TD-OP-0051 330KV

GRIDCo

OPERATING PROCEDURE FOR ASOGLI 330KV SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR ASOGLI SUBSTATION (SG51)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Manager, Asogli Operating Staff, Asogli Maintenance Staff, Asogli Dispatch Staff, SCC	**Number:**	TD-OP-0051
		Subject Area:	Operating
		Issue Date:	Trial
		Origin:	Technical Services
Key Words:	Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at SG51 330KV Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Asogli Operating Area and System Control Center (SCC) for operation of equipment at SG51 330KV Substation.

3. Procedure

3.1. To take SG5KC line out of service

SCC shall carry out (or advise the SG51 Operator to carry out) the following:

- Open 51PET11 breaker

SCC shall carry out (or advise the KC75 Operator to carry out) the following:

- Open 751T11A and 75T11T2 breakers
- Check for no potential on SG5KC line

3.2. To take out, isolate and de-energize SG5KC line for work

SG51 Operator shall request for Station Guarantee from KC75

SCC shall carry out (or advise the SG51 Operator to carry out) the following:

- Open 51PET11 breaker

SCC shall carry out (or advise the KC75 Operator to carry out) the following:

- Open 75T11A and 75T11T2 breakers
- Check for no potential on SG5KC line

SCC shall advise the KC75 Operator to carry out the following:

- Open 75T11A–T11 and 75T11T2-T11 disconnect switches and turn off 125Vdc supply

SCC shall advise the SG51 Operator to carry out the following:

- Open 51PET11-T11 disconnect switch and turn off 125Vdc supply
- Open AC control MCB to 51T11 auxiliaries and tag
- Open 125V DC MCB to 51T11 primary and secondary protection and tag with PC13
- Close 51T11-G ground disconnect switch

3.3. To restore SG5KC line to service after work

3.3.1. Prepare SG5KC line for restoration:

SG51 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 SG5KC line

SCC shall advise SG51 Operator to carry out the following:

- Open 22SG5KC-G ground disconnect switch
- Turn on 125Vdc supply and close 51T11L1-L1 disconnect switch
- Close AC control MCB to 51T11 auxiliaries and tag
- Close 125V DC MCB to 51T11 primary and secondary protection and tag with PC13

SCC shall advise KC75 Operator to carry out the following:

- Turn on 125Vdc supply and close 75T11A–T11 and 75T11T2-T11 disconnect switches

3.3.2. Restoration of SG5KC line to service:

SCC shall:

- Advise the KC75 and SG51 Operators of readiness to restore SG5KC line to service
- Close (or advise SG51 Operator to close) 51PET11 breaker
- Close (or advise KC75 Operator to close) 751T11A and 75T11T2 breakers

3.4. To restore SG5KC line to service after automatic outage

If SG5KC line trips auto due to fault:

SG51 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 SG51 Operator to energize) the line **ONCE** by closing 51PET11 breaker
- Close (or advise KC75 Operator to close) 751T11A and 75T11T2 breakers

SG51 Operator shall:

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

3.5. To take SG6DA line out of service

SCC shall carry out (or advise the SG51 Operator to carry out) the following:

- Open 51PEL6 breaker

SCC shall carry out (or advise the DA80 Operator to carry out) the following:

- Open 80L6E and 80L1L6 breakers
- Check for no potential on SG6DA line

3.6. To take out, isolate and de-energize SG6DA line for work

SG51 Operator shall request for Station Guarantee from DA80

SCC shall carry out (or advise the SG51 Operator to carry out) the following:

- Open 51PEL6 breaker

SCC shall carry out (or advise the DA80 Operator to carry out) the following:

- Open 80L6E and 80L1L6 breakers

- Check for no potential on SG6DA line

SCC shall advise DA80 Operator to carry out the following:

- Open 80L6E-L6 and 80L1L6-L6 disconnect switches and turn off 125Vdc supply
- Close 80SG6DA-G ground disconnect switch

SCC shall advise SG51 Operator to carry out the following:

- Open 51PEL6-L6 disconnect switch and turn off its 125Vdc supply
- Close 51SG6DA-G ground disconnect switch

3.7. To restore SG6DA line to service after work

3.7.1. Prepare SG6DA line for restoration

SG51 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 SG6DA line

SCC shall advise DA80 Operator to carry out the following:

- Check opened 80L6E and 80L1L6 breakers
- Open 80SG6DA-G ground disconnect switch
- Turn on 125Vdc supply and close 80L6E-L6 and 80L1L6-L6 disconnect switches

SCC shall advise SG51 Operator to carry out the following

- Check opened 51PEL6 breaker
- Open 51SG6DA-G ground disconnect switch
- Turn on 125Vdc supply and close 51PEL6-L6 disconnect switch

3.7.2. Restoration of SG6DA line to service:

SCC shall:

- Advise the SG51 and DA80 Operators of readiness to restore SG6DA line to service

- Close (or advise the DA80 Operator to close) 80L6E and 80L1L6 breakers
- Close (or advise the SG51 Operator to close) 51PEL6 breaker

3.8. To restore SG6DA line to service after automatic outage

If SG6DA line trips auto due to fault:

SG51 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:

- Close (or advise the SG51 Operator to energize) the line **ONCE** by closing 51PEL6 breaker
- Close (or advise the DA80 Operator to close) 80L6E and 80L1L6 breakers

SG51 Operator shall:

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

3.9. To take SG22V line out of service

SCC shall carry out (or advise the SG51 Operator to carry out) the following:

- Open 51PEL22 breaker

SCC shall carry out (or advise the V2 Operator to carry out) the following:

- Open 2L22E and 2L22P breakers
- Check for no potential on SG22V line

3.10. To take out, isolate and de-energize SG22V line for work

SG51 Operator shall request for Station Guarantee from V2

SCC shall carry out (or advise the SG51 Operator to carry out) the following:

- Open 51PEL22 breaker

SCC shall carry out (or advise the V2 Operator to carry out) the following:

- Open 2L22E and 2L22P breakers
- Check for no potential on SG22V line

SCC shall advise V2 Operator to carry out the following:

- Open 2L22E-L22 and 2L22P-L22 disconnect switches and turn off 125Vdc supply
- Close 2SG22V-G ground disconnect switch

SCC shall advise SG51 Operator to carry out the following:

- Open 51PEL22-L22 disconnect switch and turn off its 125Vdc supply
- Close 51SG22V-G ground disconnect switch

3.11. To restore SG22V line to service after work

3.11.1. Prepare SG22V line for restoration

SG51 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 SG22V line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2L22E and 2L22P breakers
- Open 2SG22V-G ground disconnect switch
- Turn on 125Vdc supply and close 2L22E-L22 and 2L22P-L22 disconnect switches

SCC shall advise SG51 Operator to carry out the following

- Check opened 51PEL22 breaker
- Open 51SG22V-G ground disconnect switch
- Turn on 125Vdc supply and close 51PEL22-L22 disconnect switch

3.11.2. Restoration of SG22V line to service:

SCC shall:

- Advise the SG51 and V2 Operators of readiness to restore SG22V line to service
- Close (or advise the V2 Operator to close) 2L22E and 2L22P breakers
- Close (or advise the SG51 Operator to close) 51PEL22 breaker

3.12. To restore SG22V line to service after automatic outage

If SG22V line trips auto due to fault:

SG51 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:

- Close (or advise the SG51 Operator to energize) the line **ONCE** by closing 51PEL22 breaker
- Close (or advise the V2 Operator to close) 2L22E and 2L22P breakers

SG51 Operator shall:

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

3.13. To isolate 51T11 Transformer for work

- SG51 Operator shall request Station Guarantee from Operator at KC75

SCC shall carry out (or advise SG51 Operator to carry out) the following:

- Open 51PET11 breaker

- Open AC1 Contactor/MCB to take off supply to 51T11 transformer auxiliaries

SCC shall carry out (or advise KC75 Operator to carry out) the following:

- Open 751T11A and 75T11T2 breakers
- Check for no potential on SG5KC line

SCC shall advise the KC75 Operator to carry out the following:

- Open 75T11A–T11 and 75T11T2-T11 disconnect switches and turn off 125Vdc supply

SCC shall advise the SG51 Operator to carry out the following:

- Open 51PET11-T11 disconnect switch and turn off 125Vdc supply
- Open AC control MCB to 51T11 auxiliaries and tag
- Open 125V DC MCB to 51T11 primary and secondary protection and tag with PC13
- Close 51T11-G ground disconnect switch

3.14. To restore 51T11 Bank to service after work

3.14.1. Prepare 51T11 Bank to service after work

SG51 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 51T11 Bank and temporary grounds removed

SCC shall advise KC75 Operator to carry out the following:

- Turn on 125Vdc supply and close 75T11A–T11 and 75T11T2-T11 disconnect switches

SCC shall advise SG51 Operator to carry out the following:

- Open 51T11-G disconnect switch
- Turn on 125Vdc supply and close 51PET11-T11 disconnect switch
- Close AC control MCB to 51T11 auxiliaries and remove tag
- Close 125V DC MCB to 51T11 primary and secondary protection and remove PC13 tag

3.14.2. Restoration of 51T11 Bank to service:

- SCC shall close (or advise SG51 Operator to close) 51PET11 breaker
- SCC shall close (or advise KC75 Operator to close) 75T11A and 75T11T2 breakers

3.15. To restore 51T11 Bank to service after automatic outage

If 51T11 Bank trips auto due to fault:

SG51 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 SG51 Operator to energize) the bank ONCE by closing 51PET11 breaker

SCC shall close (or advise KC75 Operator to close) 75T11A and 75T11T2 breakers

SG51 Operator shall:

- Advise the Supervisor/Manager of operation above
- Isolate the Transformer for maintenance men to work on the equipment if 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 Bucholz 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

  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 station 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. 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 on, a permanent ground switches a PC 14 to close the ground switch is not required.

5. Approval

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Director, Technical Services