

TD-OP-0060



OPERATING PROCEDURE FOR SMELTER II SUBSTATION

GHANA GRID COMPANY LTD

TECHNICAL DIRECTIVES

Title: OPERATING PROCEDURE FOR SMELTER II 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-0060	
	Subject Area:	Operating
	Issue Date:	Trial
	Origin:	Technical Services
	Key Words: Take Out, Isolate, Prepare, Energize, Restore, Automatic Outage	

TECHNICAL DIRECTIVES

Contents

1. Purpose.....	4
2. Scope.....	4
3. Procedure.....	4
3.1. To take SM1S line out of service.....	4
3.2. To take out, isolate and de-energize SM1S line for work.....	4
3.3. To restore SM1S line to service after work.....	5
3.4. To restore SM1S line to service after automatic outage.....	5
3.5. To take SM2S line out of service.....	6
3.6. To take out, isolate and de-energize SM2S line for work.....	6
3.7. To restore SM2S line to service after work.....	7
3.8. To restore SM2S line to service after automatic outage.....	8
3.9. To take SM3S line out of service.....	8
3.10. To take out, isolate and de-energize SM3S line for work.....	9
3.11. To restore SM3S line to service after work.....	9
3.12. To restore SM3S line to service after automatic outage.....	10
3.13. To take SM4S line out of service.....	10
3.14. To take out, isolate and de-energize SM4S line for work.....	11
3.15. To restore SM4S line to service after work.....	11
3.16. To restore SM4S line to service after automatic outage.....	12
3.17. To take SM5S line out of service.....	13
3.18. To take out, isolate and de-energize SM5S line for work.....	13
3.19. To restore SM5S line to service after work.....	13
3.20. To restore SM5S line to service after automatic outage.....	14
3.21. To take Line No. 6 out of service.....	15
3.22. To take out, isolate and de-energize Line No. 6 for work.....	15
3.23. To restore Line No. 6 to service after work.....	15
3.24. To restore Line No. 6 to service after automatic outage.....	16
3.25. To take Line No. 7 line out of service.....	16
3.26. To take out, isolate and de-energize Line No. 7 line for work.....	17
3.27. To restore Line No. 7 line to service after work.....	17
3.28. To restore Line No. 7 line to service after automatic outage.....	18
3.29. To take V11SM line out of service.....	18
3.30. To take out, isolate and de-energize V11SM line for work.....	18
3.31. To restore V11SM line to service after work.....	19
3.32. To restore V11SM line to service after automatic outage.....	20
3.33. To take V12SM line out of service.....	20
3.34. To take out, isolate and de-energize V12SM line for work.....	21
3.35. To restore V12SM line to service after work.....	21
3.36. To restore V12SM line to service after automatic outage.....	22
3.37. To take out, isolate and de-energize V13SM line for work.....	23
3.38. To restore V13SM line to service after work.....	23
3.39. To restore V13SM line to service after automatic outage.....	24
3.40. To take out V14SM line for work.....	25
3.41. To take out, isolate and de-energize V14SM line for work.....	25
3.42. To restore V14SM line to service after work.....	26
3.43. To restore V14SM line to service after automatic outage.....	26
3.44. To take out V15SM line for work.....	27
3.45. To take out, isolate and de-energize V15SM line for work.....	27
3.46. To restore V15SM line to service after work.....	28

TECHNICAL DIRECTIVES

3.47.	To restore V15SM line to service after automatic outage	29
3.48.	To take out V16SM line for work.....	29
3.49.	To take out, isolate and de-energize V16SM line for work.....	30
3.50.	To restore V16SM line to service after work.....	30
3.51.	To restore V16SM line to service after automatic outage	31
3.52.	To take out KC10SM line for work.....	32
3.53.	To take out, isolate and de-energize KC10SM line for work	32
3.54.	To restore KC10SM line to service after work	32
3.55.	To restore KC10SM line to service after automatic outage	33
3.56.	To take out KC20SM line for work.....	34
3.57.	To take out, isolate and de-energize KC20SM line for work	34
3.58.	To restore KC20SM line to service after work	35
3.59.	To restore KC20SM line to service after automatic outage	36
3.60.	To take out AK22SM line for work.....	36
3.61.	To take out, isolate and de-energize AK22SM line for work	36
3.62.	To restore AK22SM line to service after work	37
3.63.	To restore AK22SM line to service after automatic outage	38
3.64.	To take out AK23SM line for work.....	38
3.65.	To take out, isolate and de-energize AK23SM line for work	39
3.66.	To restore AK23SM line to service after work	39
3.67.	To restore AK23SM line to service after automatic outage	40
3.68.	Isolate 60T1 Transformer for work.....	41
3.69.	To restore 60T1 Bank to service after work	41
3.70.	To restore 60T1 Bank to service after automatic outage	42
3.71.	To isolate 60T2 Transformer for work	43
3.72.	To restore 60T2 Bank to service after work	44
3.73.	Restore 60T2 Bank to service after automatic outage	45
3.74.	Isolate 60T1F1 Breaker for work	45
3.75.	To restore 60T1F1 Breaker to service after work	46
3.76.	Isolate 60T1F3 Breaker for work	46
3.77.	To restore 60T1F3 Breaker to service after work.....	46
3.78.	Isolate 60T2F2 Breaker for work	47
3.79.	To restore 60T2F2 Breaker to service after work	47
3.80.	Isolate 60T2F4 Breaker for work	48
3.81.	To restore 60T2F4 Breaker to service after work	48
3.82.	To isolate 60SC1 Capacitor Bank for work.....	49
3.83.	To restore 60SC1 Capacitor bank to service after work.....	49
3.84.	To isolate 60SC2 Capacitor Bank for work.....	49
3.85.	To restore 60SC2 Capacitor bank to service after work.....	49
4.	EXPLANATION.....	50

TECHNICAL DIRECTIVES

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at SM60 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 SM60 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

TECHNICAL DIRECTIVES

SCC shall advise SM60 Operator to carry out the following:

- Open 60L11L1-L1 and 60DL1-L1 disconnect switches and turn off its 125Vdc 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:

TECHNICAL DIRECTIVES

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 60L1 1L1 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 60L1 2L2 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 60L1 2L2 breakers

TECHNICAL DIRECTIVES

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 60L1 2L2-L2 and 60DL2-L2 disconnect switches and turn off its 125Vdc 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 60L1 2L2 and 60DL2 breakers
- Open 60SM2S-G ground disconnect switch
- Turn on 125Vdc supply and close 60L1 2L2-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

TECHNICAL DIRECTIVES

- Close (or advise the SM60 Operator to close) 60L1 2L2 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 60L1 2L2 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 60L1 3L3 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

TECHNICAL DIRECTIVES

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

TECHNICAL DIRECTIVES

- Turn on 125Vdc supply and close 60L1 3L3-L3 and 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) 60L1 3L3 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 60L1 3L3 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

TECHNICAL DIRECTIVES

- 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 its 125Vdc 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

TECHNICAL DIRECTIVES

- 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

TECHNICAL DIRECTIVES

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

TECHNICAL DIRECTIVES

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 60L1 5L5 and 60DL5 breakers
- Open 60SM5S-G ground disconnect switch
- Turn on 125Vdc supply and close 60L1 5L5-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) 60L1 5L5 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:

TECHNICAL DIRECTIVES

- 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 its 125Vdc 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

TECHNICAL DIRECTIVES

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:

TECHNICAL DIRECTIVES

- 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 its 125Vdc 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

TECHNICAL DIRECTIVES

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 V11SM line out of service

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

- Open 60L11A and 60L11L1 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL1 and 2L11L1 breakers
- Check for no potential on V11SM line

3.30. To take out, isolate and de-energize V11SM line for work

- SM60 Operator shall request for Station Guarantee from V2

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

- Open 60L11A and 60L11L1 breakers

SCC shall advise V2 Operator to carry out the following:

TECHNICAL DIRECTIVES

- Open 2DL1 and 2L1L11 breakers
- Check for no potential on V11SM line

SCC shall advise V2 Operator to carry out the following:

- Open 2DL1-L1 and 2L1L11-L1 disconnect switches and turn off its 125Vdc supply
- Close 2V11SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L11A-L1 and 60L1L11-L1 disconnect switches and turn off 125Vdc supply
- Close 60V11SM-G ground disconnect switch

3.31. To restore V11SM line to service after work

3.31.1. Prepare V11SM 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 V11SM line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2DL1 and 2L1L11 breakers
- Open 2V11SM-G ground disconnect switch
- Turn on 125Vdc supply and close 2DL1-L1 and 2L1L11-L1 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L11A and 60L1L11 breakers
- Open 60V11SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L11A-L1 and 60L1L11-L1 disconnect switches

TECHNICAL DIRECTIVES

3.31.2. Restoration of V11SM line to service:

SCC shall:

- Advise the SM60 and V2 Operators of readiness to restore V11SM line to service
- Close (or advise the SM60 Operator to close) 60L11A and 60L11L1 breakers
- Close (or advise the V2 Operator to close) 2DL1 and 2L11L1 breakers

3.32. To restore V11SM line to service after automatic outage

If V11SM line 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 V2 Operator to energize) the line **ONCE** by closing 2DL1 and 2L11L1 breakers
- Close (or advise the SM60 Operator to close) 60L11A and 60L11L1 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

3.33. To take V12SM line out of service

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

- Open 60L12A and 60L12L2 breakers

TECHNICAL DIRECTIVES

SCC shall advise V2 Operator to carry out the following:

- Open 2DL12 and 2L2L12 breakers
- Check for no potential on V12SM line

3.34. To take out, isolate and de-energize V12SM line for work

- SM60 Operator shall request for Station Guarantee from V2

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

- Open 60L12A and 60L12L2 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL12 and 2L2L12 breakers
- Check for no potential on V12SM line

SCC shall advise V2 Operator to carry out the following:

- Open 2DL12-L12 and 2L2L12-L12 disconnect switches and turn off its 125Vdc supply
- Close 2V12SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L12A-L12 and 60L12L2-L12 disconnect switches and turn off 125Vdc supply
- Close 60V12SM-G ground disconnect switch

3.35. To restore V12SM line to service after work

3.35.1. Prepare V12SM 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 V12SM line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2DL12 and 2L2L12 breakers

TECHNICAL DIRECTIVES

- Open 2V12SM-G ground disconnect switch
- Turn on 125Vdc supply and close 2DL12-L12 and 2L2L12-L1 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L12A and 60L12L2 breakers
- Open 60V12SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L12A-L12 and 60L12L2-L12 disconnect switches

3.35.2. Restoration of V12SM line to service:

SCC shall:

- Advise the SM60 and V2 Operators of readiness to restore V12SM line to service
- Close (or advise the SM60 Operator to close) 60L12A and 60L12L2 breakers
- Close (or advise the V2 Operator to close) 2DL12 and 2L12L2 breakers

3.36. To restore V12SM line to service after automatic outage

If V11SM line 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 V2 Operator to energize) the line **ONCE** by closing 2DL12 and 2L12L2 breakers
- Close (or advise the SM60 Operator to close) 60L12A and 60L12L2 breakers

SM60 Operator shall:

TECHNICAL DIRECTIVES

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

3.37. To take out, isolate and de-energize V13SM line for work

- SM60 Operator shall request for Station Guarantee from V2

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

- Open 60L13A and 60L13L3 breakers

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

- Open 2DL13 and 2L3L13 breakers
- Check for no potential on V13SM line

SCC shall advise V2 Operator to carry out the following:

- Open 2DL13-L13 and 2L3L13-L13 disconnect switches and turn off its 125Vdc supply
- Close 2V13SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L13A-L13 and 60L13L3-L13 disconnect switches and turn off 125Vdc supply
- Close 60V13SM-G ground disconnect switch

3.38. To restore V13SM line to service after work

3.38.1. Prepare V13SM 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 V13SM line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2DL13 and 2L3L13 breakers

TECHNICAL DIRECTIVES

- Open 2V13SM-G ground disconnect switch
- Turn on 125Vdc supply and close 2DL13-L13 and 2L3L13-L13 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L13A and 60L13L3 breakers
- Open 60V13SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L13A-L13 and 60L13L3-L13 disconnect switches

3.38.2. Restoration of V13SM line to service:

SCC shall:

- Advise the SM60 and V2 Operators of readiness to restore V13SM line to service
- Close (or advise the SM60 Operator to close) 60L13A and 60L13L3 breakers
- Close (or advise the V2 Operator to close) 2DL13 and 2L13L3 breakers

3.39. To restore V13SM line to service after automatic outage

If V11SM line 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 V2 Operator to energize) the line **ONCE** by closing 2DL13 and 2L13L3 breakers
- Close (or advise the SM60 Operator to close) 60L13A and 60L13L3 breakers

TECHNICAL DIRECTIVES

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

3.40. To take out V14SM line for work

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

- Open 60L14A and 60L14L4 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL14 and 2L4L14 breakers
- Check for no potential on V14SM line

3.41. To take out, isolate and de-energize V14SM line for work

- SM60 Operator shall request for Station Guarantee from V2

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

- Open 60L14A and 60L14L4 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL14 and 2L4L14 breakers
- Check for no potential on V14SM line

SCC shall advise V2 Operator to carry out the following:

- Open 2DL14-L14 and 2L4L14-L14 disconnect switches and turn off its 125Vdc supply
- Close 2V14SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L14A-L14 and 60L14L4-L14 disconnect switches and turn off 125Vdc supply
- Close 60V14SM-G ground disconnect switch

TECHNICAL DIRECTIVES

3.42. To restore V14SM line to service after work

3.42.1. Prepare V14SM 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 V14SM line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2DL14 and 2L4L14 breakers
- Open 2V14SM-G ground disconnect switch
- Turn on 125Vdc supply and close 2DL14-L14 and 2L4L14-L14 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L14A and 60L14L4 breakers
- Open 60V14SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L14A-L14 and 60L14L4-L14 disconnect switches

3.42.2. Restoration of V14SM line to service:

SCC shall:

- Advise the SM60 and V2 Operators of readiness to restore V14SM line to service
- Close (or advise the SM60 Operator to close) 60L14A and 60L14L4 breakers
- Close (or advise the V2 Operator to close) 2DL14 and 2L14L4 breakers

3.43. To restore V14SM line to service after automatic outage

If V11SM line trips auto due to fault:

SM60 Operator shall:

- Advise SCC about the outage

TECHNICAL DIRECTIVES

- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

SCC shall

- Energize (or advise the V2 Operator to energize) the line **ONCE** by closing 2DL14 and 2L14L4 breakers
- Close (or advise the SM60 Operator to close) 60L14A and 60L14L4 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

3.44. To take out V15SM line for work

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

- Open 60L15A and 60L15L5 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL15 and 2L5L15 breakers
- Check for no potential on V15SM line

3.45. To take out, isolate and de-energize V15SM line for work

- SM60 Operator shall request for Station Guarantee from V2

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

- Open 60L15A and 60L15L5 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL15 and 2L5L15 breakers
- Check for no potential on V15SM line

SCC shall advise V2 Operator to carry out the following:

TECHNICAL DIRECTIVES

- Open 2DL15-L15 and 2L5L15-L15 disconnect switches and turn off its 125Vdc supply
- Close 2V15SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L15A-L15 and 60L15L5-L15 disconnect switches and turn off 125Vdc supply
- Close 60V15SM-G ground disconnect switch

3.46. To restore V15SM line to service after work

3.46.1. Prepare V15SM 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 V15SM line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2DL15 and 2L5L15 breakers
- Open 2V15SM-G ground disconnect switch
- Turn on 125Vdc supply and close 2DL15-L15 and 2L5L15-L15 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L15A and 60L15L5 breakers
- Open 60V15SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L15A-L15 and 60L15L5-L15 disconnect switches

3.46.2. Restoration of V15SM line to service:

SCC shall:

- Advise the SM60 and V2 Operators of readiness to restore V15SM line to service

TECHNICAL DIRECTIVES

- Close (or advise the SM60 Operator to close) 60L15A and 60L15L5 breakers
- Close (or advise the V2 Operator to close) 2DL15 and 2L15L5 breakers

3.47. To restore V15SM line to service after automatic outage

If V15SM line 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 V2 Operator to energize) the line **ONCE** by closing 2DL15 and 2L15L5 breakers
- Close (or advise the SM60 Operator to close) 60L15A and 60L15L5 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

3.48. To take out V16SM line for work

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

- Open 60L16A and 60L16L6 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL16 and 2L6L16 breakers
- Check for no potential on V16SM line

TECHNICAL DIRECTIVES

3.49. To take out, isolate and de-energize V16SM line for work

- SM60 Operator shall request for Station Guarantee from V2

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

- Open 60L16A and 60L16L6 breakers

SCC shall advise V2 Operator to carry out the following:

- Open 2DL16 and 2L6L16 breakers
- Check for no potential on V16SM line

SCC shall advise V2 Operator to carry out the following:

- Open 2DL16-L16 and 2L6L16-L16 disconnect switches and turn off its 125Vdc supply
- Close 2V16SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L16A-L16 and 60L16L6-L16 disconnect switches and turn off 125Vdc supply
- Close 60V16SM-G ground disconnect switch

3.50. To restore V16SM line to service after work

3.50.1. Prepare V16SM 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 V16SM line

SCC shall advise V2 Operator to carry out the following:

- Check opened 2DL16 and 2L6L16 breakers
- Open 2V16SM-G ground disconnect switch
- Turn on 125Vdc supply and close 2DL16-L16 and 2L6L16-L16 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

TECHNICAL DIRECTIVES

- Check opened 60L16A and 60L16L6 breakers
- Open 60V16SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L16A-L16 and 60L16L6-L16 disconnect switches

3.50.2. Restoration of V16SM line to service:

SCC shall:

- Advise the SM60 and V2 Operators of readiness to restore V16SM line to service
- Close (or advise the SM60 Operator to close) 60L16A and 60L16L6 breakers
- Close (or advise the V2 Operator to close) 2DL16 and 2L16L6 breakers

3.51. To restore V16SM line to service after automatic outage

If V16SM line 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 V2 Operator to energize) the line **ONCE** by closing 2DL16 and 2L16L6 breakers
- Close (or advise the SM60 Operator to close) 60L16A and 60L16L6 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

TECHNICAL DIRECTIVES

3.52. To take KC10SM line out of service

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

- Open 60DL10 and 60L23L10 breakers

SCC shall advise KC75 Operator to carry out the following:

- Open 75L10A and 75L2L10 breakers
- Check for no potential on KC10SM line

3.53. To take out, isolate and de-energize KC10SM line for work

- SM60 Operator shall request for Station Guarantee from KC75

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

- Open 60DL10 and 60L23L10 breakers

SCC shall advise KC75 Operator to carry out the following:

- Open 75L10A and 75L2L10 breakers
- Check for no potential on KC10SM line

SCC shall advise KC75 Operator to carry out the following:

- Open 75L10A-L10 and 75L2L10-L10 disconnect switches and turn off its 125Vdc supply
- Close 75KC10SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60DL10-L10 and 60L23L10-L10 disconnect switches and turn off 125Vdc supply
- Close 60KC10SM-G ground disconnect switch

3.54. To restore KC10SM line to service after work

3.54.1. Prepare KC10SM line for restoration

SM60 Operator shall:

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

TECHNICAL DIRECTIVES

- Check for no potential on KC10SM line

SCC shall advise KC75 Operator to carry out the following:

- Check opened 75L10A and 75L2L10 breakers
- Open 75KC10SM-G ground disconnect switch
- Turn on 125Vdc supply and close 75L10A-L10 and 75L2L10-L10 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60DL10 and 60L23L10 breakers
- Open 60KC20SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60DL10-L10 and 60L23L10-L10 disconnect switches

3.54.2. Restoration of KC10SM line to service:

SCC shall:

- Advise the SM60 and KC75 Operators of readiness to restore KC10SM line to service
- Close (or advise the KC75 Operator to close) 75L10A and 75L2L10 breakers
- Close (or advise the SM60 Operator to close) 60DL10 and 60L23L10 breakers

3.55. To restore KC10SM line to service after automatic outage

If KC10SM line 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

TECHNICAL DIRECTIVES

- Energize (or advise the KC75 Operator to energize) the line **ONCE** by closing 75L10A and 75L2L10 breakers
- Close (or advise the SM60 Operator to close) 60DL10 and 60L22L10 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

3.56. To take out KC20SM line for work

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

- Open 60L20D and 60L22L20 breakers

SCC shall advise KC75 Operator to carry out the following:

- Open 75L20A and 75L3L20 breakers
- Check for no potential on KC20SM line

3.57. To take out, isolate and de-energize KC20SM line for work

- SM60 Operator shall request for Station Guarantee from KC75

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

- Open 60L20D and 60L22L20 breakers

SCC shall advise KC75 Operator to carry out the following:

- Open 75L20A and 75L3L20 breakers
- Check for no potential on KC10SM line

SCC shall advise KC75 Operator to carry out the following:

- Open 75L20A-L20 and 75L3L20-L20 disconnect switches and turn off its 125Vdc supply
- Close 75KC20SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

TECHNICAL DIRECTIVES

- Open 60L20D-L20 and 60L23L20-L20 disconnect switches and turn off 125Vdc supply
- Close 60KC20SM-G ground disconnect switch

3.58. To restore KC20SM line to service after work

3.58.1. Prepare KC20SM 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 KC20SM line

SCC shall advise KC75 Operator to carry out the following:

- Check opened 75L20A and 75L3L20 breakers
- Open 75KC20SM-G ground disconnect switch
- Turn on 125Vdc supply and close 75L20A-L20 and 75L3L20-L20 disconnect switches

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L20D and 60L23L20 breakers
- Open 60KC20SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L20D-L20 and 60L23L20-L20 disconnect switches

3.58.2. Restoration of KC20SM line to service:

SCC shall:

- Advise the SM60 and KC75 Operators of readiness to restore KC10SM line to service
- Close (or advise the SM60 Operator to close) 60L20D and 60L23L20 breakers
- Close (or advise the KC75 Operator to close) 75L20A and 75L3L20 breakers

TECHNICAL DIRECTIVES

3.59. To restore KC20SM line to service after automatic outage

If KC20SM line 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 KC75 Operator to energize) the line **ONCE** by closing 75L20A and 75L3L20 breakers
- Close (or advise the SM60 Operator to close) 60L20D and 60L23L20 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

3.60. To take out AK22SM line for work

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

- Open 60L22A and 60L22L20 breakers

SCC shall advise AK79 Operator to carry out the following:

- Open 79ADL22 breaker
- Check for no potential on AK22SM line

3.61. To take out, isolate and de-energize AK22SM line for work

- SM60 Operator shall request for Station Guarantee from AK79

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

- Open 60L22A and 60L22L20 breakers

TECHNICAL DIRECTIVES

SCC shall advise AK79 Operator to carry out the following:

- Open 79ADL22 breaker
- Check for no potential on AK22SM line

SCC shall advise AK79 Operator to carry out the following:

- Open 79ADL22-L22 disconnect switch and turn off its 125Vdc supply
- Close 79AK22SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L22A-L22 and 60L22L20-L22 disconnect switches and turn off 125Vdc supply
- Close 60AK22SM-G ground disconnect switch

3.62. To restore AK22SM line to service after work

3.62.1. Prepare AK22SM 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 AK22SM line

SCC shall advise AK79 Operator to carry out the following:

- Check opened 79ADL22 breaker
- Open 79AK22SM-G ground disconnect switch
- Turn on 125Vdc supply and close 79ADL22-L22 disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L22A and 60L22L20 breakers
- Open 60AK22SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L22A-L22 and 60L22L20-L22 disconnect switches

TECHNICAL DIRECTIVES

3.62.2. Restoration of AK22SM line to service:

SCC shall:

- Advise the SM60 and AK79 Operators of readiness to restore AK22SM line to service
- Close (or advise the SM60 Operator to close) 60L22A and 60L22L20 breakers
- Close (or advise the KC75 Operator to close) 79ADL22 breaker

3.63. To restore AK22SM line to service after automatic outage

If AK22SM line 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 AK79 Operator to energize) the line **ONCE** by closing 79ADL22 breaker
- Close (or advise the SM60 Operator to close) 60L22A and 60L22L20 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

3.64. To take out AK23SM line for work

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

- Open 60L23A and 60L23L10 breakers

TECHNICAL DIRECTIVES

SCC shall advise AK79 Operator to carry out the following:

- Open 79ADL23 breaker
- Check for no potential on AK23SM line

3.65. To take out, isolate and de-energize AK23SM line for work

- SM60 Operator shall request for Station Guarantee from AK79

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

- Open 60L23A and 60L23L10 breakers

SCC shall advise AK79 Operator to carry out the following:

- Open 79ADL23 breaker
- Check for no potential on AK23SM line

SCC shall advise AK79 Operator to carry out the following:

- Open 79ADL23-L23 disconnect switch and turn off its 125Vdc supply
- Close 79AK23SM-G ground disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Open 60L23A-L23 and 60L23L10-L23 disconnect switches and turn off 125Vdc supply
- Close 60AK23SM-G ground disconnect switch

3.66. To restore AK23SM line to service after work

3.66.1. Prepare AK23SM 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 AK23SM line

SCC shall advise AK79 Operator to carry out the following:

- Check opened 79ADL23 breaker

TECHNICAL DIRECTIVES

- Open 79AK23SM-G ground disconnect switch
- Turn on 125Vdc supply and close 79ADL23-L23 disconnect switch

SCC shall advise SM60 Operator to carry out the following:

- Check opened 60L23A and 60L23L10 breakers
- Open 60AK23SM-G ground disconnect switch
- Turn on 125Vdc supply and close 60L23A-L23 and 60L23L10-L23 disconnect switches

3.66.2. Restoration of AK23SM line to service:

SCC shall:

- Advise the SM60 and AK79 Operators of readiness to restore AK23SM line to service
- Close (or advise the KC75 Operator to close) 79ADL23 breaker
- Close (or advise the SM60 Operator to close) 60L23A and 60L23L10 breakers

3.67. To restore AK23SM line to service after automatic outage

If AK23SM line 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 AK79 Operator to energize) the line **ONCE** by closing 79ADL23 breaker
- Close (or advise the SM60 Operator to close) 60L23A and 60L23L10 breakers

SM60 Operator shall:

TECHNICAL DIRECTIVES

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

3.68. Isolate 60T1 Transformer for work

SM60 Operator shall request for Station Guarantee from customer on 60F1 and 60F3 Feeders

SCC shall advise SM60 operator to carry out the following:

- Inform customers about readiness to take off 60T1 bank
- Request customers on 60T1 Bank to take off their load
- Transfer Station Service from AC1 to AC2, if Station Service is on 60T1
- Open AC1 Contactor/MCB to take off supply to 60T1 transformer auxiliaries

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

- Open 60T1SC1 breaker
- Open 60T1F1 breaker
- Open 60T1F3 breaker
- Open 60L8T1 breaker
- Open 60DT1 breaker
- Check for no potential on 60T1 Bank
- Open 60DT1-T1 and 60L8T1-T1 disconnect switches and turn off 125Vdc supply
- Open 60T1F1-T1, 60T1F3-T1 and 60T1SC1-T1 disconnect switches and turn off 125Vdc supply
- Open AC control MCB to 60T1 auxiliaries and tag
- Open 125V DC MCB to 60T1 primary and secondary protection and tag with PC13

3.69. To restore 60T1 Bank to service after work

TECHNICAL DIRECTIVES

3.69.1. Prepare 60T1 bank for restoration:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 60T1 Bank and temporary grounds removed
- Check opened 60T1F1, 60T1F3 and 60SC1T1 breakers
- Check opened 60L8T1 and 60DT1
- Close 60T1F1-T1, 60T1F3-T1 and 60T1SC1-T1 disconnect switches and turn off 125Vdc supply
- Close 60L8T1-T1 and 60DT1-T1 disconnect switches and turn off 125Vdc supply
- Close AC control MCB to 60T1 auxiliaries and remove tag
- Close 125V DC MCB to 60T1 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 60T1 Bank to service

3.69.2. Restoration of 60T1 bank to service:

- SCC shall close (or advise SM60 Operator to close) 60L8T1 and 60DT1 breakers
- SM60 Operator shall advise Customer of readiness to restore 60T1 Bank to service
- SCC shall close (or advise SM60 Operator to close) the 60T1F1 and 60T1F3 feeder breakers
- SCC shall close (or advise SM60 Operator to close) 60T1SC1 breaker if the voltage is below 32.8kV

3.70. To restore 60T1 Bank to service after automatic outage

If 60T1 bank trips auto due to fault:

- Advise SCC about the outage
- Acknowledge all alarms and record relay operation details
- Reset relay targets
- Report relay operation details to SCC

TECHNICAL DIRECTIVES

SCC shall energize (or advise the SM60 Operator to energize) the bank **ONCE** by closing 60L8T1 and 60DT1 breakers

SM60 Operator shall advise Customer of readiness to restore 60F1 and 60F3 feeders to service

SCC shall close (or advise SM60 Operator to close) 60T1F1 and 60T1F3 breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above
- If not successful, isolate the Transformer for maintenance men to work on the equipment. (Refer to **4. Explanation.**)

3.71. To isolate 60T2 Transformer for work

SM60 Operator shall request for Station Guarantee from customers on 60F2 and 60F4 Feeders

SCC shall advise SM60 Operator to carry out the following:

- Inform customers about readiness to take off 60T2 bank
- Request customers on 60T2 Bank to take off their load
- Transfer Station Service from AC2 to AC1, if Station Service is on 60T2
- Open AC2 Contactor/MCB to take off supply to 60T2 transformer auxiliaries

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

- Open 60T2SC2 breaker
- Open 60T2F2 breaker
- Open 60T2F4 breaker
- Open 60L9T2 breaker
- Open 60DT2 breaker
- Check for no potential on 60T2 Bank
- Open 60DT2-T2 and 60L9T2-T2 disconnect switches and turn off 125Vdc supply

TECHNICAL DIRECTIVES

- Open 60T2F2-T2, 60T2F4-T2 and 60T2SC2-T2 disconnect switches and turn off 125Vdc supply
- Open AC control MCB to 60T2 auxiliaries and tag
- Open 125V DC MCB to 60T2 primary and secondary protection and tag with PC13

3.72. To restore 60T2 Bank to service after work

3.72.1. Prepare 60T2 bank for restoration:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 60T2 Bank and temporary grounds removed
- Check opened 60T2F2, 60T2F4 and 60T2SC2 breakers
- Check opened 60L9T2 and 60DT2
- Close 60L9T2-T2 and 60DT2-T2 disconnect switches and turn off 125Vdc supply
- Close 60T2F2-T2, 60T2F4-T2 and 60T2SC2-T2 disconnect switches and turn off 125Vdc supply
- Close AC control MCB to 60T2 auxiliaries and remove tag
- Close 125V DC MCB to 60T2 primary and secondary protection and remove PC13 tag
- Advise SCC of readiness to restore 60T2 Bank to service

3.72.2. Restoration of 60T2 bank to service:

- SCC shall close (or advise SM60 Operator to close) 60L9T2 and 60DT2 breakers
- SM60 Operator shall advise Customers of readiness to restore 60F2 and 60F4 feeders to service
- SCC shall close (or advise SM60 Operator to close) the 60T2F2 and 60T2F4 feeder breakers
- SCC shall close (or advise SM60 Operator to close) 60T2SC2 breaker if the voltage is below 32.8kV

TECHNICAL DIRECTIVES

3.73. Restore 60T2 Bank to service after automatic outage

If 60T2 bank 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 bank **ONCE** by closing 60T2F2 and 60T2F4 breakers

SM60 Operator shall advise Customer of readiness to restore 60F2 and 60F4 feeders to service

SCC shall close (or advise SM60 Operator to close) 60T2F2 and 60T2F4 feeder breakers

SM60 Operator shall:

- Advise the Supervisor/Area Manager of item above
- If not successful, isolate the Transformer for maintenance men to work on the equipment. (Refer to 4. Explanation.)

3.74. Isolate 60T1F1 Breaker for work

- SM60 Operator shall request Station Guarantee from Customer on 60F1 Feeder

SCC shall advise SM60 Operator to carry out the following:

- Inform Customer about readiness to take off 60T1F1 breaker

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

- Open 60T1F1 breaker

SCC shall advise SM60 Operator to carry out the following:

- Open 60T1F1-T1 disconnect switch and turn off its 125Vdc supply
- Open 60T1F1-F1 disconnect switch and turn off its 125Vdc supply

TECHNICAL DIRECTIVES

3.75. To restore 60T1F1 Breaker to service after work

3.75.1. Prepare 60T1F1 breaker for restoration:

SM60 Operator shall:

- Advise SCC when work on the feeder breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Turn on 125Vdc supply and open 60T1F1-T1 disconnect switch
- Turn on 125Vdc supply and open 60T1F1-F1 disconnect switch
- Advise Customer of readiness to restore 60F1 feeder to service

3.75.2. Restoration of 60T1F1 Breaker to service:

- SM60 Operator shall advise Customer of readiness to restore 60F1 feeder to service
- SCC shall close (or advise SM60 Operator to close) the 60T1F1 breaker

3.76. Isolate 60T1F3 Breaker for work

- SM60 Operator shall request for Station Guarantee from Customer on 60F3 Breaker

SCC shall advise SM60 Operator to carry out the following:

- Inform Customer about readiness to take off 60T1F3 breaker

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

- Open 60T1F3 breaker

SCC shall advise SM60 Operator to carry out the following:

- Open 60T1F3-T1 disconnect switch and turn off its 125Vdc supply
- Open 60T1F3-F3 disconnect switch and turn off its 125Vdc supply

3.77. To restore 60T1F3 Breaker to service after work

3.77.1. Prepare 60T1F3 breaker for restoration:

SM60 Operator shall:

- Advise SCC when work on the feeder breaker has been completed and

TECHNICAL DIRECTIVES

permit(s) surrendered (including all Station Guarantees)

- Turn on 125Vdc supply and open 60T1F3-T1 disconnect switch
- Turn on 125Vdc supply and open 60T1F3-F3 disconnect switch
- Advise Customer of readiness to restore 60F3 feeder to service

3.77.2. Restoration of 60T1F3 breaker to service:

- SM60 Operator shall advise Customer of readiness to restore 60F3 feeder to service
- SCC shall close (or advise SM60 Operator to close) the 60T1F3 breaker

3.78. Isolate 60T2F2 Breaker for work

- SM60 Operator shall request for Station Guarantee from customer on 60F2 Feeder

SCC shall advise SM60 Operator to carry out the following:

- Inform Customer about readiness to take off 60T2F2 Breaker

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

- Open 60T2F2 Breaker

SCC shall advise SM60 Operator to carry out the following:

- Open 60T2F2-T2 disconnect switch and turn off its 125Vdc supply
- Open 60T2F2-F2 disconnect switch and turn off its 125Vdc supply

3.79. To restore 60T2F2 Breaker to service after work

3.79.1. Prepare 60T2F2 breaker for restoration:

SM60 Operator shall:

- Advise SCC when work on the feeder breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Turn on 125Vdc supply and close 60T2F2-T2 disconnect switch
- Turn on 125Vdc supply and close 60T2F2-F2 disconnect switch
- Advise Customer of readiness to restore 60F2 feeder to service

TECHNICAL DIRECTIVES

3.79.2. Restoration of 60T2F2 breaker to service:

- SM60 Operator shall advise Customer of readiness to restore 60F2 feeder to service
- SCC shall close (or advise SM60 Operator to close) the 60T2F2 breaker

3.80. Isolate 60T2F4 Breaker for work

- SM60 Operator shall request for Station Guarantee from customer on 60T2F4 Breaker

SCC shall advise SM60 Operator to carry out the following:

- Inform Customer about readiness to take off 60T2F4 breaker

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

- Open 60T2F4 breaker

SCC shall advise SM60 Operator to carry out the following:

- Open 60T2F4-T2 disconnect switch and turn off its 125Vdc supply
- Open 60T2F4-F4 disconnect switch and turn off its 125Vdc supply

3.81. To restore 60T2F4 Breaker to service after work

3.81.1. Prepare 60T2F4 Breaker for restoration:

SM60 Operator shall:

- Advise SCC when work on the feeder breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Turn on 125Vdc supply and close 60T2F4-T2 disconnect switch
- Turn on 125Vdc supply and close 60T2F4-F4 disconnect switch
- Advise Customer of readiness to restore 60F4 feeder to service

3.81.2. Restoration of 60T2F4 Breaker to service:

- SM60 Operator shall advise Customer of readiness to restore 60F4 feeder to service
- SCC shall close (or advise SM60 Operator to close) the 60T2F4 breaker

TECHNICAL DIRECTIVES

3.82. To isolate 60SC1 Capacitor Bank for work

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

- Open 60T1SC1 breaker
- Open 60T1SC1-SC1 disconnect switch and turn off its supply
- Close 60T1SC1-G ground disconnect switch

3.83. To restore 60SC1 Capacitor bank to service after work

3.83.1. Prepare 60SC1 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 60T1SC1 breaker
- Open 60T1SC1-G ground disconnect switch
- Turn on 125Vdc supply and close 60T1SC1-SC1 disconnect switch

3.83.2. Restoration of 60SC1 Capacitor Bank to service:

- SCC shall close (or advise SM60 Operator to close) 60T1SC1 breaker if the voltage is below 32.8kV

3.84. To isolate 60SC2 Capacitor Bank for work

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

- Open 60T2SC2 breaker
- Open 60T2SC2-SC2 disconnect switch and turn off its supply
- Close 60T2SC2-G disconnect switch

3.85. To restore 60SC2 Capacitor bank to service after work

3.85.1. Prepare 60SC2 Capacitor bank for restoration:

SM60 Operator shall:

- Advise SCC when work on the capacitor bank has been completed and

TECHNICAL DIRECTIVES

permit(s) surrendered (including all Station Guarantees)

- Check opened 60T2SC2 breaker
- Open 60T2SC2-G disconnect switch
- Turn on 125Vdc supply and close 60T2SC2-SC2 disconnect switch

3.85.2. Restoration of 60SC2 Capacitor Bank to service:

- SCC shall close (or advise SM60 Operator to close) 60T2SC2 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.

TECHNICAL DIRECTIVES

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

TECHNICAL DIRECTIVES