TD-OP-0061

GRIDCo

OPERATING PROCEDURE FOR NEW ABIREM SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR NEW ABIREM SUBSTATION (NA61)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Akosombo Operating Staff, Akosombo Area Maintenance Staff, Akosombo Area Dispatch Staff, SCC	**Number:**	TD-OP-0061
		Subject Area:	Operating
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Contents

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at NA61 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Akosombo Operating Area and System Control Center (SCC) for operation of equipment at NA61 Substation.

3. Procedure

3.1. To take N4NA line out of service

SCC shall carry out (or advise the NA61 Operator to carry out) the following:

- Open 61L4A and 61L4T1 breakers

SCC shall carry out (or advise the N14 Operator to carry out) the following:

- Open 14DL4 and 14L4T2 breakers
- Check for no potential on N4NA line

3.2. To take out, isolate and de-energize N4NA line for work

- NA61 Operator shall request for Station Guarantee from N14

SCC shall carry out (or advise the NA61 Operator to carry out) the following:

- Open 61L4A and 61L4T1 breakers

SCC shall carry out (or advise N14 operator to carry out) the following:

- Open 14DL4 and 14L4T2 breakers
- Check for no potential on N4NA line

SCC shall advise the NA61 Operator to carry out the following:

- Open 61L4A-L4 and 61L4T1-L4 disconnect switches and turn off its 125Vdc supply
- Close 61N4NA-G ground disconnect switch

SCC shall advise N14 Operator to carry out the following:

- Open 14DL4-L4 and 14L4T2-L4 disconnect switches and turn off its 125Vdc supply

- Close 14N4NA-G ground disconnect switch

3.3. To restore N4NA line to service after work

3.3.1. Prepare N4NA line for restoration:

NA61 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 N4NA line

SCC shall advise N14 Operator to carry out the following:

- Check opened 14DL4 and 14L4T2 breakers
- Open 14N4NA-G ground disconnect switch
- Turn on 125Vdc supply and close 14DL4-L4 and 14L4T2-L4 disconnect switches

SCC shall advise NA61 Operator to carry out the following:

- Check opened 61L4A and 61L4T1 breakers
- Open 61N4NA-G ground disconnect switch
- Turn on 125Vdc supply and close 61L4A-L4 and 61L4T1-L4 disconnect switches

3.3.2. Restoration of N4NA line to service:

SCC shall:

- Advise the N14 and NA61 Operators of readiness to restore N4NA line to service
- Close (or advise the N14 Operator to close) 14DL4 and 14L4T2 breakers
- Close (or advise the NA61 Operator to close) 61L4A and 61L4T1 breakers

3.4. To restore N4NA line to service after automatic outage

If N4NA line trips auto due to fault:

NA61 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 N14 Operator to energize) the line **ONCE** by closing 14DL4 and 14L4T2 breakers
- Close (or advise the NA61 Operator to close) 61L4A and 61L4T1 breakers

NA61 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 61T1 Transformer for work

SCC shall advise NA61 Operator to carry out the following:

- Inform customer about readiness to take off 61T1 transformer
- Request customer on 61T1 Bank to take off their load
- If the station service is on 61T1 transfer supply to 61T2 by switching from AC1 to AC2
- Open AC1 Contactor/MCB to take off supply to 61T1 transformer auxiliaries

SCC shall carry out (or advise NA61 Operator to carry out) the following:

- Open 61T1F1 breaker
- Open 61DT1 and 61L4T1 breakers
- Check for no potential on 61T1 Bank
- Open 61L4T1-T1 and 61DT1-T1 disconnect switches and turn off its 125Vdc supply
- Open 61T1F1-T1 disconnect switch

- Open AC control MCB to 61T1 auxiliaries

- Open 125V DC MCB to 61T1 primary and secondary protection and tag with PC13

3.6. To restore 61T1 Bank to service after work

3.6.1. Prepare 61T1 Bank for restoration:

NA61 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 61T1 Bank and temporary grounds removed

- Check opened 61T1F1 breaker

- Close 61T1F1-T1 disconnect switch

- Turn on 125Vdc supply and close 61L4T1-T1 and 61DT1-T1 disconnect switches

- Close AC control MCB to 61T1 auxiliaries

- Close 125V DC MCB to 61T1 primary and secondary protection and remove PC13 tag

- Advise SCC of readiness to restore 61T1 Bank to service

3.6.2. Restoration of 61T1 Bank to service:

- SCC shall close (or advise NA61 operator to close) 61L4T1 and 61DT1 breakers

- NA61 Operator shall advise Customers of readiness to restore 61F1 feeder to service

- SCC shall close (or advise NA61 Operator to close) the 61T1F1 breaker

3.7. To restore 61T1 Bank to service after automatic outage

If 61T1 bank trips auto due to fault:

NA61 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 NA61 Operator to energize) the transformer ONCE by closing 61L4T1 and 61DT1 breakers

NA61 Operator shall advise Customers of readiness to restore 61F1 Feeder to service

SCC shall close (or advise the NA61 Operator to close) 61T1F1 breaker

NA61 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.

3.8. To isolate 61T2 Transformer for work

SCC shall advise NA61 Operator to carry out the following:

- Inform customers about readiness to take off 61T2 transformer

- Request customers on 61T2 Bank to take off their load

- If the station service is on 61T2 transfer supply to 61T1 by switching from AC2 to AC1

- Open AC2 Contactor/MCB to take off supply to 61T2 transformer auxiliaries

SCC shall carry out (or advise NA61 Operator to carry out) the following:

- Open 61T2F2 breaker

- Open 61L4A and 61DT1 breakers

- Check for no potential on 61T2 Bank

- Open 61AT2-A and 61DT2-D disconnect switches and turn off its 125Vdc supply

- Open 61T2F2-T2 disconnect switch

- Open AC control MCB to 61T2 auxiliaries

- Open 125V DC MCB to 61T2 primary and secondary protection and tag with PC13

3.9. To restore 61T2 Bank to service after work

3.9.1. Prepare 61T2 Bank for restoration:

NA61 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 61T2 Bank and temporary grounds removed
- Close 61T2F2-T2 disconnect switch
- Turn on 125Vdc supply and close 61AT2-A and 61DT2-D disconnect switches
- Close AC control MCB to 61T2 auxiliaries
- Close 125V DC MCB to 61T2 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 61T2 Bank to service

3.9.2. Restoration of 61T2 bank to service:

- SCC shall close (or advise NA61 Operator to close) 61L4A and 61DT2 breakers
- NA61 Operator shall advise Customers of readiness to restore 61F2 Feeder to service
- SCC shall close (or advise NA61 Operator to close) the 61T2F2 breaker

3.10. To restore 61T2 Bank to service after automatic outage

If 61T2 bank trips auto due to fault:

NA61 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 NA61 Operator to energize) the transformer

ONCE by closing 61L4A and 61DT1 breakers

MM62 Operator shall advise Customers of readiness to restore 61F2 feeder to service

SCC shall close (or advise the MM62 Operator to close) 61T21F2 breaker

NA61 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. To isolate 61T1F1 Breaker for work

- NA61 Operator shall request for Station Guarantee from Customer on 61F1 Feeder

SCC shall carry out (or advise NA61 Operator to carry out) the following:

- Inform Customer about readiness to take off 61T1 bank
- Request Customer on 61T1 Bank to take off their load
- Transfer Station Service supply from AC1 to AC2, if Station Service is on 61T1
- Open AC1 Contactor/MCB to take off supply to 61T1 transformer auxiliaries

SCC shall advise NA61 Operator to carry out the following:

- Open 61T1F1 breaker
- Open 61DT1 and 61L4T1 breakers
- Open 61T1F1-T1 and 61T1F1-F1 disconnect switches and turn off its 125Vdc supply
- Check for no potential on 61T1 Bank

3.12. To restore 61T1F1 Breaker to service after work

3.12.1. Prepare 61T1F1 breaker for restoration:

NA61 Operator shall:

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

- Check for no potential on 61T1 Bank and temporary grounds removed

- Turn on 125Vdc supply and close 61T1F1-F1 and 61T1F1-T1 disconnect switches
- Close AC1 Contactor/MCB to restore supply to 61T1 transformer auxiliaries

- Advise SCC of readiness to restore 61T1F1 breaker to service

3.12.2. Restoration of 61T1F1 breaker to service:

- SCC shall close (or advise NA61 Operator to close) 61DT1 and 61L4T1 breakers

- NA61 Operator shall advise Customer of readiness to restore 61F1 feeder to service

- SCC shall close (or advise NA61 Operator to close) 61T1F1 breaker

3.13. To isolate 61T2F2 Breaker for work

- NA61 Operator shall request for Station Guarantee from Customer on 61F2 feeder

SCC shall carry out (or advise NA61 Operator to carry out) the following:

- Inform Customer about readiness to take off 61T2 bank

- Request Customer on 61T2 Bank to take off their load

- If the station service is on 61T2 transfer supply to 61T1 by switching from AC2 to AC1

- Open AC2 Contactor/MCB to take off supply to 61T2 transformer auxiliaries

SCC shall carry out (or advise NA61 Operator to carry out) the following:

- Open 61T2F2 breaker

- Open 61DT1 and 61L4A breakers

- Open 61DT2-D and 61AT2-A disconnect switches and turn off its 125Vdc supply

- Open 61T2F2-T1 and 61T2F2-F2 disconnect switches

- Check for no potential on 61T2 Bank

3.14. To restore 61T2F2 Breaker to service after work

3.14.1. Prepare 61T2F2 breaker for restoration:

NA61 Operator shall:

- Advise SCC when work on the feeder breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 61T2 Bank and temporary grounds removed
- Close 61T2F2-T2 and 61T2F2-F2 disconnect switches
- Turn on 125Vdc supply and close 61DT2-D and 61AT2-A disconnect switches
- Close AC2 Contactor/MCB to restore supply to 61T2 transformer auxiliaries
- Advise SCC of readiness to restore 61T2F2 breaker to service

3.14.2. Restoration of 61T2F2 breaker to service:

- SCC shall close (or advise NA61 Operator to close) 61DT1 and 61L4A breakers
- NA61 Operator shall advise Customer of readiness to restore 61F2 feeder to service
- SCC shall close (or advise NA61 Operator to close) 61T2F2 breaker

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 is only one 161Kv bus arrangement. The main 'A' and 'D' bus provides the normal points of supply to all circuits/equipment such as N4NA line, 61T1 and 61T2 transformers.

5. Approval

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Director, Technical Services