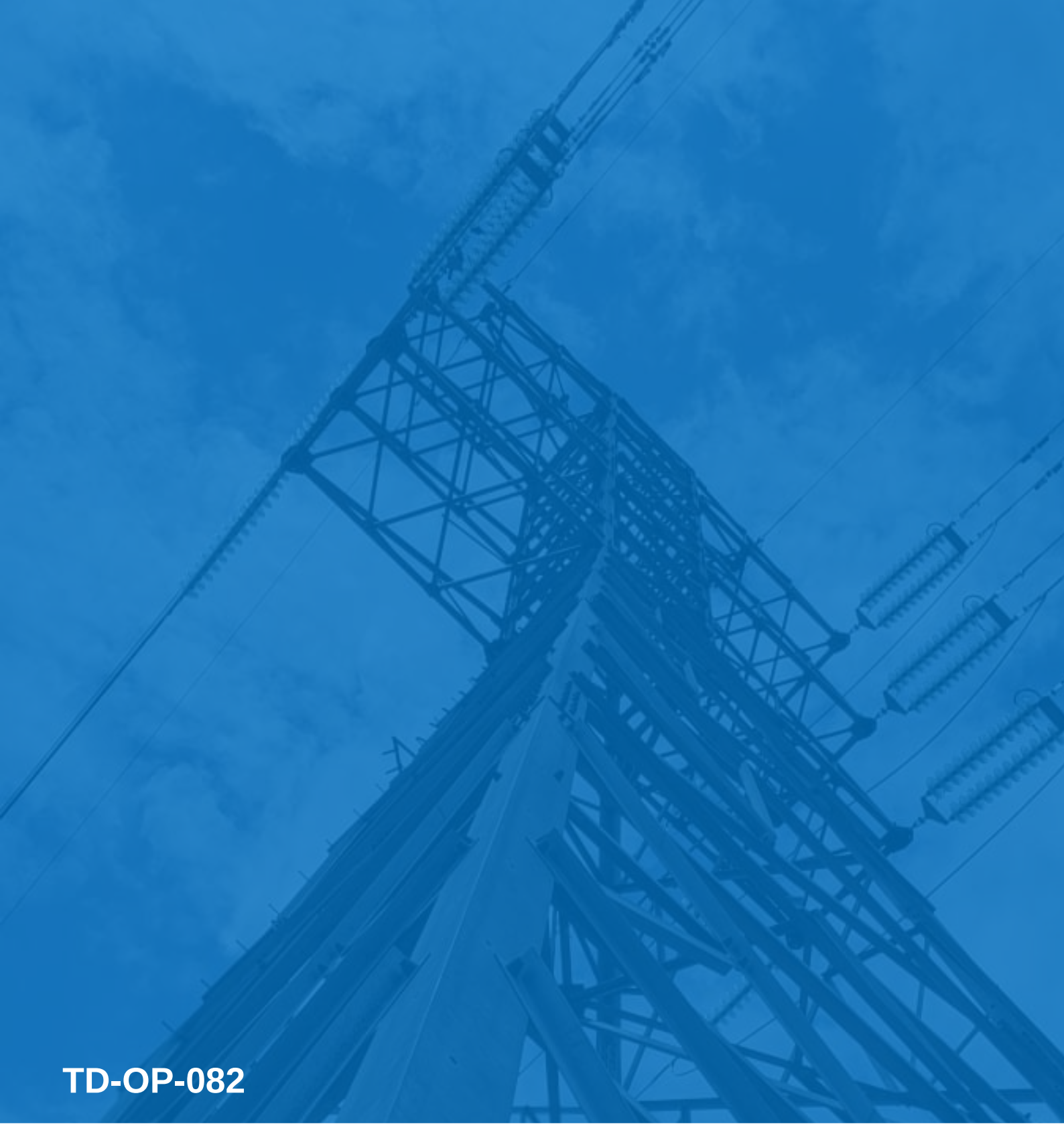

TD-OP-082

GRIDCo

OPERATING PROCEDURE FOR NAYAGNIA (225kV) SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR NAYAGNIA SUBSTATION (NY82)**		
Issued To:	Director, System Operations Director, NNS Manager, SCC Manager, Dispatch Operations Area Manager, Bolga Operating Staff, Bolga Area Maintenance Staff, Bolga Area Dispatch Staff, SCC	**Number:**	TD-OP-082
		Subject Area:	Operating
		Issue Date:	Trial
		Origin:	Technical Services
Key Words:	Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

CONTENTS

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at NY82 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Bolga Operating Area and System Control Center (SCC) for operation of equipment at NY82 Substation.

3. Procedure

3.1. To take NY6ZA line out of service

SCC shall carry out (or advise the NY82 Operator to carry out) the following:

- Open 82L6R3 breaker
- Open 82L6H and 82L6T3 breakers
- SCC shall advise the ZAGTOULI Operator to carry out the following:
- Open the necessary breakers at their end
- Check for no potential on NY6ZA line

3.2. To take out, isolate and de-energize NY6ZA line for work

NY82 Operator shall request for Station Guarantee from ZAGTOULI

SCC shall carry out (or advise the NY82 Operator to carry out) the following:

- Open 82L6R3 breaker
- Open 82L6H and 82L6T3 breakers
- SCC shall advise the Burkina Faso Operator to carry out the following:
- Open the necessary breakers at their end
- Check for no potential on NY6ZA line

SCC shall advise ZAGTOULI Operator to carry out the following:

- Isolate their end of the line

SCC shall advise NY82 Operator to carry out the following:

- Open 82NY6ZA-H and 82L6R3-L6 disconnect switches and turn off 125Vdc supply

- Close 82NY6ZA-G ground disconnect switch

3.3. To restore NY6ZA line to service after work

3.3.1. Prepare NY6ZA line for restoration:

NY82 Operator shall:

- Advise SCC when work on the line has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on NY6ZA line

SCC shall advise ZAGTOULI Operator to carry out the following

- Check opened the necessary breakers

SCC shall advise NY82 Operator to carry out the following:

- Check open 82L6R3 breaker

- Check open 82L6H and 82L6T3 breakers

- Open 82NY6ZA-G ground disconnect switch

- Turn on 125Vdc supply and close 82NY6ZA-H and 82L6R3-L6 disconnect switches

3.3.2. Restoration of NY6ZA line to service:

SCC shall:

- Advise the NY82 and ZAGTOULI Operators of readiness to restore NY6ZA line to service

    - Close (or advise the NY82 Operator to close) 82L6R3, 82L6H and 82L6T3 breakers

- Advise the ZAGTOULI Operator to close the necessary breakers at their end

3.4. To restore NY6ZA line to service after automatic outage

If NY6ZA line trips auto due to fault on the line:

NY82 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall:

- Energize (or advise the NY82 Operator to energize) the line **ONCE** by closing 82L6R3, 82HL6 and 82L6T3 breakers
- Advise the ZAGTOULI Operator to close their end breakers

NY82 Operator shall:

- Advise the Supervisor/Area Manager of operation above
- Advise maintenance men to patrol the line if the operation above is not successful

3.5. To isolate 82T3 Bank for work

SCC shall advise NY82 Operator to carry out the following:

- Inform customers about readiness to take off 82T3 bank
- Request customers on 82T3 Bank to take off their load
- If Station Service is on 82T3 transfer supply to 82T4 by switching from AC3 to AC4,
- Open AC3 Contactor/MCB to take off supply to 82T3 transformer auxiliaries

SCC shall carry out (or advise NY82 Operator to carry out) the following:

- Open 82T3K and 82L6T3 breakers (225kV) breakers
- Open 82PT3 and 82ET3 breakers (330kV) breakers
- Check for no potential on 82T3 Bank
- Open 82T3-K disconnect switch and turn of its 125kV dc supply
- Open 82T3-P disconnect switch and turn off its 125kV dc supply

- Close 82T3-G1 disconnect switch (330kV)
- Close 82T3-G2 disconnect switch (225kV)
- Open AC control MCB to 82T3 auxiliaries
- Open 125Vdc breaker to 82T3 primary and secondary protection and tag with PC13

SCC shall advise NY82 Operator to carry out the following:

- Open AC1 Contactor/MCB to take off supply to 82T3 transformer auxiliaries

3.6. To restore 82T3 Bank to service after work

3.6.1. Prepare 82T3 bank for restoration:

NY82 Operator shall:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 82T3 Bank and temporary grounds removed
- Check open 82T3K and 82L6T3 breakers (225kV) breakers
- Check open 82PT3 and 82ET3 breakers (330kV) breakers
- Open 82T3-G2 disconnect switch (225kV)
- Open 82T3-G1 disconnect switch (330kV)
- Turn on 125Vdc supply and close 82T3-P disconnect switch (330kV)
- Turn on 125Vdc supply and close 82T3-K disconnect switch (225kV)
- Close AC control MCB to 82T3 auxiliaries
- Close 125Vdc breaker to 82T3 primary and secondary protection and remove tag PC13
- Advise SCC of readiness to restore 82T3 Bank to service

3.6.2. Restoration of 82T3 bank to service:

- SCC shall close (or advise NY82 Operator to close) the 82PT3 and 82ET3 breakers (330kV) to energize 82T3 Bank
- SCC shall close (or advise NY82 Operator to close) the 82T3K and

82L6T3 breakers (225kV) to tie to 225kV Bus

3.7. To restore 82T3 Bank to service after automatic outage

If 82T3 bank trips auto due to fault:

NY82 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall:

- Energize (or advise the NY82 Operator to energize) the transformer ONCE by closing 82PT3 and 82ET3 breakers (330kV)

NY82 Operator shall:

- Check for potential on 82T3 and advice SCC

SCC shall:

Close (or advise the NY82 Operator to close) 82T3K and 82HT3 breakers (225kV) breakers

NY82 Operator shall:

- Advise the Supervisor/Area Manager and SCC of items above
- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

3.8. Isolate 82T4 Bank for work

SCC shall advise NY82 Operator to carry out the following:

- Inform customers about readiness to take off 82T4 bank
- Request customers on 82T4 Bank to take off their load
- If Station Service is on 82T4 transfer supply to 82T3 by switching from AC4 to AC3,
- Open AC4 Contactor/MCB to take off supply to 82T4 transformer

auxiliaries

SCC shall carry out (or advise NY82 Operator to carry out) the following:

- Open 82HT4 and 82T4K breakers (225kV) breakers
- Open 82PT4 and 82ET4 breakers (330kV) breakers
- Check for no potential on 82T4 Bank
    - Open 82T4-K disconnect switches and turn off 125Vdc supply
- Open 82T4-P disconnect switch and turn off 125Vdc supply
- Close 82T4-G1 disconnect switch (330kV)
- Close 82T4-G2 disconnect switch (225kV)

  Open AC control MCB to 82T4 auxiliaries
- Open 125Vdc breaker to 82T4 primary and secondary protection and tag with PC13

3.9. To restore 82T4 Bank to service after work

3.9.1. Prepare 82T4 bank for restoration:

NY82 Operator shall:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 82T4 Bank and temporary grounds removed
- Check open 82HT4 and 82T4K breakers (225kV) breakers
- Check open 82PT4 and 82ET4 breakers (225kV) breakers
- Open 82T4-G1 disconnect switch (330kV)
- Open 82T4-G2 disconnect switch (225kV)
- Turn on 125Vdc supply and close 82T4-P disconnect switch (330kV)
- Turn on 125Vdc supply and close 82T4-K disconnect switch (225kV)
- Close AC control MCB to 82T4 auxiliaries
- Close 125Vdc breaker to 82T4 primary and secondary protection and remove tag PC13

- Advise SCC of readiness to restore 82T4 Bank to service

3.9.2. Restoration of 82T4 bank to service:

SCC shall close (or advise NY82 Operator to close) the 82PT4 and 82ET4 breakers (330kV)

SCC shall close (or advise NY82 Operator to close) the 82T4K and 82HT4 breakers (225kV)

3.10. To restore 82T4 Bank to service after automatic outage

If 82T4 bank trips auto due to fault:

NY82 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall:

Energize (or advise the NY82 Operator to energize) the transformer **ONCE** by closing 82PT4 and 82ET4 breakers (330kV)

NY82 Operator shall:

Check for potential on 82T4 and advice SCC

SCC shall:

Close (or advise the NY82 Operator to close 82T4K and 82HT4 breakers (225kV)

NY82 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above
- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

3.11. Isolate 82R3 Shunt Reactor for work

SCC shall advise the ZAGTOULI Operator of work on the 82R3 Shunt Reactor

SCC shall advise NY82 Operator to carry out the following:

- Open AC1 Contactor/MCB to take off supply to 82R3 Shunt Reactor auxiliaries

SCC shall carry out (or advise NY82 Operator to carry out) the following:

- Open 82L6R3 breaker
- Check for no potential on 82R3 Reactor
- Open 82L6R3-L6 disconnect switch
- Close 82L6R3-G disconnect switch
- Open AC control MCB to 82R3 Reactor auxiliaries
- Open 125V DC breaker to 82T2 primary and secondary protection and tag with PC13

3.12. To restore 82R3 Shunt Reactor to service after work

3.12.1. Prepare 82R3 Shunt Reactor for restoration:

NY82 Operator shall:

- Advise SCC when work on the Reactor has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 82R3 Shunt Reactor and temporary grounds removed
- Open 82L6R3-G disconnect switch
- Close 82L6R3-L6 disconnect switch
- Close AC control MCB to 82R3 auxiliaries and remove tag
- Close 125Vdc breaker to 82R3 primary and secondary protection and remove tag PC13
- Advise SCC of readiness to restore 82R3 Shunt Reactor to service

3.12.2. Restoration of 82R3 Shunt Reactor to service:

SCC shall close (or advise NY82 Operator to close) the 82L6R3 breaker

3.13. To restore 82R3 Shunt Reactor to service after automatic outage

If 82R3 Shunt Reactor trips auto due to fault:

NY82 Operator shall:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall:

Energize (or advise the NY82 Operator to energize) the transformer **ONCE** by closing 82L6R3 breaker

NY82 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above
- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

4. Explanation

Transformer and Bus automatic outages may be caused by the following relay operations:

- Transformer differential lockout relay-86T
- Transformer Bucholtz relay or high temperature lockout relay-86G
- Transformer overcurrent back up relays

a. If 86T operates, the breakers which have opened auto, cannot be reclosed until the lockout relay has been reset or the lockout feature has been by-passed.

- Carry out thorough inspection of the Transformer and the 34kV and 11kV
  Structures looking for oil leakage, shattered insulators on the structures and dead birds or reptiles

b. 86T can be reset manually immediately after an automatic outage if the station is attended.

c. 86G cannot be reset unless transformer gas and / or temperature conditions are normal or the MCB to the transformer protective relays is off.

NOTE:

I. If it has been necessary to restore the MCB to the transformer relay in order to reset 86G and restore a healthy bank to service, they shall not be restored until the gas and /or temperature conditions on the faulted bank is rectified.

II. Operation of 86T or 86G lockout relays may be due to major transformer faults hence No attempt should be made to re-energize the bank until Electrical Maintenance staff have inspected and meggered the Transformer.

ISOLATION AND DE-ENERGIZING

1. Open the necessary breaker(s) to take the line off potential.
2. Check all three phases off potential using the Multifunction meter or Analog Voltmeter or for Pole discrepancies on the panel.
3. Open the necessary disconnect switches or MODS to isolate the line from all sources of supply.
4. Close the Grounding Switch.
5. Report completion of the isolation and de-energizing at all assisting stations, to the where the Protection Guarantee is to be issued and to System Control Centre.
6. Issue Work or Work and Test Permit to the workman.

ORDER TO OPERATE

1. An O.TO. (Order-To-Operate) to isolate a line is as follows:

    a. Line Voltage - Check all three phases off potential
    b. Line Breaker - Check Open
    c. Line Disconnect Switches - Open, lock and Tag (MCB to MOD Turn-off)

2. Due to communication difficulties arising when grounds are placed on a line it is necessary to issue a Protection Guarantee on the line before grounds are placed. A work and Test Permit allows for closing and opening permanent grounds switches while the Permit is in effect.

3. If work is to be done a permanent ground switches a PC 14 to close the ground switch is not required.

    The station has two 225kV buses. The main 'H' and 'K' buses have a breaker and half configuration which provides the normal points of supply to all circuits/equipment such as NY6ZA and 82R3 Reactor.

    The 82R3 Reactor in service allows the lines/Bus to be shunt compensated and avoid voltage jumps occurring at the receiving end.

5. Approval

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Director, TSD