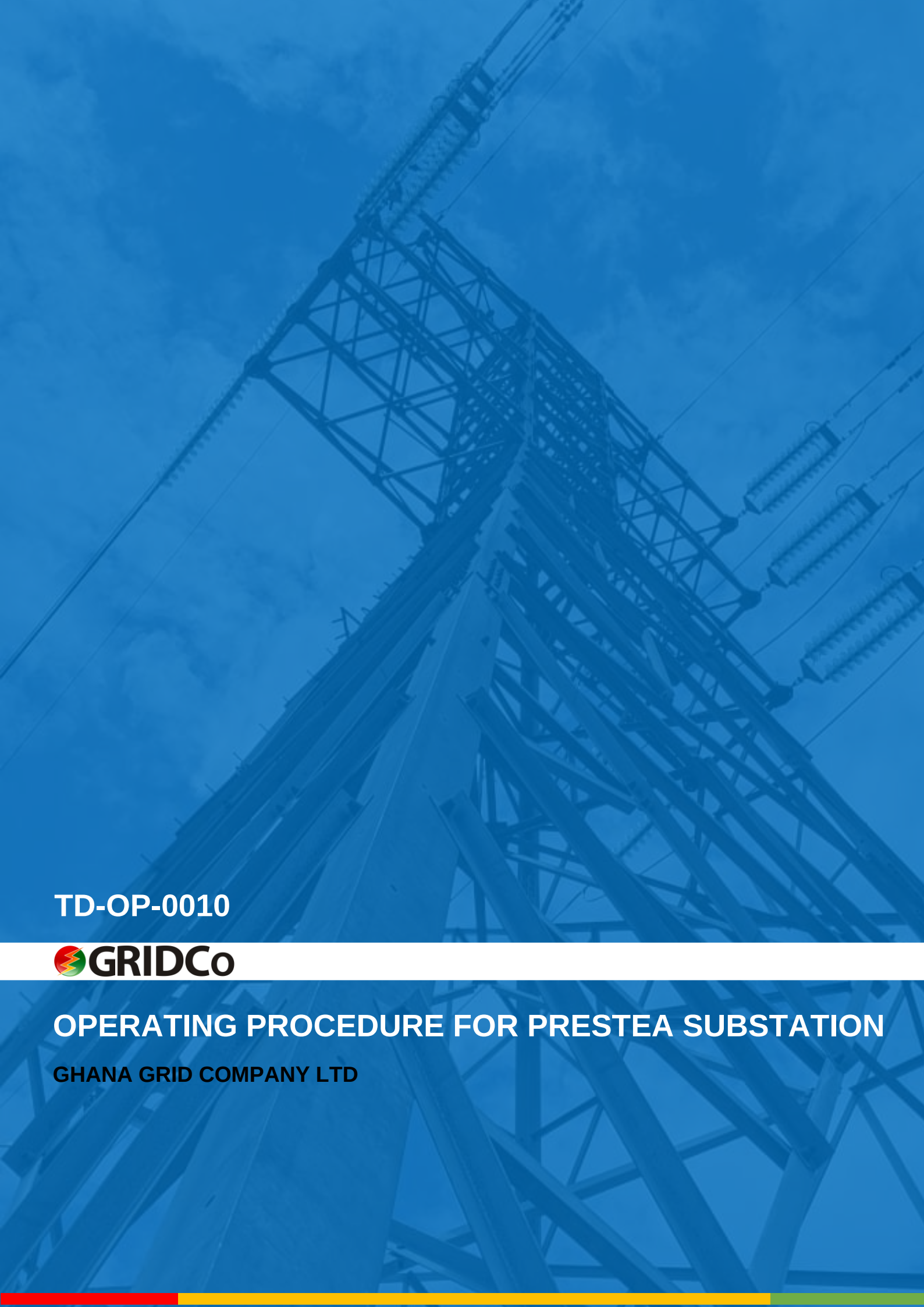

TD-OP-0010

GRIDCo

OPERATING PROCEDURE FOR PRESTEA SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR PRESTEA SUBSTATION (P10)**		
Issued To:	Director, System Operations Director, NNS Manager, SCC Manager, Dispatch Operations Area Manager, Prestea Operating Staff, Prestea Area Maintenance Staff, Prestea Area Dispatch Staff, SCC	**Number:**	TD-OP-0010
		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 P10 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Prestea Operating Area and System Control Center (SCC) for operation of equipment at P10 Substation.

3. Procedure

3.1. To take P2NR line out of service

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10L2A and 10L2L6 breakers

SCC shall carry out (or advise the NR41 Operator to carry out) the following:

- Open 41L2A2 breaker
- Check for no potential on P2NR line

3.2. To take out, isolate and de-energize P2NR line for work

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10L2A and 10L2L6 breakers

SCC shall carry out (or advise NR41 Operator to carry out) the following:

- Open 41L2A2 breaker
- Check for no potential on P2NR line

SCC shall advise NR41 Operator to carry out the following:

- Open 41L2A2-L2 disconnect switch and turn off its 125Vdc supply
- Close 41P2NR-G ground disconnect switch

SCC shall advise P10 Operator to carry out the following:

- Open 10L2A-L2 and 10L2L6-L2 disconnect switches and turn off 125Vdc supply
- Close 10P2NR-G ground disconnect switch

3.3. To restore P2NR line to service after work

3.3.1. Prepare P2NR line for restoration:

P10 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 P2NR line

SCC shall advise NR41 Operator to carry out the following:

- Check opened 41L2A2 breaker
- Open 41P2NR-G ground disconnect switch
- Turn on 125Vdc supply and close 41L2A2-L2 disconnect switch

SCC shall advise P10 Operator to carry out the following:

- Check opened 10L2A and 10L2L6 breakers
- Open 10P2NR-G ground disconnect switch
- Turn on 125Vdc supply and close 10L2A-L2 and 10L1L2-L2 disconnect switches

3.3.2. Restoration of P2NR line to service:

SCC shall:

- Advise the NR41and P10 Operators of readiness to restore P2NR line to service
- Close (or advise the NR41Operator to close) 41L2A2 breaker
- Close (or advise the P10 Operator to close) 10L2A and 10L2L6 breakers

3.4. To take P3BN line out of service

SCC shall carry out (or advise the BN99 Operator to carry out) the following:

- Open 99ADL3 breaker

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10L3A breaker.
- Check for no potential on P3BN line

3.5. To take out, isolate and de-energize P3BN line for work

- P10 Operator shall request for Station Guarantee from BN99

SCC shall advise the BN99 Operator to carry out the following:

- Open 99ADL3 breaker

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10L3A breaker.
- Check for no potential on P3BN line

SCC shall advise BN99 Operator to carry out the following:

- Open 99ADL3-L3 disconnect switch and turn off its 125Vdc supply
- Close 99P3BN-G ground disconnect switch

SCC shall advise P10 operator to carry out the following:

- Open 10L3A-L3 disconnect switch and turn off its 125Vdc supply
- Close 10L3A-G ground disconnect switch

3.6. To restore P3BN line to service after work

3.6.1. Prepare P3BN line for restoration:

P10 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 P3BN line

SCC shall advise BN99 Operator to carry out the following:

- Check opened 99ADL3 breaker
- Open 99P3BN-G ground disconnect switch
- Turn on 125Vdc supply and close 99ADL3-L3 disconnect switch

SCC shall advise P10 Operator to carry out the following:

- Check opened 10L3A breaker
- Open 10L3A-G ground disconnect switch
- Turn on 125Vdc supply and close 10L3A-L3 disconnect switch

3.6.2. Restoration of P3BN line to service:

SCC shall:

- Advise the BN99 and P10 Operators of readiness to restore P3BN line to service
- Close (or advise the BN99 Operator to close) 99ADL3 breaker
- Close (or advise the P10 Operator to close) 10L3A breaker

3.7. To restore P3BN line to service after automatic outage

If P3BN line trips auto due to fault:

P10 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 P10 Operator to energize) the line **ONCE** by closing 10L3A breaker
- Advise the BN99 Operator to close 99ADL3 breaker

P10 Operator shall:

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

3.8. To take BS4P line out of service

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10DL4 and 10L4L7 breakers

SCC shall carry out (or advise the BS30 Operator to carry out) the following:

- Open 30L2L4 and 30DL4 breakers
- Check for no potential on BS4P line

3.9. To take out, isolate and de-energize BS4P line for work

- P10 Operator shall request for Station Guarantee from BS30

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10DL4 and 10L4L7 breakers

SCC shall carry out (or advise BS30 Operator to carry out) the following:

- Open 30L2L4 and 30DL4 breakers
- Check for no potential on BS4P line

SCC shall advise BS30 Operator to carry out the following:

- Open 30L2L4-L4 and 30DL4-L4 disconnect switches and turn off 125Vdc supply
- Close 30BS4P-G ground disconnect switch

SCC shall advise P10 Operator to carry out the following:

- Open 10DL4-L4 and 10L4L7-L4 disconnect switches and turn off 125Vdc supply
- Close 10BS4P-G ground disconnect switch

3.10. To restore BS4P line to service after work

3.10.1. Prepare BS4P line for restoration:

P10 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 BS4P line

SCC shall advise BS30 Operator to carry out the following:

- Check opened 30L2L4 and 30DL4 breakers
- Open 30BS4P-G ground disconnect switch
- Turn on 125Vdc supply and close 30L2L4-L4 and 30DL4-L4 disconnect switches

SCC shall advise P10 Operator to carry out the following:

- Check opened 10DL4 and 10L4L7 breakers

- Open 10BS4P-G ground disconnect switch

- Turn on 125Vdc supply and close 10DL4-L4 and 10L4L7-L4 disconnect switches

3.10.2. Restoration of BS4P line to service:

SCC shall:

- Advise the BS30 and P10 Operators of readiness to restore BS4P line to service

- Close (or advise the BS30 Operator to close) 30DL4 and 30L2L4 breakers

- Close (or advise the P10 Operator to close) 10DL4 and 10L4L7 breakers

3.11. To restore BS4P line to service after automatic outage

If BS4P line trips auto due to fault:

P10 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 BS30 Operator to energize) the line **ONCE** by closing 30L2L4 and 30DL4 breakers

- Close (or advise the P10 Operator to close) 10DL4 and 10L4L7 breakers

P10 Operator shall:

- Advise the Supervisor/Area Manager of operation above

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

3.12. To take P6B line out of service

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10DL6 and 10L2L6 breakers

SCC shall carry out (or advise the B12 Operator to carry out) the following:

- Verify opened 12P6B-S bypass disconnect switch
- Open 12P6B breaker
- Check for no potential on P6B line

3.13. To take out, isolate and de-energize P6B line for work

- P10 Operator shall request for Station Guarantee from B12

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10DL6 and 10L2L6 breakers

SCC shall carry out (or advise B12 Operator to carry out) the following:

- Check opened 12P6B-S by-pass disconnect switch and turn off 125Vdc supply
- Open 12P6B breaker
- Check for no potential on P6B line

SCC shall advise B12 Operator to carry out the following:

- Open 12P6B-L6 disconnect switch and turn off its 125Vdc supply
- Close 12P6B-G ground disconnect switch

SCC shall advise P10 Operator to carry out the following:

- Open 10DL6-L6 and 10L2L6-L6 disconnect switches and turn off 125Vdc supply
- Close 10P6B-G ground disconnect switch

3.14. To restore P6B line to service after work

3.14.1. Prepare P6B line for restoration:

P10 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 P6B line

SCC shall advise B12 Operator to carry out the following:

- Check opened 12P6B-S bypass disconnect switch and turn on 125Vdc supply

- Check opened 12P6B breaker
- Open 12P6B-G ground disconnect switch
- Turn on 125Vdc supply and close 12P6B-L6 disconnect switch

SCC shall advise P10 Operator to carry out the following:

- Check opened 10DL6 and 10L2L6 breakers
- Open 10P6B-G ground disconnect switch
- Turn on 125Vdc supply and close 10DL6-L6 and 10L2L6-L6 disconnect switches

3.14.2. Restoration of P6B line to service:

SCC shall:

- Advise the B12 and P10 Operators of readiness to restore P6B line to service
- Close (or advise the B12 Operator to close) 12P6B breaker
- Close (or advise the P10 Operator to close) 10DL6 and 10L2L6 breakers

3.15. To restore P6B line to service after automatic outage

If P6B line trips auto due to fault:

P10 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 B12 Operator to energize) the line **ONCE** by closing 12P6B breaker
- Close (or advise the P10 Operator to close) 10DL6 and 10L2L6 breakers

P10 Operator shall:

- Advise the Supervisor/Area Manager of operation above

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

3.16. To take R7P line out of service

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10L7A and 10L4L7 breakers

SCC shall carry out (or advise the R9 Operator to carry out) the following:

- Open 9L7A and 9L7T2 breakers
- Check for no potential on R7P line

3.17. To take out, isolate and de-energize R7P line for work

- P10 Operator shall request for Station Guarantee from B12

SCC shall carry out (or advise the P10 Operator to carry out) the following:

- Open 10L7A and 10L4L7 breakers

SCC shall carry out (or advise R9 Operator to carry out) the following:

- Open 9L7A and 9L7T2 breakers
- Check for no potential on R7P line

SCC shall advise R9 Operator to carry out the following:

- Open 9L7A-L7 and 9L7T2-L7 disconnect switches and turn off 125Vdc supply
- Close 9R7P-G ground disconnect switch

SCC shall advise P10 Operator to carry out the following:

- Open 10L7A-L7 and 10L4L7-L7 disconnect switches and turn off 125Vdc supply
- Close 10R7P-G ground disconnect switch

3.18. To restore R7P line to service after work

3.18.1. Prepare R7P line for restoration:

P10 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 R7P line

SCC shall advise R9 Operator to carry out the following:

- Check opened 9L7A and 9L7T2 breakers
- Open 9R7P-G ground disconnect switch
- Turn on 125Vdc supply and close 9L7A-L7 and 9L7T2-L7 disconnect switches

SCC shall advise P10 Operator to carry out the following:

- Check opened 10L7A and 10L4L7 breakers
- Open 10P6B-G ground disconnect switch
- Turn on 125Vdc supply and close 10L7A-L7 and 10L4L7-L7 disconnect switches

3.18.2. Restoration of R7P line to service:

SCC shall:

- Advise the R9 and P10 Operators of readiness to restore P6B line to service
- Close (or advise the R9 Operator to close) 9L7A and 9L7T2 breakers
- Close (or advise the P10 Operator to close) 10L7A and 10L4L7 breakers

3.19. To restore R7P line to service after automatic outage

If R7P line trips auto due to fault:

P10 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 R9 Operator to energize) the line **ONCE** by closing 9L7A and 9L7T2 breakers
- Close (or advise the P10 Operator to close) 10L7A and 10L4L7

breakers

P10 Operator shall:

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

3.20. To isolate 10T1 Transformer for work

P10 Operator shall request Station Guarantee from Customers on 10F1 and 10F3 feeders

SCC shall advise P10 Operator to carry out the following:

- Inform Customers about readiness to take off 10T1 bank
- Request Customers on 10T1 Bank to take off their load
- Transfer Station Service from AC1 to AC2, if Station Service is on 10T1
- Open AC1 Contactor/MCB to take off supply to 10T1 transformer auxiliaries

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10SC1.2 breaker
- Open 10T1F1 breaker
- Open 10T1F3 breaker
- Open 10AT1 and 10T1T2 breakers
- Check for no potential on 10T1 Bank

SCC shall advise P10 Operator to carry out the following:

- Open 10SC1.2-T1 disconnect switch
- Open 10T1F1-F1 disconnect switch
- Open 10T1F3-T1 disconnect switch
- Open 10AT1-T1 and 10T1T2-T1 disconnect switches and turn off its 125Vdc supply
- Open AC control MCB to 10T1 auxiliaries and tag
- Open 125Vdc MCB to 10T1 primary and secondary protection and tag with PC13

3.21. To restore 10T1 Bank to service after work

3.21.1. Prepare 10T1 Bank for restoration:

P10 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 10T1 Bank and temporary grounds removed
- Close 10T1F1-F1 disconnect switch
- Close 10T1F3-T1 disconnect switch
- Close 10SC1.2-T1 disconnect switch
- Turn on 125Vdc supply and close 10AT1-T1 and 10T1T2-T1 disconnect switches
- Close AC control MCB to 10T1 auxiliaries and remove tag
- Close 125Vdc MCB to 10T1 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 10T1 Bank to service

3.21.2. Restoration of 10T1 bank to service:

- SCC shall close (or advise P10 Operator to close) the 10AT1 and 10T1T2 breakers
- P10 Operator shall advise customers of readiness to restore 10T1 bank to service
- SCC shall close (or advise P10 Operator to close) the 10T1F1 and 10T1F3 breakers

3.22. To restore 10T1 Bank to service after automatic outage

If 10T1 bank trips auto due to fault:

P10 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 P10 Operator to energize) the bank **ONCE** by closing 10AT1 and 10T1T2 breakers

P10 Operator shall advise Customers of readiness to restore 10F1 and 10F3 feeders to service

SCC shall close (or advise P10 Operator to close) 10T1F1 and 10T1F3 breakers

P10 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**.)

3.23. To isolate 10T2 Transformer for work

P10 Operator shall request Station Guarantee from customers on 10F2 and 10F4 feeders

SCC shall advise P10 Operator to carry out the following:

- Inform customers about readiness to take off 10T2 bank
- Request customers on 10T2 Bank to take off their load
- Transfer Station Service from AC2 to AC1, if Station Service is on 10T2
- Open AC1 Contactor/MCB to take off supply to 10T2 transformer auxiliaries

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10SC3.4 breaker
- Open 10T2F2 breaker
- Open 10T2F4 breaker
- Open 10T1T2 and 10DT2 breakers
- Check for no potential on 10T2 Bank

SCC shall advise P10 Operator to carry out the following:

- Open 10SC3.4-T2 disconnect switch
- Open 10T2F2-F2 disconnect switch
- Open 10T2F4-T2 disconnect switch
- Open 10T1T2-T2 and 10DT2-T2 disconnect switches and turn off 125Vdc

supply

- Open AC control MCB to 10T2 auxiliaries and tag
- Open 125Vdc MCB to 10T2 primary and secondary protection and tag with PC13

3.24. To restore 10T2 Bank to service after work

3.24.1. Prepare 10T2 Bank for restoration:

P10 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 10T2 Bank and temporary grounds removed
- Close 10SC3.4-T2 disconnect switch
- Close 10T2F2-F2 disconnect switch
- Close 10T2F4-T2 disconnect switch
- Turn on 125Vdc supply and close 10T1T2-T2 and 10DT2-T2 disconnect switches
- Close AC control MCB to 10T2 auxiliaries and remove tag
- Close 125Vdc MCB to 10T2 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 10T2 Bank to service

3.24.2. Restoration of 10T2 bank to service:

- SCC shall close (or advise P10 Operator to close) the 10T1T2 and 10DT2 breakers
- P10 Operator shall advise customers of readiness to restore 10T2 bank to service
- SCC shall close (or advise P10 Operator to close) the 10T2F2 and 10T2F4 breakers

3.25. To restore 10T2 Bank to service after automatic outage

If 10T2 bank trips auto due to fault:

P10 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 P10 Operator to energize) the bank **ONCE** by closing 10T1T2 and 10DT2 breakers

P10 Operator shall advise Customers of readiness to restore 10F2 and 10F4 feeders to service

SCC shall close (or advise P10 Operator to close) 10T2F2 and 10T2F4 breakers

P10 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.**)

3.26. To isolate 10T7 Transformer for work

SCC shall advise P10 Operator to carry out the following:

- Transfer Station Service from AC3 to AC4, if Station Service is on 10T7

- Open AC3 Contactor/MCB to take off supply to 10T7 transformer auxiliaries

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10T7K breaker

- Open 10T7A breaker

- Open 10SC5T7 breaker

- Check for no potential on 10T7 Bank

SCC shall advise P10 Operator to carry out the following:

- Open 10SC5T7-T7 disconnect switch and turn off its 125Vdc supply

- Open 10T7K-K disconnect switch and turn off its 125Vdc supply

- Open AC control MCB to 10T7 auxiliaries and tag

- Open 125Vdc MCB to 10T7 primary and secondary protection and tag with PC13

3.27. To restore 10T7 Bank to service after work

3.27.1. Prepare 10T7 Bank for restoration:

P10 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 10T7 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 10SC5T7-T7 disconnect switch
- Turn on 125Vdc supply and close 10T7K-K disconnect switch
- Turn on 125Vdc supply and close 10T7A-T7 disconnect switch
- Close AC control MCB to 10T7 auxiliaries and remove tag
- Close 125Vdc MCB to 10T7 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 10T7 Bank to service

3.27.2. Restoration of 10T7 bank to service:

- SCC shall close (or advise P10 Operator to close) the 10T7K breaker and 10T7A breakers

3.28. To restore 10T7 Bank to service after automatic outage

If 10T7 bank trips auto due to fault:

P10 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 P10 Operator to energize) the bank **ONCE** by closing 10T7A breaker

SCC shall close (or advise P10 Operator to close) the 10T7K breaker

P10 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.**)

3.29. To isolate 10T8 Transformer for work

SCC shall advise P10 Operator to carry out the following:

- Transfer Station Service from AC4 to AC3, if Station Service is on 10T8
- Open AC3 Contactor/MCB to take off supply to 10T8 transformer auxiliaries

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10T8K breaker
- Open 10T8D breaker
- Check for no potential on 10T8 Bank

SCC shall advise P10 Operator to carry out the following:

- Open 10T8K-K disconnect switch and turn off its 125Vdc supply
- Open 10T8D-T8 disconnect switch and turn off its 125Vdc supply
- Open AC control MCB to 10T8 auxiliaries and tag
- Open 125Vdc MCB to 10T8 primary and secondary protection and tag with PC13

3.30. To restore 10T8 Bank to service after work

3.30.1. Prepare 10T8 Bank for restoration:

P10 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 10T8 Bank and temporary grounds removed
- Turn on 125Vdc supply and close 10T8K-K disconnect switch
- Turn on 125Vdc supply and close 10T8D-T8 disconnect switch
- Close AC control MCB to 10T8 auxiliaries and remove tag
- Close 125Vdc MCB to 10T8 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 10T8 Bank to service

3.30.2. Restoration of 10T8 bank to service:

- SCC shall close (or advise P10 Operator to close) the 10T8K breaker and 10T8D breakers

3.31. To restore 10T8 Bank to service after automatic outage

If 10T7 bank trips auto due to fault:

P10 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 P10 Operator to energize) the bank **ONCE** by closing 10T8D breaker

SCC shall close (or advise P10 Operator to close) the 10T8K breaker

P10 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.**)

3.32. To Isolate 10T1F1 Breaker for work

- P10 Operator shall request Station Guarantee from customer on 10F1 feeder

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10T1F1 breaker
- Open 10T1F3 breaker
- Open 10T1SC1.2 breaker
- Open 10AT1 and 10T1T2 breakers

SCC shall advise P10 Operator to carry out the following:

- Open 10T1F1-F1 disconnect switch
- Open 10T1SC1.2-T1 disconnect switch

- Open 10T1F3-T1 disconnect switch

- Open 10AT1-T1 and 10T1T2-T1 disconnect switches and turn off 125Vdc supply

- Check for no potential on 10T1F1 Breaker

3.33. To restore 10T1F1 Breaker to service after work

3.33.1. Prepare 10T1F1 Breaker for restoration:

P10 Operator shall:

- Advise SCC when work on the 10T1F1 Breaker has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 10T1F1 Breaker and temporary grounds removed

- Close 10T1F1-F1 disconnect switch

- Close 10T1SC1.2-T1 disconnect switch

- Close 10T1F3-T1 disconnect switch

- Turn on 125Vdc supply and close 10AT1-T1 and 10T1T2-T1 disconnect switches

3.33.2. Restoration of 10T1F1 Breaker to service:

- SCC shall close (or advise P10 Operator to close) the 10AT1 and 10T1T2 breakers

- P10 Operator shall advise customers of readiness to restore 10F1 and 10F3 feeders to service

- SCC shall close (or advise P10 Operator to close) the 10T1F1 and 10T1F3 breakers

3.34. To Isolate 10T2F2 Breaker for work

- P10 Operator shall request Station Guarantee from customer on 10F2 feeder

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10T2F2 breaker

- Open 10T2F4 breaker

- Open 10T2SC3.4 breaker
- Open 10DT2 and 10T1T2 breakers

SCC shall advise P10 Operator to carry out the following:

- Open 10T2F4-T2 disconnect switch
- Open 10T2SC3.4-T2 disconnect switch
- Open 10T2F2-F2 disconnect switch
- Open 10DT2-T2 and 10T1T2-T2 disconnect switches and turn off 125Vdc supply
- Check for no potential on 10T2F2 Breaker

3.35. To restore 10T2F2 Breaker to service after work

3.35.1. Prepare 10T2F2 Breaker for restoration:

P10 Operator shall:

- Advise SCC when work on the 10T2F2 Breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 10T2F2 Breaker and temporary grounds removed
- Close 10T2F4-T2 disconnect switch
- Close 10T2SC3.4-T2 disconnect switch
- Close 10T2F2-F2 disconnect switch
- Turn on 125Vdc supply and close 10DT2-T2 and 10T1T2-T2 disconnect switches

3.35.2. Restoration of 10T2F2 Breaker to service:

- SCC shall close (or advise P10 Operator to close) the 10DT2 and 10T1T2 breakers
- P10 Operator shall advise customers of readiness to restore 10F2 and 10F3 feeders to service
- SCC shall close (or advise P10 Operator to close) the 10T2F2 and 10T2F4 breakers

3.36. To Isolate 10T1F3 Breaker for work

- P10 Operator shall request Station Guarantee from customer on 10F3 feeder

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10T1F1 breaker
- Open 10T1F3 breaker
- Open 10T1SC1.2 breaker
- Open 10AT1 and 10T1T2 breakers

SCC shall advise P10 Operator to carry out the following:

- Open 10T1F1-F1 disconnect switch
- Open 10T1SC1.2-T1 disconnect switch
- Open 10T1F3-T1 disconnect switch
- Open 10AT1-T1 and 10T1T2-T1 disconnect switches and turn off 125Vdc supply
- Check for no potential on 10T1F3 breaker

3.37. To restore 10T1F3 breaker to service after work

3.37.1. Prepare 10T1F3 breaker for restoration:

P10 Operator shall:

- Advise SCC when work on the 10T1F3 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 10T1F3 breaker and temporary grounds removed
- Close 10T1F1-F1 disconnect switch
- Close 10T1SC1.2-T1 disconnect switch
- Close 10T1F3-T1 disconnect switch
- Turn on 125Vdc supply and close 10AT1-T1 and 10T1T2-T1 disconnect switches

3.37.2. Restoration of 10T1F3 breaker to service:

- SCC shall close (or advise P10 Operator to close) the 10AT1 and 10T1T2 breakers
- P10 Operator shall advise customers of readiness to restore 10F1 and

10F3 feeders to service

- SCC shall close (or advise P10 Operator to close) the 10T1F1 and 10T1F3 breakers

3.38. To Isolate 10T2F4 Breaker for work

- P10 Operator shall request Station Guarantee from customer on 10F4 feeder

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10T2F4 breaker
- Open 10T2F4 breaker
- Open 10T2SC3.4 breaker
- Open 10DT2 and 10T1T2 breakers

SCC shall advise P10 Operator to carry out the following:

- Open 10T2F4-T2 disconnect switch
- Open 10T2SC3.4-T2 disconnect switch
- Open 10T2F2-F2 disconnect switch
- Open 10DT2-T2 and 10T1T2-T2 disconnect switches and turn off 125Vdc supply
- Check for no potential on 10T2F4 Breaker

3.39. To restore 10T2F4 Breaker to service after work

3.39.1. Prepare 10T2F4 Breaker for restoration:

P10 Operator shall:

- Advise SCC when work on the 10T2F4 Breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 10T2F4 Breaker and temporary grounds removed
- Close 10T2F4-T2 disconnect switch
- Close 10T2SC3.4-T2 disconnect switch
- Close 10T2F2-F2 disconnect switch
- Turn on 125Vdc supply and close 10DT2-T2 and 10T1T2-T2 disconnect

switches

3.39.2. Restoration of 10T2F4 Breaker to service:

- SCC shall close (or advise P10 Operator to close) the 10DT2 and 10T1T2 breakers
- P10 Operator shall advise customers of readiness to restore 10F4 and 10F2 feeders to service
- SCC shall close (or advise P10 Operator to close) the 10T2F4 and 10T2F2 breakers

3.40. To isolate 10SC1.2Capacitor Bank for work

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10SC1.2 breaker

SCC shall advise P10 Operator to carry out the following:

- Open 10SC1.2-T1 disconnect switch
- Close 10SC1-G ground disconnect switch

3.41. To restore 10SC1.2Capacitor Bank to service after work

3.41.1. Prepare 10SC1.2Capacitor Bank for restoration:

P10 Operator shall:

- Advise SCC when work on the 10SC1.2 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 10SC1.2 Capacitor Bank and temporary grounds removed
- Open 10SC2-G disconnect switch
- Close 10SC1.2-T1 disconnect switch

3.41.2. Restoration of 10SC1.2 Capacitor Bank to service:

- SCC shall close (or advise P10 Operator to close) 10SC1.2 breaker if the voltage is below 32.8kV

3.42. To isolate 10SC3.4 Capacitor Bank for work

SCC shall carry out (or advise P10 Operator to carry out) the following:

- Open 10SC3.4 breaker

SCC shall advise P10 Operator to carry out the following:

- Open 10SC3.4-T2 disconnect switch

- Close 10SC1-G ground disconnect switch

3.43. To restore 10SC3.4 Capacitor Bank to service after work

3.43.1. Prepare 10SC3.4 Capacitor Bank for restoration:

P10 Operator shall:

- Advise SCC when work on the 10SC3.4 Capacitor Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 10SC3.4 Capacitor Bank and temporary grounds removed

- Open 10SC2-G ground disconnect switch

- Close 10SC3.4-T2 disconnect switch

3.43.2. Restoration of 10SC3.4 Capacitor Bank to service:

- SCC shall close (or advise P10 Operator to close) 10SC3.4 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.

OTE:

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' and 'D' buses, a breaker and half configuration provides the normal points of supply to all circuits/equipment such as P2NR, P3BN, BS4P and P6B lines and 10T1 and 10T2 transformers and 10SC1.2 and 10SC3.4 Capacitor Banks.

5. Approval

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Director, TSD