TD-OP-0013

GRIDCo

OPERATING PROCEDURE FOR KUMASI SUBSTATION

GHANA GRID COMPANY LTD

Title:	**OPERATING PROCEDURE FOR KUMASI SUBSTATION (K13)**		
Issued To:	Director, System Operations Director, SNS Manager, SCC Manager, Dispatch Operations Area Manager, Kumasi Operating Staff, Kumasi Area Maintenance Staff, Kumasi Area Dispatch Staff, SCC	**Number:**	TD-OP-0013
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CONTENTS

1. Purpose

This directive specifies the operations to be carried out to take out of service, isolate or restore equipment at AC83 Substation to service for planned and auto outages.

2. Scope

The directive will be used by Operators at Accra Operating Area and System Control Center (SCC) for operation of equipment at AC83 Substation.

3. Procedure

3.3. To take AW1K line out of service

SCC shall carryout (or advise the K13 Operator to carry out) the following:

- Open 13L1A and 13L1T2 breakers

SCC shall carry out (or advise the AW1K Operator to carry out) the following:

- Open 58DL1 and 58L1L2 breakers
- Check for no potential on AW1K line

3.4. To take out, isolate and de-energize AW1K line for work

- K13 Operator request for Station Guarantee from AW58

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13L1A and 13L1T2 breakers

SCC shall carry out (or advise AW58 Operator to carry out) the following:

- Open 58DL1 and 58L1L2 breakers
- Check for no potential on AW1K line

SCC shall advise AW1K Operator to carry out the following:

- Open 58DL1-L1 and 58L1L2-L1 disconnect switches and turn off 125Vdc supply
- Close 58AW1K-G ground disconnect switch

SCC shall advise K13 Operator to carry out the following:

- Open 13L1A-L1 and 13L1T2-L1 disconnect switches and turn off 125Vdc supply

- Close 13AW1K-G ground disconnect switch

3.5. To restore AW1K line to service after work

3.5.1. Prepare AW1K line for restoration:

K13 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 AW1K line

SCC shall advise AW58 Operator to carry out the following:

- Check opened 58DL1 and 58L1L2 breakers
- Open 58AW1K-G ground disconnect switch
- Turn on 125Vdc supply and close 58DL1-L1 and 58L1L2-L1 disconnect switches

SCC shall advise K13 Operator to carry out the following:

- Check opened 13L1A and 13L1T2 breakers
- Open 13AW1K-G ground disconnect switch
- Turn on 125Vdc supply and close 13L1A-L1 and 13L1T2-L1 disconnect switches

3.5.2. Restoration of AW1K line to service:

SCC shall:

- Advise the AW58 and K13 Operators of readiness to restore AW1K line to service
- Close (or advise the AW58 Operator to close) 58DL1 and 58L1L2 breakers

- Close (or advise the K13 Operator to close) 13L1A and 13L1T2 breakers

3.6. To restore AW1K line to service after automatic outage

If AW1K line trips auto due to fault on the line:

K13 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 AW58 Operator to energize) the line **ONCE** by closing 58DL1 and 58L1L2 breakers
- Close (or advise the K13 Operator to close) 13L1A and 13L1T2 breakers

K13 Operator shall:

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

3.7. To take J2K line out of service

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13L2A and 13L2T3 breakers

SCC shall carry out (or advise the J18 Operator to carry out) the following:

- Open 18J2K breaker
- Check for no potential on J2K line

3.8. To take out, isolate and de-energize J2K line for work

- K13 Operator shall request for Station Guarantee from J18

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13L2A and 13L2T3 breakers

SCC shall carry out (or advise the J18 Operator to carry out) the following:

- Verify opened 18J2K-S bypass disconnect switch and turn off its 125Vdc supply
- Open 18J2K breaker
- Check for no potential on J2K line

SCC shall advise K13 operator to carry out the following:

- Open 13L2A-L2 and 13L2T3-L2 disconnect switches and turn off 125Vdc supply

- Close 13J2K-G ground disconnect switch

3.9. To restore J2K line to service after work

3.9.1. Prepare J2K line for restoration:

K13 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 J2K line

SCC shall advise J18 Operator to carry out the following:

- Check opened 18J2K-S bypass disconnect switch and turn off its

125Vdc supply

- Check opened 18J2K breaker
- Open 18J2K-G ground disconnect switch
- Turn on 125Vdc supply and close 18J2K-L2 disconnect switch

SCC shall advise K13 Operator to carry out the following:

- Check opened 13L2A and 13L2T3 breakers
- Open 13J2K-G ground disconnect switch
- Turn on 125Vdc supply and close 13L2A-L2 and 13L2T3-L2 disconnect switches

3.9.2. Restoration of J2K line to service:

SCC shall:

- Advise the J18 and K13 Operators of readiness to restore J2K line to service
- Close (or advise the J18 Operator to close) 18J2K breaker
- Close (or advise the K13 Operator to close) 13L2A and 13L2T3 breakers

3.10. To restore J2K line to service after automatic outage

If J2K line trips auto due to fault on the line:

K13 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 J18 Operator to energize) the line **ONCE** by closing 18J2K breaker
- Close (or advise the K13 Operator to close) 13L2A and 13L2T3 breakers

K13 Operator shall:

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

3.11. To take K3TH line out of service

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13L3A and 13L3L4 breakers

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

- Open 26L3A breaker
- Check for no potential on K3TH line

3.12. To take out, isolate and de-energize K3TH line for work

- K13 Operator request for Station Guarantee from TH26

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13L3A and 13L3L4 breakers

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

- Open 26L3A breaker
- Check for no potential on K3TH line

SCC shall advise K13 Operator to carry out the following:

- Verify opened 26L3-D transfer disconnect switch and turn off its 125Vdc supply

- Open 26L3A-L3 disconnect switch and turn off its 125Vdc supply

- Close 26K3TH-G ground disconnect switch

SCC shall advise K13 Operator to carry out the following:

- Open 13L3A-L3 and 13L3L4-L3 disconnect switches and turn off 125Vdc supply

- Close 13K3TH-G ground disconnect switch

3.13. To restore K3TH line to service after work

3.13.1. Prepare K3TH line for restoration:

K13 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 K3TH line

SCC shall advise TH26 Operator to carry out the following:

- Check opened 26L3-D transfer disconnect switch and turn off its 125Vdc supply

- Check opened 26L3A breaker

- Open 26K3TH-G ground disconnect switch

- Turn on 125Vdc supply and close 26L3A-L3 disconnect switch

SCC shall advise K13 Operator to carry out the following:

- Check opened 13L3A and 13L3L4 breakers

- Open 13K3TH-G ground disconnect switch

- Turn on 125Vdc supply and close 13L3A-L3 and 13L3L4-L3 disconnect switches

3.13.2. Restoration of K3TH line to service:

SCC shall:

- Advise the TH26 and K13 Operators of readiness to restore K3TH line to service

- Close (or advise the K13 Operator to close) 13L3A and 13L3L4 breakers

- Close (or advise the TH26 Operator to close) 26L3A breaker

3.14. To restore K3TH line to service after automatic outage

If K3TH line trips auto due to fault on the line:

K13 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 K13 Operator to energize) the line **ONCE** by closing 13L3A and 13L3L4 breakers

- Close (or advise the TH26 Operator to close) 26L3A breaker

K13 Operator shall:

- Advise the Supervisor/Area Manager of operation above

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

3.15. To take K4KY line out of service

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13DL4 and 13L3L4 breakers

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

- Open 43L4A breaker
- Check for no potential on K4KY line

3.16. To take out, isolate and de-energize K4KY line for work

- K13 Operator request for Station Guarantee from KY43

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13DL4 and 13L3L4 breakers

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

- Open 43L4A breaker
- Check for no potential on K4KY line

SCC shall advise KY43 Operator to carry out the following:

- Check open 43L4A breaker
- Verify opened 43L4-D disconnect switch and turn off its 125vdc supply
- Open 43L4A-L4 disconnect switch and turn off its 125vdc supply
- Close 43K4KY-G ground disconnect switch

SCC shall advise K13 Operator to carry out the following:

- Open 13DL4-L4 and 13L3L4-L4 disconnect switches and turn off 125Vdc supply
- Close 13K4KY-G ground disconnect switch

3.17. To restore K4KY line to service after work

3.17.1. Prepare K4KY line for restoration:

K13 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 K4KY line

SCC shall advise KY43 Operator to carry out the following:

- Check opened 43L4-D disconnect switch and turn on its 125vdc supply

- Check opened 43L4A breaker
- Open 43K4KY -G ground disconnect switch
- Turn on 125Vdc supply and close 43L4A-L4 disconnect switch

SCC shall advise K13 Operator to carry out the following:

- Check opened 13L4D and 13L3L4 breakers
- Open 13K4KY-G ground disconnect switch
- Turn on 125Vdc supply and close 13L4D-L4 and 13L3L4–L4 disconnect switches

3.17.2. Restoration of K4KY line to service:

SCC shall:

- Advise the KY43 and K13 Operators of readiness to restore K4KY line to service
- Close (or advise the KY43 Operator to close) 43L4A breaker
- Close (or advise the K13 Operator to close) 13L4D and 13L3L4 breakers

3.18. To restore K4KY line to service after automatic outage

If K4KY **line** trips auto due to fault on the line:

K13 Operator shall:

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

SCC shall:

- Energize (or advise the KY43 Operator to energize) the line **ONCE** by closing 43L4A breaker
- Close (or advise the K13 Operator to close) 13L4D and 13L3L4 breakers

K13 Operator shall:

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

3.19. To take K5NB line out of service

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13L5A and 13L5T1 breakers

SCC shall carry out (or advise the NB21 Operator to carry out) the following:

- Open 21L2L5 and 21L5L3 breakers
- Check for no potential on K5NB line

3.20. To take out, isolate and de-energize K5NB line for work

- K13 Operator request for Station Guarantee from K5NB

SCC shall carry out (or advise the K13 Operator to carry out) the following:

- Open 13L5A and 13L5T1 breakers

SCC shall carry out (or advise NB21 Operator to carry out) the following:

- Open 21L2L5 and 21L5L3 breakers

- Check for no potential on K5NB line

SCC shall advise NB21 Operator to carry out the following:

- Open 21L2L5-L5 and 21L5L3-L5 disconnect switches and turn off 125Vdc supply

- Close 21K5NB-G ground disconnect switch

SCC shall advise K13 Operator to carry out the following:

- Open 13L1A-L1 and 13L1T2-L1 disconnect switches and turn off 125Vdc supply

- Close 13K5NB-G ground disconnect switch

3.21. To restore K5NB line to service after work

3.21.1. Prepare K5NB line for restoration:

K13 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 K5NB line

SCC shall advise NB21 Operator to carry out the following:

- Check opened 21L2L5 and 21L5L3 breakers

- Open 21K5NB-G ground disconnect switch

- Turn on 125Vdc supply and close 21L2L5-L5 and 21L5L3-L5 disconnect switches

SCC shall advise K13 Operator to carry out the following:

- Check opened 13L5A and 13L5T1 breakers

- Open 13K5NB-G ground disconnect switch

- Turn on 125Vdc supply and close 13L5A-L5 and 13L5T1-L5 disconnect switches

3.21.2. Restoration of K5NB line to service:

SCC shall:

- Advise the NB21 and K13 Operators of readiness to restore K5NB line to service

- Close (or advise the NB21 Operator to close) 21L2L5 and 21L5L3 breakers

- Close (or advise the K13 Operator to close) 13L5A and 13L5T1 breakers

3.22. To restore K5NB line to service after automatic outage

If K5NB line trips auto due to fault on the line:

K13 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 NB21 Operator to energize) the line **ONCE** by closing 21L2L5 and 21L5L3 breakers

- Close (or advise the K13 Operator to close) 13L5A and 13L5T1 breakers

K13 Operator shall:

- Advise the Supervisor/Area Manager of operation above

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

3.23. To isolate 13T1 Bank for work

SCC shall advise K13 Operator to carry out the following:

- Inform customers about readiness to take off 13T1 bank

- Request customers on 13T1 Bank to take off their load

- Open AC1 Contactor/MCB to take off supply to 13T1 transformer auxiliaries

- Transfer Station Service from AC1 to AC2, if station service is on 13T1 transformer

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T1SC1 breaker

- Open 13T1F1 breaker

- Open 13L5T1 and 13DT1 breakers

- Open 13T1F1-F1 disconnect switch

- Open 13T1SC1-T1 disconnect switch

- Open 13L5T1-T1 and 13DT1-D disconnect switches and turn off 125Vdc supply

- Open AC control MCB to 13T1 auxiliaries and tag

- Open 125VDC MCB to 13T1 primary and secondary protection and tag with PC13

- Check for no potential on 13T1 Bank

3.24. To restore 13T1 Bank to service after work

3.24.1. Prepare 13T1 bank for restoration:

K13 Operator shall:

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

- Check for no potential on 13T1 Bank and temporary grounds removed

- Close 13T1F1-F1 disconnect switch

- Close 13T1SC1-T1 disconnect switch

- Turn on 125Vdc supply and close 13L5T1-T1 and 13DT1-T1 disconnect switches

- Close AC control MCB to 13T1 auxiliaries and tag

- Close 125VDC MCB to 13T1 primary and secondary protection and tag with PC13

- Advise SCC of readiness to restore 13T1 Bank to service

3.24.2. Restoration of 13T1 bank to service:

- SCC shall close (or advise K13 Operator to close) the 13L5T1 and 13DT1 breakers

- K13 Operator shall advise customers of readiness to restore 13T1 Bank to service

- SCC shall close (or advise K13 Operator to close) the 13T1F1 breaker

- SCC shall close (or advise K13 Operator to close) 13T1SC1 breaker if the voltage is below 32.8kV

3.25. To restore 13T1 Bank to service after automatic outage

If 13T1 bank trips auto due to fault:

K13 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 K13 Operator to energize) the transformer ONCE by closing 13L5T1 and 13DT1 breakers
- Advise customer of readiness to restore 13F1 feeder to service
- Close 13T1F1 breaker
- SCC shall close (or advise K13 Operator to close) 13T1SC1 breaker if the voltage is below 32.8kV

K13 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above
- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

3.26. To isolate 13T2 Bank for work

SCC shall advise K13 Operator to carry out the following:

- Inform customers about readiness to take off 13T2 bank
- Request customers on 13T2 Bank to take off their load
- Open AC1 Contactor/MCB to take off supply to 13T2 transformer auxiliaries
- Transfer Station Service from AC2 to AC1, if station service is on 13T2 transformer

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T2SC2 breaker
- Open 13T2F2 breaker
- Open 13L1T2 and 13DT2 breakers
- Open 13T2F2-F2 disconnect switch
- Open 13T2SC2-T2 disconnect switch
- Open 13L1T2-T2 and 13DT2-T2 disconnect switches and turn off 125Vdc supply
- Open AC control MCB to 13T2 auxiliaries and tag
- Open 125VDC MCB to 13T2 primary and secondary protection and tag with PC13
- Check for no potential on 13T2 Bank

3.27. To restore 13T2 Bank to service after work

3.27.1. Prepare 13T2 bank for restoration:

K13 Operator shall:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 13T2 Bank and temporary grounds removed
- Close 13T2F2-F2 disconnect switch
- Close 13T2SC2-T2 disconnect switch
- Turn on 125Vdc supply and close 13L1T2-T2 and 13DT2-T2 disconnect switches
- Close AC control MCB to 13T2 auxiliaries and tag
- Close 125VDC MCB to 13T2 primary and secondary protection and tag with PC13
- Advise SCC of readiness to restore 13T2 Bank to service

3.27.2. Restoration of 13T2 bank to service:

- SCC shall close (or advise K13 Operator to close) the 13L1T2 and 13DT2 breakers

- K13 Operator shall advise customers of readiness to restore 13T2 Bank to service

- SCC shall close (or advise K13 Operator to close) the 13F2 breaker

- SCC shall close (or advise K13 Operator to close) 13T2SC2 breaker if the voltage is below 32.8kV

3.28. To restore 13T2 Bank to service after automatic outage

If 13T2 bank trips auto due to fault:

K13 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 K13 Operator to energize) the transformer ONCE by closing 13L1T2 and 13DT2 breakers

- Advise customer of readiness to restore 13F2 feeder to service

- Close 13T2F2 breaker

- SCC shall close (or advise K13 Operator to close) 13T2SC2 breaker if the voltage is below 32.8kV

K13 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above

- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

3.29. To isolate 13T3 Bank for work

SCC shall advise K13 Operator to carry out the following:

- Inform customers about readiness to take off 13T3 bank

- Request customers on 13T3 Bank to take off their load

- Open AC1 Contactor/MCB to take off supply to 13T3 transformer auxiliaries

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T3F3 breaker

- Open 13T3SC7 breaker

- Open 13L2T3 and 13DT3 breakers

- Open 13T3F3-F3 disconnect switch

- Open 13T3SC7-T3 disconnect switch

- Open 13L2T3-T3 and 13DT3-T3 disconnect switches and turn off its 125Vdc supply

- Open AC control MCB to 13T3 auxiliaries and tag

- Open 125VDC MCB to 13T3 primary and secondary protection and tag with PC13
- Check for no potential on 13T3 Bank

3.30. To restore 13T3 Bank to service after work

3.30.1. Prepare 13T3 bank for restoration:

K13 Operator shall:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 13T1 Bank and temporary grounds removed
- Close 13T3F3-F3 disconnect switch
- Close 13T3SC7-T3 disconnect switch
- Turn on 125Vdc supply and close 13L2T3-T3 and 13DT3-T3 disconnect switches
- Close AC control MCB to 13T3 auxiliaries and tag
- Close 125VDC MCB to 13T3 primary and secondary protection and tag with PC13
- Advise SCC of readiness to restore 13T3 Bank to service

3.30.2. Restoration of 13T3 bank to service:

- SCC shall close (or advise K13 Operator to close) the 13L2T3 and 13DT3 breakers

- K13 Operator shall advise customers of readiness to restore 13T3 Bank to service

- SCC shall close (or advise K13 Operator to close) the 13T3F3 breaker

- SCC shall close (or advise K13 Operator to close) 13T3SC7 breaker if the voltage is below 32.8kV

3.31. To restore 13T3 Bank to service after automatic outage

If 13T1 bank trips auto due to fault:

K13 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 K13 Operator to energize) the transformer ONCE by closing 13L2T3 and 13DT3 breakers

- Advise customer of readiness to restore 13F3 feeder to service

- Close 13T3F3 breaker

- SCC shall close (or advise K13 Operator to close) 13T3SC7 breaker if the voltage is below 32.8kV

K13 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above

- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

3.32. To isolate 13T4 Bank for work

SCC shall advise K13 Operator to carry out the following:

- Inform customers about readiness to take off 13T4 bank
- Request customers on 13T4 Bank to take off their load
- Open AC1 Contactor/MCB to take off supply to 13T4 transformer auxiliaries

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T4SC5.6 breaker
- Open 13T4F4 breaker
- Open 13DT4 breaker
- Open 13T4F4-F4 disconnect switch
- Open 13T4SC5.6-T4 disconnect switch
- Open 13DT4-D disconnect switch and turn off its 125Vdc supply
- Open AC control MCB to 13T4 auxiliaries and tag
- Open 125VDC MCB to 13T4 primary and secondary protection and tag with PC13
- Check for no potential on 13T4 Bank

3.33. To restore 13T4 Bank to service after work

3.33.1. Prepare 13T4 bank for restoration:

K13 Operator shall:

- Advise SCC when work on the transformer has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 13T4 Bank and temporary grounds removed

- Close 13T4F4-F4 disconnect switch
- Close 13T4SC5.6-T4 disconnect switch
- Turn on 125Vdc supply and close 13DT4-D disconnect switch
- Close AC control MCB to 13T4 auxiliaries and tag
- Close 125VDC MCB to 13T4 primary and secondary protection and tag with PC13
- Advise SCC of readiness to restore 13T4 Bank to service

3.33.2. Restoration of 13T4 bank to service:

- SCC shall close (or advise K13 Operator to close) 13DT4 breaker
- K13 Operator shall advise customers of readiness to restore 13T4 Bank to service
- SCC shall close (or advise K13 Operator to close) the 13T4F4 breaker
- SCC shall close (or advise K13 Operator to close) 13T4SC5.6 breaker if the voltage is below 32.8kV

3.34. To restore 13T4 Bank to service after automatic outage

If 26T2 bank trips auto due to fault:

K13 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 K13 Operator to energize) the transformer ONCE by closing 13DT4 breaker

- Advise customer of readiness to restore 13F4 feeder to service

- Close 13T4F4 breaker

- SCC shall close (or advise K13 Operator to close) 13T4SC5.6 breaker if the voltage is below 32.8kV

K13 Operator shall:

- Advise the Supervisor/Area Manager and SCC of item above

- Isolate the Transformer for maintenance men to work on the equipment if the operation above is not successful. See explanation.

3.35. To Isolate 13T1F1 Breaker for work

- K13 Operator shall request Station Guarantee from customer on 13T1F1 Bus

SCC shall advise K13 Operator to carry out the following:

- Inform customers about readiness to take off 13T1 bank

- Request customers on 13T1 Bank to take off their load

- Open AC1 Contactor/MCB to take off supply to 13T1 transformer auxiliaries

- Transfer Station Service from AC1 to AC2, if station service is on 13T1 transformer

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T1SC1 breaker
- Open 13T1F1 breaker
- Open 13L5T1 and 13DT1 breakers

SCC shall advise K13 Operator to carry out the following:

- Open 13T1F1-F1 disconnect switch

- Open 13T1SC1-T1 disconnect switch

- Open 13L5T1-T1 and 13DT1-T1 disconnect switches and turn off its 125Vdc supply

- Check for no potential on 13T1 Bank

3.36. To restore 13T1F1 Breaker to service after work

3.36.1. Prepare 13T1F1 breaker for restoration:

K13 Operator shall:

- Advise SCC when work on the 13T1F1 breaker has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 13F1 Breaker and temporary grounds removed
- Close 13T1F1-F1 disconnect switch
- Close 13T1SC1-T1 disconnect switch
- Check for no potential on 13T1 Bank

3.36.2. Restoration of 13T1F1 breaker to service:

- SCC shall close (or advise K13 Operator to close) the 13L5T1 and 13DT1 breakers
- K13 Operator shall advise customers of readiness to restore 13T1 Bank to service
- SCC shall close (or advise K13 Operator to close) the 13T1F1 breaker
- SCC shall close (or advise K13 Operator to close) 13T1SC1 breaker if the voltage is below 32.8kV

3.37. To Isolate 13T2F2 Breaker for work

- K13 Operator shall request Station Guarantee from customer on 13T2F2 Bus

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T2SC2 breaker
- Open 13T2F2 breaker

- Open 13L1T2 and 13DT2 breakers

SCC shall advise K13 Operator to carry out the following:

- Open 13T2F2-F2 disconnect switch

- Open 13T2SC2-T2 disconnect switch

- Open 13L1T2-T2 and 13DT2-D disconnect switches and turn off 125Vdc supply

- Check for no potential on 13T2 Bank

3.38. To restore 13T2F2 Breaker to service after work

3.38.1. Prepare 13T2F2 breaker for restoration:

K13 Operator shall:

- Advise SCC when work on the 13T2F2 breaker has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 13F2 Breaker and temporary grounds removed

- Close 13T2F2-F2 disconnect switch

- Close 13T2SC2-T2 disconnect switch

- Turn on 125Vdc supply and close 13L1T2-T2 and 13DT2-T2 disconnect switches

3.38.2. Restoration of 13T2F2 breaker to service:

- SCC shall close (or advise K13 Operator to close) the 13L1T2 and 13DT2 breakers

- K13 Operator shall advise customers of readiness to restore 13T2 Bank to service

- SCC shall close (or advise K13 Operator to close) the 13F2 breaker

- SCC shall close (or advise K13 Operator to close) 13T2SC2 breaker if the voltage is below 32.8kV

3.39. To Isolate 13T3F3 Breaker for work

- K13 Operator shall request Station Guarantee from customer on 13T3F3 Bus

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T3F3 breaker

- Open 13T3SC7 breaker

- Open 13L2T3 and 13DT3 breakers

SCC shall advise K13 Operator to carry out the following:

- Open 13T3F3-F3 disconnect switch

- Open 13T3SC7-T3 disconnect switch

- Open 13L2T3-T3 and 13DT3-T3 disconnect switches and turn off 125Vdc supply

- Check for no potential on 13T3 Bank

3.40. To restore 13F3 Breaker to service after work

3.40.1. Prepare 13F3 breaker for restoration:

K13 Operator shall:

- Advise SCC when work on the 13F3 breaker has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 13F3 Breaker and temporary grounds removed

- Close 13T3F3-F3 disconnect switch

- Close 13T3SC7-T3 disconnect switch

- Turn on 125Vdc supply and close 13L2T3-T3 and 13DT3-T3 disconnect switches

3.40.2. Restoration of 13F3 breaker to service:

- SCC shall close (or advise K13 Operator to close) the 13L2T3 and 13DT3 breakers

- K13 Operator shall advise customers of readiness to restore 13T3 Bank to service

- SCC shall close (or advise K13 Operator to close) the 13T3F3 breaker

- SCC shall close (or advise K13 Operator to close) 13T3SC7 breaker if the voltage is below 32.8kV

3.41. To Isolate 13T4F4 Breaker for work

- K13 Operator shall request Station Guarantee from customer on 13T4F4 Bus

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T4SC5.6 breaker

- Open 13T4F4 breaker

- Open 13DT4 breaker

SCC shall advise K13 Operator to carry out the following:

- Open 13T4F4-F4 disconnect switch

- Open 13T4SC5.6-T4 disconnect switch

- Open 13DT4-D disconnect switch and turn off its 125Vdc supply

- Check for no potential on 13T4 Bank

3.42. To restore 13T4F4 Breaker to service after work

3.42.1. Prepare 13F4 breaker for restoration:

K13 Operator shall:

- Advise SCC when work on the 13T4F4 breaker has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 13T4F4 Breaker and temporary grounds removed

- Close 13T4F4-F4 disconnect switch

- Close 13T4SC5.6-T4 disconnect switch

- Turn on 125Vdc supply and close 13DT4-D disconnect switch

3.42.2. Restoration of 13F4 breaker to service:

- SCC shall close (or advise K13 Operator to close) 13DT4 breaker

- K13 Operator shall advise customers of readiness to restore 13T4 Bank to service

- SCC shall close (or advise K13 Operator to close) the 13T4F4 breaker

- SCC shall close (or advise K13 Operator to close) 13T3SC7 breaker if the voltage is below 32.8kV

3.43. To isolate 13SC1 Cap Bank for work

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T1SC1 breaker

SCC shall advise K13 Operator to carry out the following:

- Open 13T1SC1-T1 disconnect switch

- Close 13SC1-G disconnect switch

3.44. To restore 13SC1 Cap Bank to service after work

3.44.1. Prepare 13SC1 Cap Bank for restoration:

K13 Operator shall:

- Advise SCC when work on the 13SC1 Cap Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 13SC1 Cap Bank and temporary grounds removed

- Open 13SC1-G disconnect switch

- Close 13T1SC1-T1 disconnect switch

3.44.2. Restoration of 13SC1 Cap Bank to service:

- K13 Operator shall advise customers of readiness to restore 13SC1 Cap Bank to service

- SCC shall close (or advise K13 Operator to close) the 13T1SC1 breaker

- SCC shall close (or advise K13 Operator to close) 13T1SC1 breaker if the voltage is below 32.8kV

3.45. To isolate 13SC2 Cap Bank for work

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T2SC2 breaker

SCC shall advise K13 Operator to carry out the following:

- Open 13T2SC2-T2 disconnect switch

- Close 13SC2-G disconnect switch

3.46. To restore 13SC2 Cap Bank to service after work

3.46.1. Prepare 13SC2 Cap Bank for restoration:

K13 Operator shall:

- Advise SCC when work on the 13SC2 Cap Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 13SC2 Cap Bank and temporary grounds removed

- Open 13SC2-G disconnect switch

- Close 13T2SC2-T2 disconnect switch

3.46.2. Restoration of 13SC2 Cap Bank to service:

- K13 Operator shall advise customers of readiness to restore 13SC2 Cap Bank to service

- SCC shall close (or advise K13 Operator to close) the 13T2SC2 breaker

- SCC shall close (or advise K13 Operator to close) 13T2SC2 breaker if the voltage is below 32.8kV

3.47. To isolate 13SC3.4 Cap Bank for work

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13ASC3.4 breaker

SCC shall advise K13 Operator to carry out the following:

- Open 13SC3.4-SC3.4 disconnect switch

- Close 13ASC3.4-G disconnect switch

3.48. To restore 13SC3.4 Cap Bank to service after work

3.48.1. Prepare 13SC3.4 Cap Bank for restoration:

K13 Operator shall:

- Advise SCC when work on the 13SC3.4 Cap Bank has been completed and permit(s) surrendered (including all Station Guarantees)

- Check for no potential on 13SC3.4 Cap Bank and temporary grounds removed

- Open 13ASC3.4-G disconnect switch

- Close 13SC3.4-SC3.4 disconnect switch

3.48.2. Restoration of 13SC3.4 Cap Bank to service:

- K13 Operator shall advise customers of readiness to restore 13SC3.4 Cap Bank to service

- SCC shall close (or advise K13 Operator to close) the 13ASC3.4 breaker

- SCC shall close (or advise K13 Operator to close) 13T3SC3.4 breaker if the voltage is below 32.8kV

3.49. To isolate 13SC5.6 Cap Bank for work

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13ASC5.6 breaker

SCC shall advise K13 Operator to carry out the following:

- Open 13SC5.6-SC5.6 disconnect switch
- Close 13ASC5.6-G disconnect switch

3.50. To restore 13SC5.6 Cap Bank to service after work

3.50.1. Prepare 13SC5.6 Cap Bank for restoration:

K13 Operator shall:

- Advise SCC when work on the 13SC5.6 Cap Bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 13SC5.6 Cap Bank and temporary grounds removed
- Open 13ASC5.6-G disconnect switch
- Close 13SC5.6-SC5.6 disconnect switch

3.50.2. Restoration of 13SC5.6 Cap Bank to service:

- K13 Operator shall advise customers of readiness to restore 13SC5.6 Cap Bank to service
- SCC shall close (or advise K13 Operator to close) the 13T4SC5.6 breaker

- SCC shall close (or advise K13 Operator to close) 13T4SC5.6 breaker if the voltage is below 32.8kV

3.51. To isolate 13SC7 Cap Bank for work

SCC shall carry out (or advise K13 Operator to carry out) the following:

- Open 13T3SC7 breaker

SCC shall advise K13 Operator to carry out the following:

- Open 13T3SC7-SC7 disconnect switch
- Close 13SC7-G disconnect switch

3.52. To restore 13SC7 Cap Bank to service after work

3.52.1. Prepare 13SC7 Cap Bank for restoration:

K13 Operator shall:

- Advise SCC when work on the 13SC7 Cap Bank has been completed and permit(s) surrendered (including all Station Guarantees)
- Check for no potential on 13SC7 Cap Bank and temporary grounds removed
- Open 13SC7-G disconnect switch
- Close 13SC7-SC7 disconnect switch

3.52.2. Restoration of 13SC7 Cap Bank to service:

- K13 Operator shall advise customers of readiness to restore 13SC7 Cap Bank to service

- SCC shall close (or advise K13 Operator to close) the 13T3SC7 breaker

- SCC shall close (or advise K13 Operator to close) 13T3SC7 breaker if the voltage is below 32.8kV

4. Explanation

Transformer and Bus automatic outages may be caused by the following relay operations:

- Transformer differential lockout relay-86T

- Transformer Bucholtz relay or high temperature lockout relay-86G

- Transformer overcurrent back up relays

a. If 86T operates, the breakers which have opened auto, cannot be reclosed until the lockout relay has been reset or the lockout feature has been by-passed.

- Carry out thorough inspection of the Transformer and the 34kV and 11kV Structures looking for oil leakage, shattered insulators on the structures and dead birds or reptiles

b. 86T can be reset manually immediately after an automatic outage if the station is attended.

c. 86G cannot be reset unless transformer gas and / or temperature conditions are normal or the MCB to the transformer protective relays is off.

NOTE:

I. If it has been necessary to restore the MCB to the transformer relay in order to reset 86G

and restore a healthy bank to service, they shall not be restored until the gas and /or temperature conditions on the faulted bank is rectified.

II. Operation of 86T or 86G lockout relays may be due to major transformer faults hence No attempt should be made to re-energize the bank until Electrical Maintenance staff have inspected and meggered the Transformer.

ISOLATION AND DE-ENERGIZING

1. Open the necessary breaker(s) to take the line off potential.

2. Check all three phases off potential using the Multifunction meter or Analog Voltmeter or for Pole discrepancies on the panel.

3. Open the necessary disconnect switches or MODS to isolate the line from all sources of supply.

4. Close the Grounding Switch.

5. Report completion of the isolation and de-energizing at all assisting stations, to the where the Protection Guarantee is to be issued and to System Control Centre.

6. Issue Work or Work and Test Permit to the workman.

ORDER TO OPERATE

1. An O.TO. (Order-To-Operate) to isolate a line is as follows:

    a. Line Voltage - Check all three phases off potential
    b. Line Breaker - Check Open
    c. Line Disconnect Switches - Open, lock and Tag (MCB to MOD Turn-off)

2. Due to communication difficulties arising when grounds are placed on a line it is necessary to issue a Protection Guarantee on the line before grounds are placed. A work and Test Permit allows for closing and opening permanent grounds switches while the Permit is in effect.

3. If work is to be done a permanent ground switches a PC 14 to close the ground switch is not required.

The station has two 161Kv buses. The main 'A' and 'D' buses, a breaker and half configuration provides the normal points of supply to all circuits/equipment such as AW1K, J2K, K3TH, K4KY and K5NB lines, 13T1, 13T2, 13T3 and 13T4 transformers.

5. Approval

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Director, TSD