

STATION PROCEDURE OR FORM CHANGE

A. IDENTIFICATION

PROCEDURE OR FORM NUMBER OP2347B REV. 5 CHANGE NO. 1
(Circle One)

PROCEDURE OR FORM TITLE Normal Station Service Transformer
(Circle One)

INITIATED BY Keith D. Deslandes 156-25 (N.S.S.T.)

B. CHANGE

as per attached sheet

C. REASON FOR CHANGE

In response to CR0484-02 "Operating a nuclear Power Plant at Voltage Levels Lower Than Analyzed"

D. NON-INTENT CHANGE AUTHORIZATION (N/A for Intent Changes)

TITLE	SIGNATURE	DATE
<u>Shift Supervisor (on duty)</u>	_____	_____
_____	_____	_____

E. REVIEWED

Department Head

John S. Keenan 8/14/85

Unreviewed Safety Question Evaluation Documentation Required:

(Significant change in procedure method or scope as described in FSAR)

(If yes, document in PORC/SORC meeting minutes)

[] YES [X] NO

ENVIRONMENTAL IMPACT

(Adverse environmental impact)

(If yes, document in PORC/SORC meeting minutes)

[] YES [X] NO

F. INTEGRATED SAFETY REVIEW REQUIRED

(Affects response of Safety Systems, performance of safety-related control systems or performance of control systems which may indirectly affect safety system response.)

(If yes, document in PORC/SORC meeting minutes.)

[] YES [X] NO

G. PORC/SORC RECOMMENDS APPROVAL (or confirmation of interim change within 14 days)

PORC/SORC Meeting Number 2-85-176

H. APPROVAL AND IMPLEMENTATION

The change is hereby implemented and is effective this date, except for interim changes which were implemented and effective per the Authorization of D above.

John S. Keenan
Station Superintendent/Unit Superintendent

8/15/85
Date

DEGRADED VOLTAGE (DRAFT)

Addition to OP 2347B

8.2(a) NSST Degraded Voltage C04L CA-8

<u>Initiating Device</u>	<u>Setpoint</u>
Computer Point	>3620 volts
EE032	(90% + 20V)
Bus 24 A/B (4.16KV)	

** And/or the following alarms **

ESAS UV 2A Trip Bus 24D	C01	A-44
ESAS UV 2B Trip Bus 24D	C01	B-44
ESAS UV 2C Trip Bus 24D	C01	C-44
ESAS UV 2D Trip Bus 24D	C01	D-44

<u>Initiating Device</u>	<u>Setpoint 70% for .5 sec. or 88% for 8 sec.</u>
UV 2 Bistable BA113	85.5 VAC or 106 VAC for 8 seconds
UV 2 Bistable BA213	85.5 VAC or 106 VAC for 8 seconds
UV 2 Bistable BA313	85.5 VAC or 106 VAC for 8 seconds
UV 2 Bistable BA413	85.5 VAC or 106 VAC for 8 seconds

ESAS UV 1 A Trip Bus 24C	C01	A-43
ESAS UV 1 B Trip Bus 24C	C01	B-43
ESAS UV 1 C Trip Bus 24C	C01	C-43
ESAS UV 1 D Trip Bus 24C	C01	D-43

<u>Initiating Device</u>	<u>Setpoint 70% for .5 sec. or 88% for 8 sec.</u>
UV 1 Bistable BA112	85.5 VAC or 106 VAC for 8 seconds
UV 1 Bistable BA212	85.5 VAC or 106 VAC for 8 seconds
UV 1 Bistable BA312	85.5 VAC or 106 VAC for 8 seconds
UV 1 Bistable BA412	85.5 VAC or 106 VAC for 8 seconds

NOTE:

The computer alarm EE032 may be the first alarm due to a degraded voltage condition. The ESAS alarms could precede or follow if the grid voltage continues to fall.

With a voltage of 3520 volts (88%) for a time period of 8 seconds; the RSST feeder breaker will open.

If the grid voltage falls to 2820 volts the ESAS alarms will come in. Buses 24C and 24D will load shed and both diesel generators will start.

ACTION:

Auto :

1. None

Initial

1. Verify proper operation of the Turbine Generator and its exciter per procedure OP 2324A.
2. Verify actual degraded voltage condition by observation of bus voltmeters.

Bus 24A,B,C,D,E	<3620 volts
Bus 22E,F	<424 volts
3.
 - a) Call convex to raise 24KV generator voltage/increase VAR output.
 - b) Call convex to raise system voltage.
4. After 2 hours of degraded voltage (<3620 volts on bus 24A,B,C,D, E) complete the following.
 - a) Lockout the RSST feeder breaker to the 4KV bus (24C or 24D), whichever is supplying bus 24E.
 - b) Start the diesel generator on the 4KV bus (24C or 24D), whichever one is supplying bus 24E, per OP 2346A.
 - c) Match diesel generator load with bus load.
 - d) Open the tie breaker to the non-vital loads on the affected bus. The tie-breaker also disconnects the NSST from the affected bus.
 - e) Raise diesel generator output voltage and frequency to normal running conditions.
 - f) Trip the ESAS undervoltage module for the affected bus.

NOTE:

If the undervoltage module is not tripped and if an SIAS were to occur, the starting of HPSI, LPSI and Containment Spray Pumps would overload the diesel generator.

NOTE:

The above steps are protecting two out of three pumps from undervoltage. Only one of the two pumps are running at any time on the affected buses.

No safety related pumps (HPSI, LPSI, Containment Spray) are running. All surveillance on operating and safety related pumps and motors are to be secured.

5. After 3 hours of degraded voltage and if reactor/turbine has not occurred, manually trip reactor/turbine.

SUBSEQUENT

1. Determine cause of degraded voltage condition and log reason, action taken and time period to restore normal voltage.

MP2 PDCR Routing/Review

PROCEDURE

This ~~PDCR~~ will be presented to PDCR on 8/15/85

PDCR Member Routing — *Degraded Grid Voltage Procedure*

If no response is received by 8/13/85, it is assumed that there is no comment.

R. W. Bates	D. C. Kross
F. R. Dacimo	J. J. Parillo
J. S. Keenan	R. A. Place
J. J. Kelley	

Department Design Review (completed prior to PDCR) This design review involves a face to face discussion including these topics as a minimum.

- 1) The problem to be resolved
- 2) The design intent
- 3) Installation
- 4) Repair ease during operations
- 5) Operational Concepts
- 6) Test Program and Procedures.

Operations	Signature	
Maintenance	Signature	
Instrumentation	Signature	
Production Test	Signature	if required
Betterment	Signature	if required
Quality Control	Signature	

*Please send comments to Keith P. Deslards
Unit 2. Engineering.*

STATION PROCEDURE COVER SHEET

A. IDENTIFICATION

Number OP 2347B

Rev. 5

Title NORMAL STATION SERVICE TRANSFORMER 15G-2S (N.S.S.T.)

Prepared By R. H. Burnside

B. REVIEW

I have reviewed the above procedure and have found it to be satisfactory.

<u>TITLE</u>	<u>SIGNATURE</u>	<u>DATE</u>
DEPARTMENT HEAD		
<u>Shift Supervisor</u>	<u>[Signature]</u>	<u>3/7/85</u>
	<u>[Signature]</u>	<u>2/16/85</u>

C. UNREVIEWED SAFETY QUESTION EVALUATION DOCUMENTATION REQUIRED:

(Significant change in procedure method or scope as described in FSAR) YES [] NO [☒]
(If yes, document in PORC/SORC meeting minutes)

ENVIRONMENTAL IMPACT

(Adverse environmental impact) YES [] NO [☒]
(If yes, document in PORC/SORC meeting minutes)

D. INTEGRATED SAFETY REVIEW REQUIRED

(Affects response of Safety Systems, performance of safety-related control systems or performance of control systems which may indirectly affect safety system response.) YES [] NO [☒]
(If yes, document in PORC/SORC meeting minutes.)

E. PROCEDURE REQUIRES PORC/SORC REVIEW

YES [☒] NO []

F. PORC/SORC APPROVAL

PORC/SORC Meeting Number 2-85-39

G. APPROVAL AND IMPLEMENTATION

The attached procedure is hereby approved, and effective on the date below:

[Signature]
Station/Service/Unit Superintendent

3/22/85
Effective Date

UNIT 2

NORMAL STATION SERVICE TRANSFORMER 15G-2S (N.S.S.T.)

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7.2 De-energizing N.S.S.T.	15G-2S

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1. OBJECTIVE

- 1.1 To provide a procedure for startup, shutdown, normal and casualty operations of the Normal Station Service Transformer (N.S.S.T.).

2. LICENSE REQUIREMENTS

- 2.1 Refer to Technical Specifications 3/4.7.

3. REFERENCES

- 3.1 F.S.A.R. Chapter 8.

4. PLANT OPERATING REQUIREMENTS

- 4.1 The N.S.S.T. is the preferred source of 6.9-KV and 4.16-KV power during Turbine Generator at power operations.

5. PREREQUISITES

- 5.1 125 VDC control power in service.
5.2 Station relaying available as required.
5.3 Telephone communications as required.
5.4 Cooling Supply Power from MCC 22-2A and MCC 22-1DA is available and Cooling Control in Automatic.
5.5 Data Logger Computer in service (desired).
5.6 N.S.S.T. N2 Gas bottles pressure between 500 psig and 2000 psig and gas system in service. Normal tank pressure range 1.0 psig to 1.5 psig.
5.7 Verify Transformer Deluge System available for service.

6. PRECAUTIONS

- 6.1 Before racking out any low side breaker, check to make sure the breaker is open.
6.2 Do not close breakers locally without contacting Control Room Operator.
6.3 Check switching and tagging log to assure clearance of all tags on equipment to be energized.

- 6.4 Before energizing any equipment following maintenance, a visual inspection will be made to ensure that all portable grounds have been removed, all bus compartment panels have been replaced, all breakers on the equipment are open, all foreign objects from in and around the equipment have been removed, all protective relay targets are reset, potential transformer fuses are installed and all compartment doors are closed.
- 6.5 N.S.S.T. will be energized anytime the turbine generator is energized, except whenever the isolated phase links between the generator terminals and N.S.S.T. terminals have been removed.
- 6.6 For forced-oil-cooled (FOA or FOW) transformers with all pumps or fans or both inoperative, the following operating conditions are assumed to occur infrequently and without undue damage to the transformer:
1. Rated load may be maintained for approximately 1 (one) hour following normal operation at nameplate rating at 30°C ambient.
 2. Rated load may be carried for approximately 2 (two) hours if started with the windings and oil at 30°C ambient.
 3. Rated voltage may be maintained for 6 (six) hours at no load, following continuous operation at nameplate rating at 30°C ambient with cooling equipment in operation.
 4. Rated voltage may be maintained for 12 hours at no load starting with the windings and oil at 30°C ambient.
- 6.7 For forced-oil-cooled transformers (FOA or FOW) ratings with part of coolers in operation, use the following:

Table 92.01 - 244

% of Total Coolers in Operation	Permissible Load in % of Nameplate Rating
---------------------------------	--

100	100
80	90
60	78
50	70
40	60
33	50

- 6.8 Do not exceed the low side rates of X-Wdy 6.9KV 30MVA 2513 amps, Y-Wdy 4.16KV 15MVA 2084 amps.
- 6.9 When racking a 4160 or 6900V breaker up and down, stand off to the side of the compartment, use only the left hand for racking operation, and turn your face away.
- 6.10 Whenever opening or closing a 4160 or 6900V breaker locally, stand to the side of the compartment, extend only one arm across the front of it and turn your face away.

7. PROCEDURE

- 7.1 Energizing N.S.S.T. 15G-2S.
- 7.1.1 Verify N.S.S.T. low side breakers, 2S2-25A-2, 2S2-25B-2, 2S3-24A-2 and 2S3-24B-2 are open.
- 7.1.2 Refer to OP2324A for Turbine Generator Excitations operations which will energize the N.S.S.T.
- 7.2 De-energizing N.S.S.T. 15G-2S.

NOTE: In order to de-energize the N.S.S.T. during normal conditions, the Turbine Generator must be removed from service and its excitation de-energized.

- 7.2.1 Refer to OP2342 for 6.9-KV breakers and OP2343 for 4.16-KV breakers operations.
- 7.2.2 Refer to OP2324A for Turbine Generator Excitations removal from service.

8. ALARMS-AND MALFUNCTIONS

8.1 N.S.S.T. Lockout Channel I

Initiating Device

C08 A1

Set Point

$\frac{86T1}{15G-2S}$ or $\frac{86T2}{15G-2S}$

- -

Transformer Differential

(87T-A) (87T-B) (87T-C)

15G-2S

N.S.S.T. Lockout Channel II

Initiating Device

C08 B1

Set Point

$\frac{87T3}{15G-2S}$ or $\frac{86T4}{15G-2S}$

- -

High Voltage Overcurrent

50/51T-A, (B), (C)
15G-2S

Grounding Transformer Overcurrent

50/51T-A, (B), (C)
15G-2S3

Low Voltage Ground Fault 6.9KV

51N-1A
15G-2S2

Low Voltage Ground Fault 4.16KV

51N-2A
15G-2S3

Action

Auto

1. Trips Turbine Generator.
2. Trips Auto Transfer Trip Channel I & II of Main Transformer, which trip 15G-8T-2 and 15G-9T-2.
3. Trips 2S2-25A-2 and 2S2-25B-2, 6.9-KV breakers.
4. Trips and lockouts 2S3-24A-2 and 2S3-24B-2, 4.16-KV breakers.
5. Trips and lockouts of the Generator Field Breaker.
6. Initiates transfer of stations service loads to the Reserve Station Service Transformer.

Initial

1. Verify all auto actions take place.
2. Initiate EOP 2525 Standard Post Trip Actions if plant load was greater than 15% F.P. at time of trip.

Subsequent

1. Determine cause of trip by observation of relay targets, record targets and relay drops.
2. Notify CONVEX, and Maintenance Department of problem.
3. After problem has been corrected, reset targets and relays.
4. Reset Lockout relays 86T1, 86T2, 86T3 and 86T4.
5. Restore system to normal as per OP2347B.

NOTE:

For operation without the N.S.S.T.

If the N.S.S.T. cannot be restored to service, it may be isolated by removing the removable links in the isolated phase bus. This would need a special maintenance procedure and operating procedure.

8.2 N.S.S.T. Undervoltage

Initiating Device

C08 C1

Set Point

$\frac{27X-1}{15G-2S2}$ and $\frac{27X-1}{15G-2S2}$ (6.9KV)

< 70% of normal

$\frac{27X-1}{15G-2S3}$ and $\frac{27X-1}{15G-2S3}$ (4.16KV)

< 70% of normal

Action

Auto

1. Blocks closing of the following breakers:
2S3-24A-2, N.S.S.T. to Bus 24A
2S3-24B-2, N.S.S.T. to Bus 24B
2S2-25A-2, N.S.S.T. to Bus 25A
2S2-25B-2, N.S.S.T. to Bus 25B

Initial

1. Verify proper operation of the turbine generator and its exciter.

2. Verify actual undervoltage condition by observation of bus voltmeters.
3. If possible reduced affected buses loads to restore voltage to normal.

Subsequent

1. Determine cause of undervoltage and correct.

8.3 N.S.S.T. Trouble

C08 D-1

Initiating Device

Set Point

N.S.S.T. Local Panel

Common Alarm Light

Action

Auto

1. None.

Initial

1. Monitor main control board indication of voltage, current, KW, etc., or other alarms to determine if a fault exists on the N.S.S.T.
2. Monitor N.S.S.T. temperature and other parameters on the plant Data Logger.
3. Dispatch an operator to the N.S.S.T. local common alarm light panel to determine what the alarm is.

Subsequent

1. Refer to Subsequent action under individual N.S.S.T. alarms.

8.3.1 N.S.S.T. cooler Power Auto Transfer Local Panel

Initiating Device

Set Point

Transfer Device

Loss of selected power supply

Action

Auto

1. Automatic transfer of power to the alternate source.

Initial

1. Reset local alarm to enable future N.S.S.T. alarms to annunciate main control board "N.S.S.T. Trouble".
2. Check closed breakers 8C-2, 8C-3 on local panel.
3. Check for blown fuses, FU-1, on local panel.

4. Check closed power supply breakers on MCC22-2A and MCC22-1DA.
5. Insure fans and pumps are running as applicable.

Subsequent

1. If cause of trouble cannot be determined, notify Maintenance Department.

8.3.2 N.S.S.T.

High Combustible Gas

Initiating Device

Fault Gas Monitor

Set Point

1%

Action

Auto

1. None.

Initial

1. Reset local alarm to enable future alarms to annunciate Main Control Board "N.S.S.T. Trouble".
2. Observe local fault gas monitor indication.
3. Notify Control Room of indication.

A. *Classification of Total Combustible Gas Reading

TCG Reading %

Course of Action

0 - 0.5

No Action

0.5 - 1

Caution: Close

surveillance for upward Trends

1 - 5

Investigate cause

immediately

5 -

Remove transformer from

service until cause is

located and remedied

Subsequent

1. High fault, gas monitor reading could indicate an internal fault, notify CONVEX of indication.
2. Proceed as directed by CONVEX.

8.3.3 N.S.S.T. Hi-Lo Tank Pressure

Indicating Device

Set Point

Pressure Sensor Hi

3.0 psig

Pressure Sensor Lo

.25 psig

Action.

Auto

1. None.

Initial

1. Reset local alarm to enable future alarms to annunciate main control board "N.S.S.T. Trouble".
2. Observe local gas regulator pressure, tank liquid level and winding temp.
3. Notify Control Room.

Subsequent

1. Hi Tank pressure could result from a failed nitrogen regulator or an internal/external fault (normal range is 1.0 psig to 1.5 psig) or from increasing transformer load.
2. If there is an internal or external fault, notify CONVEX and proceed as directed.
3. If N2 regulator has failed, replace same as per General Electric instruction manual for the N.S.S.T. after notifying CONVEX of the malfunction.
4. If tank pressure is low, have Electrical Maintenance carry out the required adjustment. If regulator has failed, repeat subsequent action step (3). If N2 bottle is exhausted, replace same.

8.3.4 N.S.S.T. Liquid Temp
N.S.S.T. Winding Temp (Y) Local Panel
N.S.S.T. winding Temp (X)

<u>Initiating Device</u>	<u>Set Point</u>
1. Oil Temp. Detector	90°C
2. Winding Temp. Detectors	105°C

Action

Auto

1. None.

Initial

1. Reset local alarm to enable future alarms to annunciate Main Control Board "N.S.S.T. Trouble".

2. Check local temperature indicators.
3. Check cooling fans and oil pumps operating select "hand" operation for cooling fans and oil pumps at local panel, if necessary.
4. Check closed cooling fan and oil pumps CKT Bkrs. at local panel 8C-4, 8C-5, 8C-6, 8C-7, and red handle breaker in the right side of the local panel.

Subsequent

1. If temperature control cannot be regained, notify CONVEX.
2. If temperature exceeds 105°C on NSST 6.9 KV windings, monitor temperature. If temperature exceeds 115°C, transfer one 6.9 KV bus to the reserve station service transformer.

8.3.5 N.S.S.T. Pressure Relief

Indicating Device

Set Point

Pressure Relief Value (red light) \geq 5psi

Action

Auto

1. Relieve overpressure condition in the tank.

Initial

1. Reset local alarm to enable future alarms to annunciate Main Control Board "N.S.S.T. Trouble".
2. Observe which relief value has lifted, verify overpressure condition has been corrected and check that relief valve has reset.
3. Notify Control Room.

Subsequent

1. Follow applicable portions of OP Procedure, Section 8.3.3.1 and 8.3.3.2 initial and subsequent action as to causes and corrective action for tank overpressure.

8.3.6 N.S.S.T. Liquid Level

Local Panel

Initiating Device

Set Point

Liquid level gauge

Low Mark

Action -

Auto

1. None

Initial

1. Reset local alarm to enable future alarms to annunciate Main Control Board "N.S.S.T. Trouble".
2. Check local level indications.
3. Check N.S.S.T. for oil leaks.

Subsequent

1. On a major oil leak where the transformer windings will be uncovered, notify CONVEX and proceed to remove the N.S.S.T. from service.
2. On a minor oil leak, notify CONVEX and closely observe oil level until corrective action has been taken.

8.3.7	N.S.S.T. loss of liquid flow	Local Panel
	<u>Initiating Device</u>	<u>Set Point</u>
	Liquid flow gauge	Less than 90% normal

Action

Auto

1. None

Initial

1. Reset local alarm to enable future alarm to annunciate Main Control Board "N.S.S.T. Trouble".
2. Check oil pumps operating.
3. Check breakers 8C-6, 8C-7 on local panel closed.
4. Check oil pump overloads reset.
5. Check oil level.

Subsequent

1. Place oil pumps in manual, if oil pumps will not run or flow alarm will not clear, notify Maintenance Department.
2. Notify CONVEX.

8.3.8	N.S.S.T. Loss of Control Power	Local Panel
	<u>Initiating Device</u>	<u>Set Point</u>
	Control Power Undervoltage	Less than 70% normal

Action

Auto

1. Loss of N.S.S.T. Cooling fans and oil pumps.
2. Loss of fault gas monitor.
3. Loss of local panel heaters, lights and convenience outlets.

Initial

1. Reset local alarm to enable future alarms to annunciate Main Control Board "N.S.S.T. Trouble".
2. Check closed circuit breakers 8C-1, 8C-2 and 8C-3 on the local panel.
3. Check for blown fuses, FU-1, on local panel.
4. Check closed power supply breakers on MCC22-2A and MCC22-1DA.

Subsequent

1. If control power cannot be restored, notify CONVEX and proceed as directed to remove the N.S.S.T. from service.

8.3.9	N.S.S.T. Low Gas Cylinder Pressure	Local Panel
	<u>Initiating Device</u>	<u>Set Point</u>
	Pressure Switch 63GC	200psig

Action

Auto

1. None

Initial

1. Reset local alarm to enable future alarms to annunciate Main Control Board "N.S.S.T. Trouble".
2. Verify N.S.S.T. tank pressure as normal.
3. Verify low pressure condition of the N2 gas cylinder.

Subsequent

1. Notify Control Room of indications.
2. Replace the spent N2 gas cylinder with a full one.
3. Check system for leaks.

8.4	N.S.S.T. Degraded Voltage	C04L	CA-8 (Computer)
	<u>Initiating Device</u>		<u>Set Point</u>

(COMMITMENT: IE INFO NOTICE 84-02)

Computer Print	3620V
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EE032

Bus 24 A/B (4.16KV)

Action

Auto

1. None

Initial

1. Verify proper operation of the turbine generator and its exciter per Procedure OP 2324A.
2. Verify actual degraded voltage condition by observation of bus voltmeters.
Bus 24A, B, C, D, & F < 3620V
Bus 22E & F < 424V
3. If possible reduce affected busses loads to increase voltage.
4. Call Convex to raise 24KV Generator Voltage/Increase VAR output.
5. Call Convex to raise system voltage.
6. Inform Duty Officer if Degraded Voltage persists.

NOTE: The short degradation voltage for safety related motors is 85% of rated voltage. The time limit at this voltage before permanent damage is approximately 4 hours.

Subsequent

1. Determine cause of degraded voltage condition and log reason, action taken, and time period taken to restore normal voltage.

RHB:dlp