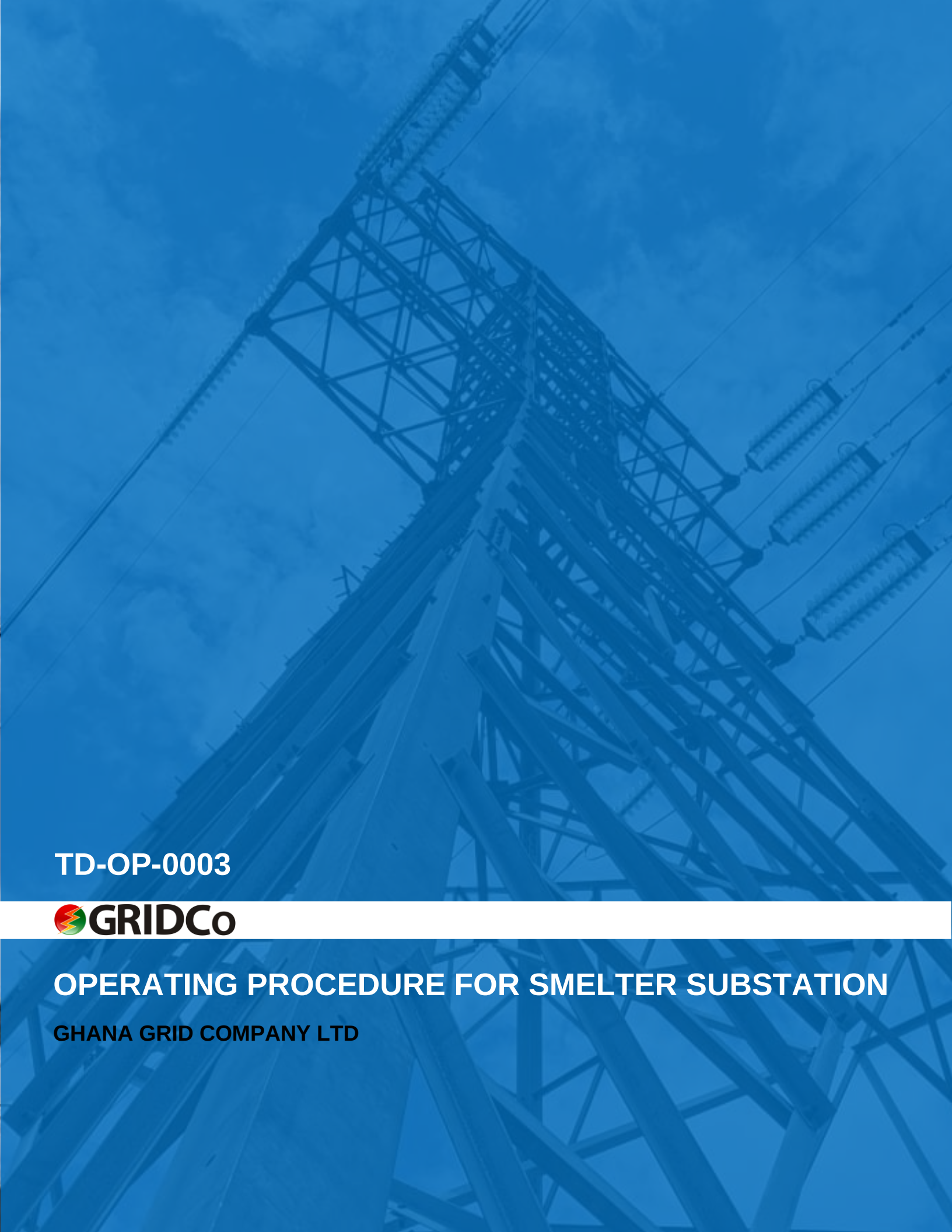

TD-OP-0003

GRIDCo

OPERATING PROCEDURE FOR SMELTER SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR SMELTER SUBSTATION (SM60)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Tema Operating Staff, Tema Area Maintenance Staff, Tema Area Dispatch Staff, SCC	**Number:**	TD-OP-0003
		Subject Area:	Operating
		Issue Date:	Trial
		Origin:	Technical Services
Key Words:	Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage		

Contents

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at S3 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Tema Operating Area and System Control Center (SCC) for operation of equipment at S3 Substation.

3. Procedure

3.1. To take SM1S line out of service

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL1 and 60L11L1 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on SM1S line

3.2. To take out, isolate and de-energize SM1S line for work

- SM60 Operator shall request for Station Guarantee from S3
- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL1 and 60L11L1 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T1 and 3T3 transformers
- Check for no potential on SM1S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T3-L disconnect switch and turn off its 125Vdc supply

SCC shall advise SM60 Operator to carry out the following:

- Open 60L11L1-L1 and 60DL1-L1 disconnect switches and turn off its125Vdc supply
- Close 60SM1S-G ground disconnect switch

3.3. To restore SM1S line to service after work

3.3.1. Prepare SM1S line for restoration

SM60 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 SM1S line

SCC shall advise S3 Operator to carry out the following

- Check for no potential on 3T1 and 3T3 transformers
- Turn on 125Vdc supply and close 3T3-L disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L11L1 and 60DL1 breakers
- Open 60SM1S-G ground disconnect switch
- Turn on 125Vdc supply and close 60L11L1-L1 and 60DL1-L1 disconnect switches

3.3.2. Restoration of SM1S line to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore SM1S line to service
- Close (or advise the SM60 Operator to close) 60L11L1 and 60DL1 breakers

3.4. To restore SM1S line to service after automatic outage

If SM1S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage
- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L11L1 and 60DL1 breakers

SM60 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 SM2S line out of service

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- SM60 Operator shall advise VALCO of outage
- Open 60DL2 and 60L12L2 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T2 transformer
- Check for no potential on SM2S line

3.6. To take out, isolate and de-energize SM2S line for work

- SM60 Operator shall request for Station Guarantee from S3
- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL2 and 60L12L2 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T2 transformer
- Check for no potential on SM2S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T2-L disconnect switch and turn off its 125Vdc supply

SCC shall advise SM60 Operator to carry out the following:

- Open 60L12L2-L2 and 60DL2-L2 disconnect switches and turn off its125Vdc supply
- Close 60SM2S-G ground disconnect switch

3.7. To restore SM2S line to service after work

3.7.1. Prepare SM2S line for restoration

SM60 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 SM2S line

SCC shall advise S3 Operator to carry out the following

- Check for no potential on 3T2 transformer
- Turn on 125Vdc supply and close 3T2-L disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L12L2 and 60DL2 breakers
- Open 60SM2S-G ground disconnect switch
- Turn on 125Vdc supply and close 60L12L2-L2 and 60DL2-L2 disconnect switches

3.7.2. Restoration of SM2S line to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore SM2S line to service
- Close (or advise the SM60 Operator to close) 60L12L2 and 60DL2 breakers

3.8. To restore SM2S line to service after automatic outage

If SM2S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage
- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L12L2 and 60DL2 breakers

SM60 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 SM3S line out of service

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- SM60 Operator shall advise VALCO of outage

- Open 60DL3 and 60L13L3 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T5 transformer

- Check for no potential on SM3S line

3.10. To take out, isolate and de-energize SM3S line for work

SM60 Operator shall request for Station Guarantee from S3

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL3 and 60L13L3 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential 3T5 transformer

- Check for no potential on SM3S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T5-L disconnect switch and turn off its 125Vdc supply

SCC shall advise SM60 Operator to carry out the following:

- Open 60L13L3-L3 and 60DL3-L3 disconnect switches and turn off its 125Vdc supply

- Close 60SM3S-G ground disconnect switch

3.11. To restore SM3S line to service after work

3.11.1. Prepare SM3S line for restoration

SM60 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 SM3S line

SCC shall advise S3 Operator to carry out the following

- Check for no potential on 3T5 transformer
- Turn on 125Vdc supply and close 3T5-L disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L13L3 and 60DL3 breakers
- Open 60SM3S-G ground disconnect switch
- Turn on 125Vdc supply and close 60L13L3-L3and 60DL3-L3 disconnect switches

3.11.2. Restoration of SM3S line to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore SM3S line to service
- Close (or advise the SM60 Operator to close) 60L13L3 and 60DL3 breakers

3.12. To restore SM3S line to service after automatic outage

If SM3S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage
- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L13L3 and 60DL3 breakers

SM60 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 SM4S line out of service

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- SM60 Operator shall advise VALCO of outage

- Open 60DL4 and 60L14L4 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T6 transformer

- Check for no potential on SM4S line

3.14. To take out, isolate and de-energize SM4S line for work

- SM60 Operator shall request for Station Guarantee from S3

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL4 and 60L14L4 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T6 transformer

- Check for no potential on SM4S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T6-L disconnect switch and turn off its 125Vdc supply

SCC shall advise SM60 Operator to carry out the following:

- Open 60L14L4-L4 and 60DL4-L4 disconnect switches and turn off its125Vdc supply

- Close 60SM4S-G ground disconnect switch

3.15. To restore SM4S line to service after work

3.15.1. Prepare SM4S line for restoration

SM60 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 SM4S line

SCC shall advise S3 Operator to carry out the following

- Check for no potential 3T6 transformer

- Turn on 125Vdc supply and close 3T6-L disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L14L4 and 60DL4 breakers

- Open 60SM4S-G ground disconnect switch

- Turn on 125Vdc supply and close 60L14L4-L4 and 60DL4-L4 disconnect switches

3.15.2. Restoration of SM4S line to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore SM4S line to service

- Close (or advise the SM60 Operator to close) 60L14L4 and 60DL4 breakers

3.16. To restore SM4S line to service after automatic outage

If SM4S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage
- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L14L4 and 60DL4 breakers

SM60 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 SM5S line out of service

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- SM60 Operator shall advise VALCO of outage
- Open 60DL5 and 60L15L5 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential 3T7 transformer
- Check for no potential on SM5S line

3.18. To take out, isolate and de-energize SM5S line for work

- SM60 Operator shall request for Station Guarantee from S3
- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL5 and 60L15L5 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential 3T7 transformer
- Check for no potential on SM5S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T7-L disconnect switch and turn off its 125Vdc supply

SCC shall advise SM60 Operator to carry out the following:

- Open 60L15L5-L5 and 60DL5-L5 disconnect switches and turn off its 125Vdc supply
- Close 60SM5S-G ground disconnect switch

3.19. To restore SM5S line to service after work

3.19.1. Prepare SM5S line for restoration

SM60 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 SM5S line

SCC shall advise S3 Operator to carry out the following

- Check for no potential 3T7 transformer
- Turn on 125Vdc supply and close 3T7-L disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L15L5 and 60DL5 breakers
- Open 60SM5S-G ground disconnect switch
- Turn on 125Vdc supply and close 60L15L5-L5 and 60DL5-L5 disconnect switches

3.19.2. Restoration of SM5S line to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore SM5S line to service

- Close (or advise the SM60 Operator to close) 60L15L5 and 60DL5 breakers

3.20. To restore SM5S line to service after automatic outage

If SM4S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage

- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L15L5 and 60DL5 breakers

SM60 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 take Line No. 6 out of service

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL6 and 60L16L6 breakers

- Check for no potential on Line No. 6

3.22. To take out, isolate and de-energize Line No. 6 for work

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL6 and 60L16L6 breakers

- Check for no potential on Line No. 6

SCC shall advise SM60 Operator to carry out the following:

- Open 60L16L6-L6 and 60DL6-L6 disconnect switches and turn off its125Vdc supply

- Close Line No. 6 ground disconnect switch

3.23. To restore Line No. 6 to service after work

3.23.1. Prepare Line No. 6 for restoration

SM60 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 Line No. 6

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L16L6 and 60DL6 breakers

- Open Line No. 6 ground disconnect switch

- Turn on 125Vdc supply and close 60L16L6-L6 and 60DL6-L6 disconnect switches

3.23.2. Restoration of Line No. 6 to service:

SCC shall:

- Advise the SM60 Operator of readiness to restore Line No. 6 to service

- Close (or advise the SM60 Operator to close) 60L16L6 and 60DL6 breakers

3.24. To restore Line No. 6 to service after automatic outage

If Line No. 6 trips auto due to fault:

SM60 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 SM60 Operator to energize) the line **ONCE** by closing 60L16L6 and 60DL6 breakers

SM60 Operator shall:

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

3.25. To take Line No. 7 line out of service

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL7 and 60L17L7 breakers
- Check for no potential on Line No. 7 line

3.26. To take out, isolate and de-energize Line No. 7 line for work

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL7 and 60L17L7 breakers
- Check for no potential on Line No. 7 line

SCC shall advise SM60 Operator to carry out the following:

- Open 60L17L7-L7 and 60DL7-L7 disconnect switches and turn off its125Vdc supply
- Close Line No. 7 ground disconnect switch

3.27. To restore Line No. 7 line to service after work

3.27.1. Prepare Line No. 7 line for restoration

SM60 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 Line No. 7 line

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L17L7 and 60DL7 breakers

- Open Line No. 7 ground disconnect switch

- Turn on 125Vdc supply and close 60L17L7-L7 and 60DL7-L7 disconnect switches

3.27.2. Restoration of Line No. 7 line to service:

SCC shall:

- Advise the SM60 Operator of readiness to restore Line No. 7 line to service

- Close (or advise the SM60 Operator to close) 60L17L7 and 60DL7 breakers

3.28. To restore Line No. 7 line to service after automatic outage

If Line No. 7 trips auto due to fault:

SM60 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 SM60 Operator to energize) the line **ONCE** by closing 60L17L7 and 60DL7 breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager of operation above

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

3.29. To take 3T1 transformer out of service

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL1 and 60L11L1 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on SM1S line

3.30. To take out, isolate and de-energize 3T1 transformer for work

- SM60 Operator shall request for Station Guarantee from S3

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL1 and 60L11L1 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T1 and 3T3 transformers
- Check for no potential on SM1S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T1-L disconnect switch and turn off its 125Vdc supply

SCC shall advise SM60 Operator to carry out the following:

- Close 60L11L1 and 60DL1 breakers to restore supply to 3T1

3.31. To restore 3T1 transformer to service after work

3.31.1. Prepare 3T1 transformer for restoration

SM60 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 3T1 transformer

SCC shall advise SM60 Operator to carry out the following

- Open 60L11L1 and 60DL1 breakers

SCC shall advise SM3 Operator to carry out the following:

- Check for no potential on 3T1 transformer and SM1S line

- Turn on 125Vdc and close 3T1-L disconnect switch

3.31.2. Restoration of 3T1 transformer to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore 3T1 transformer to service

- Close (or advise the SM60 Operator to close) 60L11L1 and 60DL1 breakers

3.32. To restore 3T1 transformer to service after automatic outage

If SM1S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage

- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L11L1 and 60DL1 breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager of operation above

3.33. To take 3T2 transformer out of service

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL2 and 60L12L2 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on SM2S line

3.34. To take out, isolate and de-energize 3T2 transformer for work

- SM60 Operator shall request for Station Guarantee from S3

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL2 and 60L12L2 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T2 transformer
- Check for no potential on SM2S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T2-L disconnect switch and turn off its 125Vdc supply

3.35. To restore 3T2 transformer to service after work

3.35.1. Prepare 3T2 transformer for restoration

SM60 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 3T2 transformer

SCC shall advise SM60 Operator to carry out the following

- Checked opened 60L12L2 and 60DL2 breakers

SCC shall advise SM3 Operator to carry out the following:

- Check for no potential on 3T2 transformer and SM2S line

- Turn on 125Vdc and close 3T2-L disconnect switch

3.35.2. Restoration of 3T2 transformer to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore 3T2 transformer to service

- Close (or advise the SM60 Operator to close) 60L12L2 and 60DL2 breakers

3.36. To restore 3T2 transformer to service after automatic outage

If SM2S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage

- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L12L2 and 60DL2 breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager of operation above

3.37. To take 3T3 transformer out of service

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL1 and 60L11L1 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on SM1S line

3.38. To take out, isolate and de-energize 3T3 transformer for work

- SM60 Operator shall request for Station Guarantee from S3

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL1 and 60L11L1 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T1 and 3T3 transformers
- Check for no potential on SM1S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T3-L disconnect switch and turn off its 125Vdc supply

SCC shall advise SM60 Operator to carry out the following:

- Close 60L11L1 and 60DL1 breakers to restore supply to 3T1

3.39. To restore 3T3 transformer to service after work

3.39.1. Prepare 3T3 transformer for restoration

SM60 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 3T3 transformer

SCC shall advise SM60 Operator to carry out the following

- Open 60L11L1 and 60DL1 breakers

SCC shall advise SM3 Operator to carry out the following:

- Check for no potential on 3T3 transformer and SM1S line

- Turn on 125Vdc and close 3T3-L disconnect switch

3.39.2. Restoration of 3T3 transformer to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore 3T3 transformer to service

- Close (or advise the SM60 Operator to close) 60L11L1 and 60DL1 breakers

3.40. To restore 3T3 transformer to service after automatic outage

If SM1S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage

- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L11L1 and 60DL1 breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager of operation above

3.41. To take 3T5 transformer out of service

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL3 and 60L13L3 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on SM3S line

3.42. To take out, isolate and de-energize 3T5 transformer for work

- SM60 Operator shall request for Station Guarantee from S3

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL3 and 60L13L3 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T5 transformer

- Check for no potential on SM3S line

SCC shall advise S3 Operator to carry out the following:

- Open 3T5-L disconnect switch and turn off its 125Vdc supply

3.43. To restore 3T5 transformer to service after work

3.43.1. Prepare 3T5 transformer for restoration

SM60 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 3T5 transformer

SCC shall advise SM60 Operator to carry out the following

- Checked opened 60L13L3 and 60DL3 breakers

SCC shall advise SM3 Operator to carry out the following:

- Check for no potential on 3T5 transformer and SM3S line
- Turn on 125Vdc and close 3T5-L disconnect switch

3.43.2. Restoration of 3T5 transformer to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore 3T5 transformer to service
- Close (or advise the SM60 Operator to close) 60L13L3 and 60DL3 breakers

3.44. To restore 3T5 transformer to service after automatic outage

If SM3S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage
- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L13L3 and 60DL3 breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager of operation above

3.45. To take 3T7 transformer out of service

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL5 and 60L15L5 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on SM3S line

3.46. To take out, isolate and de-energize 3T7 transformer for work

- SM60 Operator shall request for Station Guarantee from S3

- SM60 Operator shall advise VALCO of outage

SCC shall carry out (or advise the SM60 Operator to carry out) the following:

- Open 60DL5 and 60L15L5 breakers

SCC shall advise S3 Operator to carry out the following:

- Check for no potential on 3T7 transformer

- Check for no potential on SM3S line

SCC shall advise S3 Operator to carry out the following:

- Check opened 3SC5T7 breaker

- Check opened 3SC5T7-T7 breaker

- Open 3T7-L disconnect switch and turn off its 125Vdc supply

3.47. To restore 3T7 transformer to service after work

3.47.1. Prepare 3T7 transformer for restoration

SM60 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 3T7 transformer

SCC shall advise SM60 Operator to carry out the following

- Checked opened 60L15L5 and 60DL5 breakers

SCC shall advise SM3 Operator to carry out the following:

- Check for no potential on 3T7 transformer and SM3S line

- Check opened 3SC5T7 breaker

- Check opened 3SC5T7-T7 breaker

- Turn on 125Vdc and close 3T7-L disconnect switch

3.47.2. Restoration of 3T7 transformer to service:

SCC shall:

- Advise the SM60 and S3 Operators and VALCO of readiness to restore 3T7 transformer to service

- Close (or advise the SM60 Operator to close) 60L15L5 and 60DL5 breakers

3.48. To restore 3T7 transformer to service after automatic outage

If SM3S line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage
- Advise VALCO 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 SM60 Operator to energize) the line **ONCE** by closing 60L15L5 and 60DL5 breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager of operation above

3.49. To isolate 3SC5 Capacitor Bank for work

SCC shall carry out (or advise SM60 Operator to carry out) the following:

- Open 3SC5T7 breaker
- Open 3SC5T7-SC5 disconnect switch and turn off its supply
- Close 3SC5T7-G ground disconnect switch

3.50. To restore 3SC5 Capacitor bank to service after work

3.50.1. Prepare 3SC5 Capacitor bank for restoration:

SM60 Operator shall:

- Advise SCC when work on the capacitor bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check opened 3SC5T7 breaker

- Open 3SC5T7-G ground disconnect switch

- Turn on 125Vdc supply and close 3SC5T7-SC5 disconnect switch

3.50.2. Restoration of 3SC5 Capacitor Bank to service:

- SCC shall close (or advise SM60 Operator to close) 3SC5T7breaker 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' and 'D' buses, a breaker and half configuration provide the normal points of supply to all circuits/equipment such as SM1S, SM2S, SM3S, SM4S, SM5S, Line No. 6, Line No. 7, KC10SM, V11SM, V12SM, V13SM, V14SM, V15SM, V16SM, KC20SM, AK22SM, AK23SM lines, 60T1, 60T2 transformers 60SC1 and 60SC2 Capacitor Banks.

5. Approval

……

Director, Technical Services