD** determs and reterms per Attachment 1.

_____

_____

_____

_____ mech 4.2.12 **INSPECT** ground cable for broken strands, corrosion, rust, oxidation, and physical damage. IF necessary, THEN **CLEAN** grounding device according to MS-104 requirements. **RECORD** results of inspection.

_____

_____

_____

____ mech 4.2.13 **INSPECT** panels and frame members for evidence of rusting, corrosion, AND deterioration of the paint. IF painting is required, THEN **CONTACT** Maintenance Supervisor. **RECORD** results of inspection.

_____

_____

_____

_____
Maintenance Supervisor/Date

____ mech 4.2.14 Inspection and cleaning complete.

4.3 Transformer Micro-ohm Testing

WARNING

Control and Alarm power may still be present during micro-ohm testing.

_____ mech _____ mech 4.3.1 IF accessible, THEN **PERFORM** micro-ohm testing of all accessible bus connections.

_____ mech 4.3.1.1 **RECORD** test results below. Acceptable readings are less than 1 ohm of all connections.

_____ mech 4.3.1.2 **INFORM** the Maintenance Supervisor OR Responsible Engineer of all unacceptable readings

REFERENCE READING (MICRO-OHMS)	ACC	UNACC	MICRO-OHM READINGS

Comments:_____

4.4 Cooling Fan Inspection and Maintenance

_____ mech 4.4.1 **OBTAIN** Protective Tagging Order (PTO) for fans for the specific transformer identified here.

PTO#:_____

TRANSFORMER ID #:_____

CAUTION

Fans blades shall NOT be painted.

_____ mech 4.4.2 Visually **INSPECT** fan blades for cleanliness AND damage. **CLEAN** as necessary AND IF fan damage is identified, THEN **NOTIFY** Maintenance Supervisor OR Responsible Engineer for resolution.

_____ mech 4.4.3 **CHECK** AND **CLEAN** any fan vent screens (inlet OR outlet).

_____ mech 4.4.4 Visually **CHECK** all fan controller control wiring for fraying, nicks, overheating or any damage to the wiring insulation. The thermocouple wiring is to be checked for and bends or kinks. In addition, **CHECK** all wiring connections at the controller for tightness. IF necessary, THEN **TIGHTEN** fasteners wrench tight.

_____ mech 4.4.5 **GREASE** the fan motors sparingly with EP-2 grease.

NOTE

Steps 4.4.6, 4.4.8, 4.4.10 and 4.4.11 apply to Westinghouse Type AST (SST-2, SST-3, SST-5, SST-6) transformers and other transformers with fans powered by 110/220/240V 1-Phase 60 Hertz. N/A steps 4.4.6, 4.4.8, 4.4.10 and 4.4.11, if not applicable.

_____ mech _____ mech 4.4.6 **VERIFY** termination points AND fan operating voltage requirements for the specific transformer application. IF as found internal wiring is not in accordance with approved drawings, THEN **NOTIFY** Maintenance Supervisor OR Responsible Engineer for resolution.

NOTE

UNIT 2: Use drawing No. 306632, "W/D of Temperature Controller" (Reference 6.3.8).

UNIT 3: Use drawing no. 781C476 "ASL Transformer Wiring Diagram (Reference 6.3.7).

_____ mech _____ mech 4.4.7 **FOR UNIT 2, DETERM** AND **TAPE** the supply leads (wire no's. T10 and T11) at terminal block TB-1 and TB-2. **RECORD** determination on Attachment 1.

_____ mech _____ mech 4.4.8 **FOR UNIT 3, DETERM** AND **TAPE** internal wiring at Master Contactor Terminal Block T8 AND T9. **RECORD** determination on Attachment 1.

_____ mech _____ mech 4.4.9 **FOR UNIT 2, CONNECT** 220/240V, 1-Phase, 60 HZ, external power source at Master Contactor Terminal Block TB-1 AND TB-2. **VERIFY** all fans operate. **CHECK** for direction of rotation, abnormal vibration AND/OR noise. Take corrective actions as required. **RECORD** the results of inspection below:

_____

_____

_____ mech _____ mech 4.4.10 **FOR UNIT 3, CONNECT** 220/240V, 1-Phase, 60 HZ, external power source at Master Contactor Terminal Block T-8 AND T9. **VERIFY** all fans operate. **CHECK** for direction of rotation, abnormal vibration AND/OR noise. Take corrective actions as required. **RECORD** the results of inspection below:

_____

_____

_____ mech _____ mech 4.4.11 **DISCONNECT** the external power source AND **RETERM** the wires removed in Step 4.4.7 (Unit 2) or 4.4.8 (Unit 3) AND **RECORD** on Attachment 1.

_____ mech _____ mech 4.4.12 For certain fan testing, over 110 volts, such as those on SST-313, "Test and Maintenance" Tags may be used in instead of Steps 4.4.6, 4.4.8, 4.4.10 or 4.4.11 in this case, determination is not required. **ENSURE** the temperature control switch is in manual during testing.

NOTE

Step 4.4.13 ONLY applies to SST-312 and transformer fans powered by 110V 1-Phase 60 Hertz. N/A Step 4.4.13 if not applicable.

_____ mech 4.4.13 **VERIFY** fans operate. **CHECK** for direction of rotation, abnormal vibration and or noise. **TAKE** corrective actions as required. **RECORD** the results of the inspection below:

_____

_____

_____

_____ mech 4.4.14 **RECORD** corrective actions taken as a results of inspection findings in Steps 4.4.9 (Unit 2) or 4.4.10 (Unit 3) AND 4.4.13 (Unit 3). **RECORD** appropriate steplist number or procedure used to perform repair work.

_____

_____

_____

4.5 Transformer Lightning Arrester Inspection and Testing

WARNING

Work activities associated with this procedure SHALL be suspended if there is an immediate danger of lightning in the area.

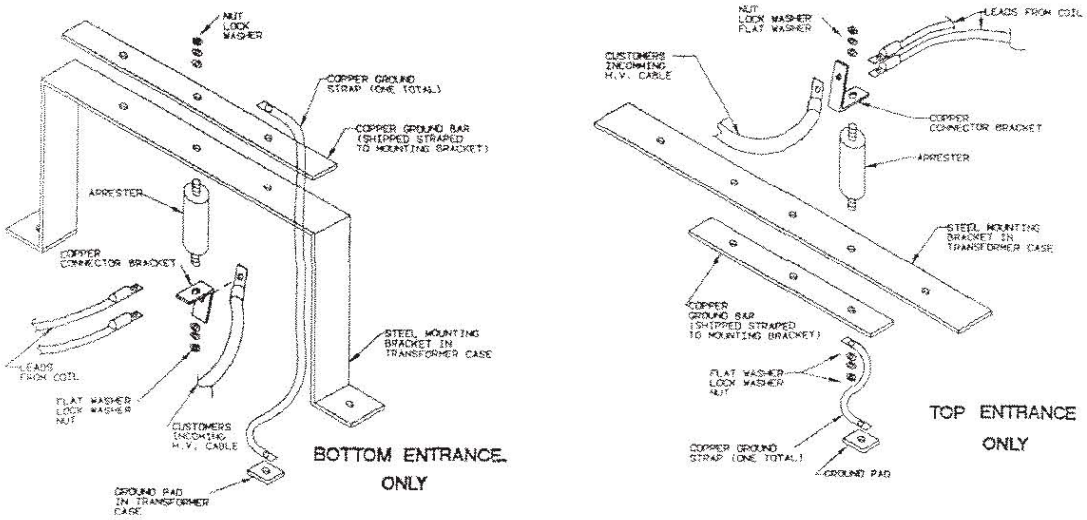

Figure 1 –Lightning Arrester Mounting - Typical

NOTE

1. **The following test produces a qualitative value providing a relative assurance of continuity.**
2. **Expect two (2) ground connections.**

_____ mech 4.5.1 **INSPECT** the lightning arresters for physical damage including porcelain discoloration, cracks, chips, OR signs of oxidation OR corrosion. **RECORD** the results of the inspection below:

_____

_____

4.5.1.1 IF during the inspection in Step 4.5.1 the arrestors found defective, THEN **PROCEED** to Section 4.6, otherwise **N/A** Section 4.6.

_____ mech 4.5.2 **CHECK** lightning arrester mounting hardware including grounding system bolted connections for tightness. **RECORD** the results of the inspection below:

_____

_____

_____

_____ mech _____ mech 4.5.3 IF accessible, THEN **PERFORM** micro-ohm testing of all accessible lightning arrester connections.

_____ mech 4.5.3.1 **RECORD** test results below. Acceptable readings are less than 1 ohm of all connections.

_____ mech 4.5.3.2 **INFORM** the Maintenance Supervisor OR Responsible Engineer of all unacceptable readings

REFERENCE READING (MICRO-OHMS)	MICRO-OHM READINGS	ACC	UNACC

Comments:_____

4.6 Replacement of Lightning Arrester(s)

_____ mech 4.6.1 **UNBOLT** the grounding strap on the lightning arrester(s) to be replaced/alternated.

_____ mech 4.6.2 While supporting the lighting arrester(s), **UNBOLT** AND **REMOVE** the mounting hardware and the lightning arrester.

NOTE

Line terminal shall not be used to lift arrester.

_____ mech 4.6.3 **INSTALL** the lightning arrester AND mounting hardware. **REFER** to Figure 1 for typical mounting details.

_____ mech 4.6.4 **ENSURE** all arrester mounting support feet are flush at bolted connection points. IF necessary, THEN **SHIM**.

_____ mech _____ mech 4.6.5 **TORQUE** the mounting hardware per the following criteria. **RECORD** Final Torque.

3/8 inch: 20 ft-lbs (19 ft-lbs min. to 21 ft-lbs max).

5/16 inch: 10 ft-lbs (9 ft-lbs min. to 11 ft-lbs max).

Final Torque:_____

ACC. /___/ UNACC. /___/

Comments:_____

_____ mech 4.6.6 **INSTALL** AND **TIGHTEN** the grounding strap wrench tight.

_____ mech 4.6.7 **OBTAIN** new lighting arrestors as necessary AND **INSPECT** the new lighting arresters for physical damage (crack, chips or any sign of oxidation).

ACC /__/ UNACC /__/

4.6.8 **PERFORM** micro-ohm testing of the replacement lighting arrester connections.

_____ mech 4.6.8.1 **RECORD** test results below. Acceptable readings are less than 1 ohm of all connections.

_____ mech 4.6.8.2 **INFORM** the Maintenance Supervisor OR Responsible Engineer of all unacceptable readings

REFERENCE READING (MICRO-OHMS)	MICRO-OHM READINGS	ACC	UNACC

Comments:_____

_____ mech 4.6.9 Replacement of lightning arrester(s) complete.

4.7 Close out

mech mech 4.7.1 **PERFORM** visual inspection AND **REMOVE** all tools, or any foreign material left inside the transformer as per IP-SMM-MA-118.

mech 4.7.2 **REMOVE** any temporary labels AND **RE-INSTALL** the access panels AND/OR covers previously removed. **TIGHTEN** wrench tight.

mech 4.7.3 **WIPE** down the transformer exterior using clean, damp cloth.

4.8 Procedure Complete

4.8.1 The Maintenance Supervisor shall record any known CRs generated during and against this maintenance activity.

List of written CRs: _____

_____

_____

_____
Maintenance Supervisor/Date

4.8.2 The personnel listed below have performed signoffs in this procedure:

Print Name (First, Last)	Signature	Initials

4.8.3 **ENSURE** ALL unused material is credited back into stock.

_____
Maintenance Supervisor/Date

4.8.4 Procedure complete; Acceptance Criteria, if applicable, has been met.

_____
Maintenance Supervisor/Date

5.0 ACCEPTANCE CRITERIA

5.1 The equipment shall be of functional mechanical and electrical condition and to continue to perform in accordance to its original design specifications.

6.0 REFERENCES

6.1 Commitment Documents

6.1.1 IEN-92-63

6.1.2 ACT #9032

6.1.3 ACT #13187 and DER 95-2075

6.2 Development Documents

6.2.1 Westinghouse Instruction Manual, Switchgear and Transformers, S.O. 24–Y–5102–I(Part of Vendor Manual #439-100000354)

6.2.2 EBD-P-004-A, Westinghouse Station Service Transformer and Buses (480V AC) SST Sections

6.2.3 3-XFR-001-ELC, Rev. 8, Dry Type Transformer Outage Inspection

6.2.4 MTC-1379, 1399, for establishing transformer megger readings and additional lightning arrester inspection criteria

6.2.5 MTC-1416, Integrate 3-XFR-001-ELC and EBD-P-004-A

6.2.6 0-ELC-400-LPS, Inspection and Testing of Lightning Arrestors On Main or Station Aux Transformers

6.3 Interface Documents

6.3.1 EN-IS-111, General industrial Safety Requirements

6.3.2 EN-IS-123 Electrical Safety

6.3.3 IP-SMM-IS-103, Electrical Safety

6.3.4 IP-SMM-IS-104, Electrical Safety Program

6.3.5 IP-SMM-IS-105, Asbestos Control

6.3.6 IP-SMM-MA-106, Housekeeping Policy

6.3.7 Unit 3 Drawing 781C476, ASL Transformer Wiring Diagram

6.3.8 Unit 2 Drawing No. 306632, W/D of Temperature Controller in Station Service Transformer

6.3.9 IP-SMM-MA-118, Foreign Material Exclusion

6.3.10 MS-104, Inspection and Cleaning of Bus Bars, Contacts, Ground Connections, Wiring, and Insulators

6.3.11 9321-F-30130, Condensate Polishing System Main One Line Diagram

7.0 RECORDS AND DOCUMENTATION

7.1 Records

The following required records are generated by this procedure and SHALL be maintained in accordance with Records Retention Schedule:

7.1.1 Complete 0-XFR-401-ELC procedure and associated forms are a part of the Maintenance Work Package.

7.2 Documentation

The following documentation resulting from this procedure are NOT required to be controlled and maintained in accordance with the Records Retention Schedule:

None

ATTACHMENT 1 **TERMINATION MATRIX**

(Page 1 of 1)

DEVICE DESC	TERM/ CABLE ID	TERM/ CABLE ID	ACTION CODE	SELF VERIF INIT/DATE	PEER VERIF INIT/DATE

**********ACTION CODES**********

RF=REMOVED FUSE	RL=RECONNECT LEAD	OV=OPEN VALVE
DL=DISCONNECT LEAD	ID=INSTALL DEVICE	O =OTHER-EXPLAIN
RD=REMOVE DEVICE	CS=CLOSE SWITCH	IC=INSTALL CARD
OS=OPEN SWITCH	RC=REMOVE CARD	RJ=REMOVE JUMPER
IF=INSTALL FUSE	IJ=INSTALL JUMPER	CV=CLOSE VALVE

NOTE

This Attachment shall be used to add Industry Experiences as they occur or are found.

There were no operating experiences found at this time.

ATTACHMENT 3 **IPEC MAINTENANCE FEEDBACK FORM**

(Page 1 of 1)

Fill out **ALL** the shaded boxes. If it is a request for a new procedure, insert "new procedure" in the box asking for the document number. An electronic version may be used.

IPEC MAINTENANCE DOCUMENT FEEDBACK FORM

TO: _____ **DATE:** _____

Procedure Sponsor/Location

PRIORITY:
1. HIGH ( )
2. MEDIUM ( )
3. LOW ( )

FROM: _____ **EXTENSION:** _____

Originator/ Dept **LOG NUMBER:** _____

The following discrepancy was found with _____

Document Number

Revision _____, during: _____

Enter PCRS No. CTS No. MOD No., or other source information

Outage Related
No ( )
Yes ( )

Discrepancy:

I propose the following resolution:

CC: Supervisor (ATTACH ADDITIONAL SHEETS OR ACTUAL DOCUMENT IF NECESSARY)

TO: _____ **DATE:** _____ **FROM:** _____

Your information has been received, and will be incorporated. ☐ *Yes* ☐ *No*

☐ *Next Revision* ☐ *Immediately* ☐ *Other* _____

( ) as you proposed ( ) as described

****REASON/COMMENTS:**

ENGINEER COMMENTS:

Original: Procedure File

CC: Originator

Thanks! We appreciate your feedback!