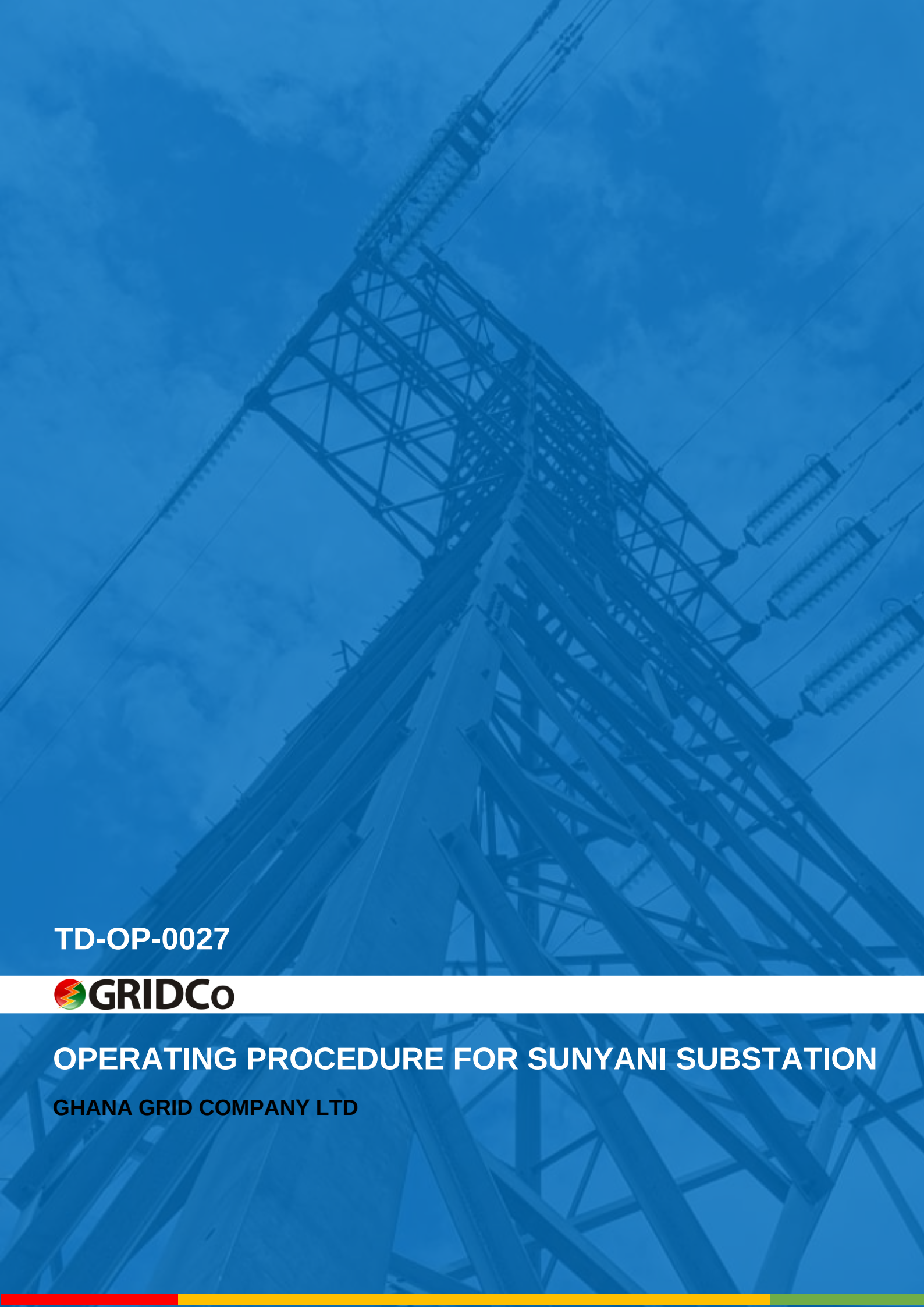

TD-OP-0027

GRIDCo

OPERATING PROCEDURE FOR SUNYANI SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR SUNYANI SUBSTATION (SN27)**		
Issued To:	Director, System Operations Director, NNS Manager, SCC Manager, Dispatch Operations Area Manager, Techiman Operating Staff, Techiman Area Maintenance Staff, Techiman Area Dispatch Staff, SCC	**Number:**	TD-OP-0027
		Subject Area:	Operating
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		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 SN27 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Techiman Operating Area and System Control Center (SCC) for operation of equipment at SN27 Substation.

3. Procedure

3.1. To take SN1BR line out of service

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Verify opened 27L1-D transfer disconnect switch
- Open 27AL1 breaker

SCC shall carry out (or advise the BR63 Operator to carry out) the following:

- Open 63L1A and 63L1T1 breakers
- Check for no potential on SN1BR line

3.2. To take out, isolate and de-energize SN1BR line for work

- SN27 Operator shall request for Station Guarantee from BR63

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Checked opened 27L1-D transfer disconnect switch and turn off its 125Vdc supply
- Open 27AL1 breaker

SCC shall carry out (or advise BR63 Operator to carry out) the following:

- Open 63L1A and 63L1T1 breakers
- Check for no potential on SN1BR line

SCC shall advise BR63 Operator to carry out the following:

- Open 63L1A-L1 and 63L1T1-L1 disconnect switches and turn off its 125Vdc supply

- Close 63SN1BR-G ground disconnect switch

SCC shall advise SN27 Operator to carry out the following:

- Open 27AL1-L1 disconnect switch and turn off its 125Vdc supply
- Close 27SN1BR-G ground disconnect switch

3.3. To restore SN1BR line to service after work

3.3.1. Prepare SN1BR line for restoration:

SN27 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 SN1BR line

SCC shall advise BR63 Operator to carry out the following:

- Check opened 63L1A and 63L1T1 breakers
- Open 63SN1BR-G ground disconnect switch
- Turn on 125Vdc supply and close 63L1A-L1 and 63L1T1-L1 disconnect switches

SCC shall advise SN27 Operator to carry out the following:

- Checked opened 27L1-D transfer disconnect switch and turn on its 125Vdc supply
- Check opened 27AL1 breaker
- Open 27SN1BR-G ground disconnect switch
- Turn on 125Vdc supply and close 27AL1-L1 disconnect switches

3.3.2. Restoration of SN1BR line to service:

SCC shall:

- Advise the BR63 and SN27 Operators of readiness to restore SN1BR line to service
- Close (or advise the SN27 Operator to close) 27AL1 breaker

- Close (or advise the BR63 Operator to close) 63L1A and 63L1T1 breakers

3.4. To restore SN1BR line to service after automatic outage

If SN1BR line trips auto due to fault:

SN27 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 SN27 Operator to energize) the line **ONCE** by closing 27AL1 breaker
- Close (or advise the BR63 Operator to close) 63L1A and 63L1T1 breakers

SN27 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 take TH2SN line out of service

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Verify opened 27L2-D transfer disconnect switch
- Open 27L2A breaker.

SCC shall carry out (or advise the TH26 Operator to carry out) the following:

- Verify opened 26L2-D transfer disconnect switch
- Open 26AL2 breaker
- Check for no potential on TH2SN line

3.6. To take out, isolate and de-energize TH2SN line for work

- SN27 Operator shall request for Station Guarantee from TH26

SCC shall carry out (or advise the TH26 Operator to carry out) the following:

- Check opened 26L2-D transfer disconnect switch and turn off its 125Vdc supply
- Open 26AL2 breaker

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Check opened 27L2-D transfer disconnect switch and turn off its 125Vdc supply
- Open 27L2A breaker
- Check for no potential on TH2SN line

SCC shall advise TH26 Operator to carry out the following:

- Open 26AL2–L2 disconnect switch and turn off its 125Vdc supply
- Close 26TH2SN-G ground disconnect switch

SCC shall advise SN27 operator to carry out the following:

- Open 27L2A-L2 disconnect switch and turn off its 125Vdc supply
- Close 27TH2SN-G ground disconnect switch

3.7. To restore TH2SN line to service after work

3.7.1. Prepare TH2SN line for restoration:

SN27 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 TH2SN line

SCC shall advise TH26 Operator to carry out the following:

- Check opened 26AL2 breaker
- Check opened 26L2-D transfer disconnect switch and turn on its 125Vdc supply
- Open 26TH2SN-G ground disconnect switch

- Turn on 125Vdc supply and close 26AL2-L2 disconnect switch

SCC shall advise SN27 Operator to carry out the following:

- Check opened 27L2A breaker
- Check opened 27L2-D transfer disconnect switch and turn on its 125Vdc supply
- Open 27TH2SN-G ground disconnect switch
- Turn on 125Vdc supply and close 27L2A-L2 disconnect switches

3.7.2. Restoration of TH2SN line to service:

SCC shall:

- Advise the SN27 and TH26 Operators of readiness to restore TH2SN line to service
- Close (or advise the TH26 Operator to close) 26AL2 breaker
- Close (or advise the SN27 Operator to close) 27L2A breaker

3.8. To restore TH2SN line to service after automatic outage

If TH2SN line trips auto due to fault:

SN27 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 TH26 Operator to energize) the line **ONCE** by closing 26AL2 breaker
- Close (or advise the SN27 Operator to close) 27L2A breaker

SN27 Operator shall:

- Advise the Supervisor/Area Manager of operation above

- Advise maintenance men to patrol the line if the operation above is not successful

3.9. To take SN3MM line out of service

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Verify opened 26L3-D transfer disconnect switch
- Open 27AL3 breaker

SCC shall carry out (or advise the MM62 Operator to carry out) the following:

- Open 62L3D and 62L1L3 breakers
- Check for no potential on BU5SN line

3.10. To take out, isolate and de-energize SN3MM line for work

- SN27 Operator request for Station Guarantee from MM62

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Check opened 27L3-D transfer disconnect switch and turn off its 125Vdc supply
- Open 27AL3 breaker

SCC shall carry out (or advise MM62 Operator to carry out) the following:

- Open 62L3D and 62L1L3 breakers
- Check for no potential on BU5SN line

SCC shall advise MM62 Operator to carry out the following:

- Open 62L3D-L3 and 62L1L3-L3 disconnect switches and turn off its 125Vdc supply
- Close 62SN3MM-G ground disconnect switch

SCC shall advise SN27 Operator to carry out the following:

- Open 27AL3-L3 disconnect switch and turn off its 125Vdc supply
- Close 27SN3MM-G ground disconnect switch

3.11. To restore SN3MM line to service after work

3.11.1. Prepare SN3MM line for restoration:

SN27 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 SN3MM line

SCC shall advise MM62 Operator to carry out the following:

- Check opened 62L3D and 62L1L3 breakers
- Open 62SN3MM-G ground disconnect switch
- Turn on 125Vdc supply and close 62L3D-L3 and 62L1L3-L3 disconnect switches

SCC shall advise SN27 Operator to carry out the following:

- Check opened 27AL3 breaker
- Check opened 27L3-D transfer disconnect switch and turn on its 125Vdc supply
- Open 27SN3MM-G ground disconnect switch
- Turn on 125Vdc supply and close 27AL3-L3 disconnect switch

3.11.2. Restoration of SN3MM line to service:

SCC shall:

- Advise the MM62 and SN27 Operators of readiness to restore BU5SN line to service
- Close (or advise the MM62 Operator to close) 62L3D and 62L1L3 breakers
- Close (or advise the SN27 Operator to close) 27AL3 breaker

3.12. To restore SN3MM line to service after automatic outage

If BU5SN line trips auto due to fault:

SN27 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 MM62 Operator to energize) the line **ONCE** by closing 62L3D and 62L1L3 breakers
- Close (or advise the SN27 Operator to close) 27AL3 breaker

SN27 Operator shall:

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

3.13. To take BU5SN line out of service

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Verify opened 27L5-D transfer disconnect switch
- Open 27L5A breaker

SCC shall carry out (or advise the BU54 Operator to carry out) the following:

- Open 54DL5 and 54L5T4 breakers
- Check for no potential on BU5SN line

3.14. To take out, isolate and de-energize BU5SN line for work

- SN27 Operator shall request for Station Guarantee from BU54

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Check opened 27L5-D transfer disconnect switch and turn off its 125Vdc supply
- Open 27L5A breaker

SCC shall carry out (or advise BU54 Operator to carry out) the following:

- Open 54DL5 and 54L5T4 breakers

- Check for no potential on BU5SN line

SCC shall advise BU54 Operator to carry out the following:

- Open 54DL5-L5 and 54L5T4-L5 disconnect switches and turn off its 125Vdc supply

- Close 54BU5SN-G ground disconnect switch

SCC shall advise SN27 Operator to carry out the following:

- Open 27L5A-L5 disconnect switch and turn off its 125Vdc supply

- Close 27BU5SN-G ground disconnect switch

3.15. To restore BU5SN line to service after work

3.15.1. Prepare BU5SN line for restoration:

SN27 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 BU5SN line

SCC shall advise BU54 Operator to carry out the following:

- Check opened 54DL5 and 54L5T4 breakers

- Open 54BU5SN-G ground disconnect switch

- Turn on 125Vdc supply and close 54DL5-L5 and 54L5T4-L5 disconnect switches

SCC shall advise SN27 Operator to carry out the following:

- Check opened 27L5A breaker

- Check opened 27L5-D transfer disconnect switch and turn on its 125Vdc supply

- Open 27BU5SN-G ground disconnect switch

- Turn on 125Vdc supply and close 27L5A-L5 disconnect switch

3.15.2. Restoration of BU5SN line to service:

SCC shall:

- Advise the BU54 and SN27 Operators of readiness to restore BU5SN line to service

- Close (or advise the BU54 Operator to close) 54DL5 and 54L5T4 breakers

- Close (or advise the SN27 Operator to close) 27L5A breaker

3.16. To restore BU5SN line to service after automatic outage

If BU5SN line trips auto due to fault:

SN27 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 BU54 Operator to energize) the line **ONCE** by closing 54DL5 and 54L5T4 breakers

- Close (or advise the SN27 Operator to close) 27L5A breaker

SN27 Operator shall:

- Advise the Supervisor/Area Manager of operation above

- Advise maintenance men to patrol the line if the operation above is not successful

3.17. To take KY6SN line out of service

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Verify opened 27L6-D transfer disconnect switch

- Open 27L6A breaker

SCC shall carry out (or advise the KY43 Operator to carry out) the following:

- Verify opened 43L6-D transfer disconnect switch

- Open 43L6A breaker

- Check for no potential on KY6SN line

3.18. To take out, isolate and de-energize KY6SN line for work

- SN27 Operator request for Station Guarantee from KY43

SCC shall carry out (or advise the SN27 Operator to carry out) the following:

- Check opened 27L6-D transfer disconnect switch and turn off its 125Vdc supply
- Open 27L6A breaker

SCC shall carry out (or advise KY43 Operator to carry out) the following:

- Check opened 43L6-D transfer disconnect switch and turn off its 125Vdc supply
- Open 43L6A breaker
- Check for no potential on KY6SN line

SCC shall advise KY43 Operator to carry out the following:

- Open 43L6A-L6 disconnect switch and turn off its 125Vdc supply
- Close 43KY6SN-G ground disconnect switch

SCC shall advise SN27 Operator to carry out the following:

- Open 27L6A-L6 disconnect switch and turn off its 125Vdc supply
- Close 27KY6SN-G ground disconnect switch

3.19. To restore KY6SN line to service after work

3.19.1. Prepare KY6SN line for restoration:

SN27 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 KY6SN line

SCC shall advise KY43 Operator to carry out the following:

- Check opened 43L6A breaker
- Check opened 43L6-D transfer disconnect switch and turn on its 125Vdc supply

- Open 43KY6SN-G ground disconnect switch
- Turn on 125Vdc supply and close 43L6A-L6 disconnect switch

SCC shall advise SN27 Operator to carry out the following:

- Check opened 27L6A breaker
- Check opened 27L6-D transfer disconnect switch and turn on its 125Vdc supply
- Open 27KY6SN-G ground disconnect switch
- Turn on 125Vdc supply and close 27L6A–L6 disconnect switch

3.19.2. Restoration of KY6SN line to service:

SCC shall:

- Advise the KY43 and SN27 Operators of readiness to restore KY6SN line to service
- Close (or advise the KY43 Operator to close) 43L6A breaker breakers
- Close (or advise the SN27 Operator to close) 27L6A breaker

3.20. To restore KY6SN line to service after automatic outage

If KY6SN line trips auto due to fault:

SN27 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 KY43 Operator to energize) the line **ONCE** by closing 43L6A breaker
- Close (or advise the SN27 Operator to close) 27L6A breaker

SN27 Operator shall:

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

3.21. To isolate 27T1 Transformer for work

SCC shall advise SN27 Operator to carry out the following:

- Inform Customers about readiness to take off 27T1 bank
- Request Customers on 27T1 Bank to take off their load
- Transfer Station Service from AC1 to AC2, if Station Service is on 27T1
- Open AC1 Contactor/MCB to take off supply to 27T1 transformer auxiliaries

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27SC3T1 breaker
- Open 27SC4T1 breaker
- Open 27T1F1 breaker
- Open 27T1F3 breaker
- Open 27AT1 breaker
- Check for no potential on 27T1 Bank

SCC shall advise SN27 Operator to carry out the following:

- Check opened 27D-T1 disconnect switch and turn off its 125Vdc supply
- Open 27SC3T1-T1 disconnect switch
- Open 27SC4T1-T1 disconnect switch
- Open 27T1F1-T1 disconnect switch
- Open 27T1F3-T1 disconnect switch
- Open 27AT1-T1 disconnect switch
- Open AC control MCB to 27T1 auxiliaries and tag
- Open 125V DC MCB to 27T1 primary and secondary protection and tag with PC13

3.22. To restore 27T1 Bank to service after work

3.22.1. Prepare 27T1 bank for restoration:

SN27 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 27T1 Bank and temporary grounds removed
- Check opened 27D-T1 disconnect switch and turn on its 125Vdc supply
- Close 27SC3T1-T1 disconnect switch
- Close 27SC4T1-T1 disconnect switch
- Close 27T1F1-T1 disconnect switch
- Close 27T1F3-T1 disconnect switch
- Turn on 125Vdc supply and close 27AT1-T1 disconnect switch
- Close AC control MCB to 27T1 auxiliaries and remove tag
- Close 125V DC MCB to 27T1 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 27T1 Bank to service

3.22.2. Restoration of 27T1 bank to service:

- SCC shall close (or advise SN27 Operator to close) the 27AT1 breaker
- SN27 Operator shall advise Customers of readiness to restore 27B1 and 27Y1 buses to service
- SCC shall close (or advise SN27 Operator to close) the 27T1F1 and 27T1F3 breakers
- SCC shall close (or advise SN27 Operator to close) 27SC1T1 breaker, if the voltage is below 32.8kV

3.23. To restore 27T1 Bank to service after automatic outage

If 27T1 bank trips auto due to fault:

SN27 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 SN27 Operator to energize) the bank ONCE by closing 27AT1 breaker

SN27 Operator shall advise Customers of readiness to restore 27F1 and 27F3 buses to service

SCC shall close (or advise SN27 Operator to close) 27T1F1 and 27T1F3 breakers

SN27 Operator shall:

- Advise the Supervisor/Area Manager of item above
- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. (Refer to **4. Explanation**.)

3.24. To isolate 27T2 Transformer for work

SCC shall advise SN27 Operator to carry out the following:

- Inform Customers about readiness to take off 27T2 bank
- Request Customers on 27T2 Bank to take off their load
- Transfer Station Service from AC2 to AC1, if Station Service is on 27T2
- Open AC1 Contactor/MCB to take off supply to 27T2 transformer auxiliaries

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27SC1T2 breaker
- Open 27SC2T2 breaker
- Open 27T2F2breaker
- Open 27T2F4 breaker
- Open 27AT2 breaker
- Check for no potential on 27T2 Bank

- SCC shall advise SN27 Operator to carry out the following:
- Check opened 27D-T2 disconnect switch and turn off its 125Vdc supply
- Open 27SC1T2-T2 disconnect switch
- Open 27SC2T2-T2 disconnect switch
- Open 27T2F2-T2 disconnect switch
- Open 27T2F4-T2 disconnect switch
- Open 27AT2-T2 disconnect switch and turn off its 125Vdc supply
- Close AC control MCB to 27T2 auxiliaries and remove tag
- Close 125V DC MCB to 27T2 primary and secondary protection and remove PC13 tag

3.25. To restore 27T2 Bank to service after work

3.25.1. Prepare 27T2 bank for restoration:

SN27 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 27T2 Bank and temporary grounds removed
- Check open 27D-T2 disconnect switch and turn on its 125Vdc supply
- Close 27SC1T2-T2 disconnect switch
- Close 27SC2T2-T2 disconnect switch
- Close 27T2F2-T2 disconnect switch
- Close 27T2F4-T2 disconnect switch
- Turn on 125Vdc supply and close 27AT2-T2 disconnect switch
- Close AC control MCB to 27T2 auxiliaries and remove tag
- Close 125V DC MCB to 27T2 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 27T2 Bank to service

3.25.2. Restoration of 27T2 bank to service:

- SCC shall close (or advise SN27 Operator to close) the 27AT2 breaker

- SN27 Operator shall advise Customers of readiness to restore 27F2 and 27F4 buses to service

- SCC shall close (or advise SN27 Operator to close) the 27T2F2 and 27T2F4 breakers

- SCC shall close (or advise SN27 Operator to close) 27SC2T2 or 27SC4T2 breaker, if the voltage is below 32.8kV or 10.45kV respectively

3.26. To restore 27T2 Bank to service after automatic outage

If 27T2 bank trips auto due to fault:

SN27 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 SN27 Operator to energize) the bank ONCE by closing 27AT2 breaker

SN27 Operator shall advise Customers of readiness to restore 27B2 and 27Y2 buses to service

SCC shall close (or advise SN27 Operator to close) 27T2F2and 27T2F4 breakers

SN27 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. (Refer to **4. Explanation.**)

3.27. To Isolate 27T1F1 Breaker for work

- SN27 Operator shall request for Station Guarantee from Customer on 27B1 Bus

SCC shall carry out (or advise TH26 Operator to carry out) the following:

- Open 27T1F1 breaker

SCC shall advise TH26 Operator to carry out the following:

- Open 27T1F1 -T1 disconnect switch
- Open 27T1F1-F1 disconnect switch
- Check for no potential on 27T1F1 Breaker

3.28. To restore 27T1F1 Breaker to service after work

3.28.1. Prepare 27T1F1 breaker for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27T1F1 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 27T1F1 Breaker and temporary grounds removed
- Close 27T1F1-T1 disconnect switch
- Close 27T1F1-F1 disconnect switch

3.28.2. Restoration of 27T1F1 breaker to service:

- SN27 Operator shall advise Customer of readiness to restore 27B1 Bus to service
- SCC shall close (or advise SN27 Operator to close) the 27T1F1 breaker

3.29. To Isolate 27T1F3 Breaker for work

- SN27 Operator shall request for Station Guarantee from Customer on 27Y1 Bus

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27T1F3 breaker

SCC shall advise TH26 Operator to carry out the following:

- Open 27T1F3 -T1 disconnect switch
- Open 27T1F3-F3disconnect switch
- Check for no potential on 27T1F3 Breaker

3.30. To restore 27T1F3 Breaker to service after work

3.30.1. Prepare 27T1F3 breaker for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27T1F3 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 27T1F3 Breaker and temporary grounds removed
- Open 27T1F3-T1disconnect switch
- Close 27T1F3-F3 disconnect switch

3.30.2. Restoration of 27T1F3 breaker to service:

- SN27 Operator shall advise Customer of readiness to restore 27F3 Bus to service
- SCC shall close (or advise SN27 Operator to close) the 27T1F3 breaker

3.31. To Isolate 27T2F2Breaker for work

- SN27 Operator shall request for Station Guarantee from Customer on 27B2 Bus

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27T2F2 breaker

SCC shall advise SN27 Operator to carry out the following:

- Open 27T2F2-T2 disconnect switch
- Open 27T2F2-F2 disconnect switch
- Check for no potential on 27T2F2 Breaker

3.32. To restore 27T2F2 Breaker to service after work

3.32.1. Prepare 27T2F2 breaker for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27T2F2 breaker has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 27T2F2Breaker and temporary grounds removed

- Close 27T2B2-T2 disconnect switch

- Close 27T2F2-F2 disconnect switch

3.32.2. Restoration of 27T2F2 breaker to service:

- SN27 Operator shall advise Customer of readiness to restore 27F2 Bus to service

- SCC shall close (or advise SN27 Operator to close) the 27T2F2 breaker

3.33. To Isolate 27T2F4 Breaker for work

- SN27 Operator shall request Station Guarantee from Customer on 27Y2 Bus

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27T2F4 breaker

SCC shall advise SN27 Operator to carry out the following:

- Open 27T2F4 -T2 disconnect switch

- Open 27T2F4-F4 disconnect switch

- Check for no potential on 27T2F4 Breaker

3.34. To restore 27T2F4 Breaker to service after work

3.34.1. Prepare 27T2F4 breaker for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27T2F4 breaker has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 27T2F4 Breaker and temporary grounds removed

- Close 27T2F4-T2 disconnect switch

- Close 27T2F4-F4 disconnect switch

3.34.2. Restoration of 27T2F4 breaker to service:

- SN27 Operator shall advise Customer of readiness to restore 27F4 Bus to service
- SCC shall close (or advise SN27 Operator to close) the 27T2F4 breaker

3.35. To isolate 27SC1 Capacitor Bank for work

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27SC1T1 breaker

SCC shall advise SN27 Operator to carry out the following:

- Open 27SC1T1-SC1 disconnect switch
- Close 27SC1-G ground disconnect switch

3.36. To restore 27SC1 Capacitor Bank to service after work

3.36.1. Prepare 27SC1 Capacitor Bank for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27SC1 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 27SC1 Capacitor Bank and temporary grounds removed
- Open 27SC1-G ground disconnect switch
- Close 27SC1T1-SC1 disconnect switch

3.36.2. Restoration of 27SC1 Capacitor Bank to service:

- SCC shall close (or advise SN27 Operator to close) 27SC1T2 breaker, if the voltage is below 10.45kV

3.37. To isolate 27SC2 Capacitor Bank for work

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27SC2T2 breaker

SCC shall advise SN27 Operator to carry out the following:

- Open 27SC2T2-SC2 disconnect switch
- Close 27SC2-G ground disconnect switch

3.38. To restore 27SC2 Capacitor Bank to service after work

3.38.1. Prepare 27SC2 Capacitor Bank for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27SC2 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 27SC2 Capacitor Bank and temporary grounds removed
- Open 27SC2-G ground disconnect switch
- Close 27SC2T2-SC2 disconnect switch

3.38.2. Restoration of 27SC2 Capacitor Bank to service:

- SCC shall close (or advise SN27 Operator to close) 27SC2T2 breaker, if the voltage is below 32.8kV

3.39. To isolate 27SC3 Capacitor Bank for work

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27SC3T1 breaker

SCC shall advise SN27 Operator to carry out the following:

- Open 27SC3T1-SC3 disconnect switch
- Close 27SC3-G ground disconnect switch

3.40. To restore 27SC3 Capacitor Bank to service after work

3.40.1. Prepare 27SC3 Capacitor Bank for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27SC3 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 27SC3 Capacitor Bank and temporary grounds removed

- Open 27SC3-G ground disconnect switch

- Close 27SC3T1-SC3 disconnect switch

3.40.2. Restoration of 27SC3 Capacitor Bank to service:

- SCC shall close (or advise SN27 Operator to close) 27SC3T1 breaker, if the voltage is below 10.45kV

3.41. To isolate 27SC4 Capacitor Bank for work

SCC shall carry out (or advise SN27 Operator to carry out) the following:

- Open 27SC4T1 breaker

SCC shall advise SN27 Operator to carry out the following:

- Open 27SC4T1-SC4 disconnect switch

- Close 27SC4-G ground disconnect switch

3.42. To restore 27SC4 Capacitor Bank to service after work

3.42.1. Prepare 27SC4 Capacitor Bank for restoration:

SN27 Operator shall:

- Advise SCC when work on the 27SC4 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 27SC4 Capacitor Bank and temporary grounds removed

- Open 27SC4-G ground disconnect switch

- Close 27SC4T1-SC4 disconnect switch

3.42.2. Restoration of 27SC4 Capacitor Bank to service:

- SCC shall close (or advise SN27 Operator to close) 27SC4T1 breaker, if the voltage is below 32.8kV

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 161kV buses. The main 'A' bus provides the normal points of supply to all circuits such as SN1BR, TH2SN, SN3MM, BU5SN and KY6SN lines and 27T1 and 27T2 transformers and 27SC1, 27SC2, 27SC3 and 27SC4 Capacitor Banks. The 'D' bus provides the necessary transfer route for only one circuit at a time.

5. Approval

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Director, TSD