WP 04-ED1621

Revision 11

Underground Electrical Distribution

Technical Procedure

EFFECTIVE DATE: 04/29/10

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APPROVED FOR USE

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INTRODUCTION [1]

The purpose of this procedure is to provide instructions for performing Underground (U/G) Electrical Distribution Lineups at the Waste Isolation Pilot Plant (WIPP) when normal Xcel Energy power has been interrupted, or an alternative lineup is required due to corrective or preventive maintenance.

Electrical system lineups are listed in Attachment 1, Site Electrical Normal and Alternate Lineups.

Performance of this procedure requires coordination between Facility Operations personnel on the surface and in the U/G. The Central Monitoring Room Operator (CMRO) is the contact point for coordination of procedure-related activities.

REFERENCES

BASELINE DOCUMENTS

- 30 CFR Part 57, Subpart K, "Electricity"
- Drawing 25-J-020-W1, WIPP Site Primary Power Distribution - One Line Reference Sheet
- Drawing 25-J-020-W2, WIPP Site Primary Power Distribution - One Line Diagram
- Drawing 25-J-020-W3, WIPP Site Primary Power Distribution - One Line Diagram Normal Interrupters Lineup
- Drawing 25-J-020-W4, WIPP Site Primary Power - One Line Diagram with Surface Low Voltage Interrupter Lineup
- Drawing 25-J-020-W5, WIPP Site Primary Power - One Line Diagram with U/G Low Voltage Interrupter Lineup
- Drawing 25-J-020-W6, WIPP Site Primary Power Distribution - One Line Selected Load System Interrupter Lineup Surface and U/G
- Drawing 53-J-037-W3, Underground Utilities, Underground SUB #4, Transformer 53P-TR15/4, Wiring and Schematic Diagrams
- Drawing 53-J-510-W1, Underground Utilities, Underground SUB #1
- JHA UGS01 Operating Circuit Breakers
- WP 04-ED1021, Surface Electrical Distribution
- WP 04-ED1341, Surface Backup Power Distribution
- WP 04-ED1631, Underground Backup Power Distribution

PRECAUTIONS AND LIMITATIONS

- Load Interrupter Switches (LISs) with a load connected **SHALL NOT** be opened. Operation of LISs should be at zero (0) volts.

- Circuit Breaker (CB) and system interlocks for safe operation of site electrical systems **SHALL NOT** be relied on.

- 13.8 kV switchgear panel covers **SHALL NOT** be removed except during approved maintenance activities.

- Protective relays limit operations as follows:

  - A CB that has a flag displayed **SHALL NOT** be closed.

  - Equipment being served by the tripped CB **SHALL NOT** be energized.

  - More than one attempt to reset an 86 (lockout) relay **SHALL NOT** be made.

  - Relay flags shall be reset only after maintenance has verified that the circuit and equipment being served from the circuit is not in a fault condition.

  - The 95 Ground Check relay may be reset only if the relay has opened due to a known undervoltage of the power distribution system. If the local CB has a flag displayed, the 95 Ground Check relay **SHALL NOT** be reset.

- Feeder Protection Relays (FPRs) at Switching Station (SS) 1, SS 5, and SS 6 require an inspection for alarms and trips. Alarms and trips will be indicated by local illumination of Light-Emitting Diode (LEDs) and remote alarms via the Plant Metering System (PMS).

- Prior to resetting Vacuum Circuit Breakers (VCBs) due to an unknown outage, perform a walkdown of the circuit from the SS to the loads.

PREREQUISITE ACTIONS

1.0 Notify CMRO prior to performance of this procedure.

NOTE

This procedure may be entered at any step describing an optional power lineup depending on power feed or load requirements.
(See Attachment 1.)

2.0 After closing LIS and before closing CBs, verify 3-Phase Voltages at Digital Power Meter or FPR relay at SS 1, SS 4, SS 5, and SS 6.

3.0 VCBs shall be operated from the Control Panel or Remotely from the PMS. If the VCBs are required to be CLOSED from the local mechanism at the breaker contact the Cognizant Engineer (CE) prior to performing the task.

4.0 During a loss of power when an alarm and other trip signal (general) may be present on the FPR the following should be performed.

4.1 To clear the ALARM, push the reset button twice and use the down arrow to select ALARM, push the Enter button twice. This should clear the alarm signal.

4.2 To clear the TRIP, push the reset button twice and use the up and down arrow to select TRIP, push the Enter button twice. This should clear the trip signal.

4.3 Push the RESET button to view the voltage/current screen.

4.4 If the alarm or trip signal does not clear contact U/G maintenance.

PERFORMANCE

1.0 NORMAL POWER SS 1 (53P-SWG15/1)

1.1 CLOSE SW-1 at SS 1, (53P-SWG15/1).

1.2 CMRO, CLOSE CB-2 at Plant SUB.

1.3 Verify with CMRO that CB-2 in the Plant SUB is CLOSED.

1.4 Verify the 3-Phase Voltages.

NOTE

During the remote operation of the CBs from the PMS system the following shall apply:

- One operator shall be at the SS
- One operator at shall be at the PMS Monitor

1.5 Verify no alarm or trip indications at FPRs.

1.6 Reset 95 relay as required.

1.7 CLOSE the required CBs at SS 1 (53P-SWG15/1).

1.8 Upon completion of closing the required CBs at SS 1, monitor the operating parameters of the SS via the PMS Monitor at work station in S550.

1.9 Perform the following at SUB 1 (53P-SBD04/5):

1.9.1 Verify 3-Phase Voltages at (534-JU1C-510-001).

1.9.2 Verify 480V Main CB is CLOSED.

1.9.3 Reset Ground Wire Monitor Relays (GWMRs).

1.9.4 CLOSE the following CBs at SUB 1 (53P-SBD04/5).

CB-1	CB-2	CB-4	CB-5
CB-6	CB-8	CB-9	CB-15
CB-18			

1.9.5 Upon completion of closing the required CBs at SS, monitor the operating parameters of SUB 1 via the PMS Monitor at the work station in S550.

2.0 NORMAL POWER SS 4 (53P-SWG15/4)

2.1 CLOSE SW-2 at SS 4 (53P-SWG15/4).

2.2 CMRO, CLOSE CB-5 in the Plant SUB.

2.3 Verify with CMRO that CB-5 in the Plant SUB is CLOSED.

2.4 Verify 3-Phase Voltage.

2.5 Verify no flags or trip indications at protective relays.

2.6 Reset 95 relays as required.

2.7 CLOSE the required CBs at SS 4 (53P-SWG15/4).

2.8 Upon completion of closing the required CBs at SS 4, monitor the operating parameters of the SS via the PMS monitor at the work station in S550.

2.9 Perform the following at SUB 4 (53P-SBD04/4):

2.9.1 Verify 3-Phase Voltages at voltmeter.

2.9.2 Verify 480V Main CB is CLOSED.

2.9.3 Reset GWMRs.

2.9.4 CLOSE the required CBs at SUB 4 (53P-SBD04/4).

CB-2	CB-5	CB-6
CB-9	CB-13	CB-16

3.0 NORMAL POWER SS 2 (53P-SWG15/2)

3.1 CLOSE SW-2, at SS 2 (53P-SWG15/2).

3.2 Verify no flags or trip indications at protective relays.

3.3 Reset 95 relays as required.

3.4 CLOSE CB-1, at SS 4 (53P-SWG15/4).

3.5 CLOSE, the required CBs at SS 2 (53P-SWG15/2).

4.0 NORMAL POWER SS 5 (53P-SWG15/5)

4.1 CLOSE SW-1, at SS 5 (53P-SWG15/5).

4.2 Verify no alarm or trip indications at FPRs.

4.3 Reset 95 relays as required.

4.4 CLOSE CB-2, at SS 1 (53P-SWG15/1).

4.5 Verify 3-Phase Voltages.

NOTE

During the remote operation of the CBs from the PMS system the following shall apply:

- One operator shall be at the SS
- One operator at shall be at the PMS Monitor

4.6 Verify no alarm or trip indications at FPRs.

4.7 Reset 95 relay as required.

4.8 CLOSE the required CBs at SS 5 (53P-SWG15/5).

4.9 Upon completion of closing the required CBs at SS 5, monitor the operating parameters of the SS via the PMS Monitor at the work station in S550.

4.10 Perform the following at SUB 5 (53P-SWG04/5).

4.10.1 Verify 3-Phase Voltages.

4.10.2 At SW-1 verify Key-1 positioned in the breaker set position.

4.10.3 CLOSE 480V Main CB.

4.10.4 Reset GWMRs.

4.10.5 CLOSE the required CBs at SUB 5 (53P-SWG04/5).

4.11 Perform the following at SUB 3 (53P-SWG04/3):

4.11.1 Verify 3-Phase Voltages.

4.11.2 CLOSE 480V Main CB.

4.11.3 Verify transfer switches associated with SUB 3 have been configured to the alternate alignment, when required due to the loss of SUB 5.

4.11.4 Reset GWMRs.

4.11.5 CLOSE the required CBs at SUB 3 (53P-SWG04/3).

5.0 NORMAL POWER SS 6 (53P-SWG15/6)

5.1 CLOSE SW-1, at SS 6 (53P-SWG15/6).

5.2 Verify no alarm or trip indications at FPRs.

5.3 Reset 95 relays as required.

5.4 CLOSE CB-4, at SS 1 (53P-SWG15/1).

NOTE

During the remote operation of the CBs from the PMS system the following shall apply:

- One operator shall be at the SS
- One operator at shall be at the PMS Monitor

5.5 Verify 3-Phase Voltages.

5.6 Verify no alarm or trip indications at FPRs.

5.7 Reset 95 relay as required.

5.8 CLOSE the required CBs at SS 6 (53P-SWG15/6).

5.9 Upon completion of closing the required CBs at SS 6, monitor the operating parameters of the SS via the PMS Monitor at the work station in S550.

5.10 Perform the following at SUB 6 (74P-PC04/2):

5.10.1 Verify 3-Phase Voltages.

5.10.2 At SW-1 verify Key-1 positioned in the breaker set position.

5.10.3 CLOSE 480V Main CB.

5.10.4 Reset GWMRs.

5.10.5 CLOSE the required CBs at SUB 6 (74P- PC04/2).

5.11 Notify CMRO that Normal Power has been restored to the U/G.

6.0 ALTERNATE SS 1 LINEUP FOR LOSS OF SALT SHAFT FEEDER

6.1 CLOSE SW-2 at SS 1.

6.2 CLOSE CB-1 at SS 2.

NOTE

During the remote operation of the CBs from the PMS system the following shall apply:

- One operator shall be at the SS
- One operator at shall be at the PMS Monitor

6.2.1 Verify no trip and alarm indications at FPRs.

6.2.2 Reset 95 relays.

6.3 CLOSE the required CBs at SS 1 (53P-SWG15/1).

6.4 Perform the following at SUB 1 (53P-SBD04/5):

6.4.1 Reset GWMRs.

6.4.2 CLOSE CBs as required.

6.5 Perform the following at SS 5 (53P-SWG15/5):

NOTE

During the remote operation of the CBs from the PMS system the following shall apply:

- One operator shall be at the SS
- One operator at shall be at the PMS Monitor

6.5.1 Verify no trip and alarm indications at FPRs.

6.5.2 Reset 95 relays.

6.5.3 Close the required CBs at SS 5.

6.6 Perform the following at SUB 5 (53P-SWG04/5):

6.6.1 Reset ground fault relays.

6.6.2 Reset 480 Volt Main CB.

6.6.3 At SW-1 verify that Key-1 is positioned in the breaker set position.

6.6.4 Close the required CBs at SUB 5.

6.7 Perform the following at SS 6 (53P-SWG15/6):

NOTE

During the remote operation of the CBs from the PMS system the following shall apply:

- One operator shall be at the SS
- One operator at shall be at the PMS Monitor

6.7.1 Verify no trip and alarm indications at FPRs.

6.7.2 Reset 95 relays.

6.7.3 Close the required CBs as SS 6.

6.8 Perform the following at SUB 6 (74P-PC04/2):

6.8.1 Reset ground fault relays.

6.8.2 Reset 480 Volt Main CB.

6.8.3 At SW-1 verify that Key-1 is positioned in the breaker set position.

6.8.4 Close the required CBs at SUB 6.

6.9 Notify CMRO that the Waste Shaft Feeder is supplying power to SS 1, SS 5, and SS 6.

6.10 **GO TO** Section 1.0 for restoration of SS 1.

7.0 ALTERNATE SS 4 and SS 2 LINEUP FOR LOSS OF WASTE SHAFT FEEDER

7.1 CLOSE SW-1 at SS 4.

7.2 At SS 1, CLOSE CB-3.

7.3 Close the required CBs at SS 4.

7.4 Perform the following at SUB 4 (53P-SBD04/4):

7.4.1 Reset GWMRs.

7.4.2 Close the required CBs at SUB 4.

7.5 Inform CMRO that Salt Shaft Feeder is supplying power to SS 4 and SS 2.

7.6 **GO TO** Section 1.0 for restoration of SS 4 and SS 2.

8.0 ALTERNATE ALIGNMENT FOR REQUIRED LOADS

NOTE

Certain loads will be lost when realigning loads to SUB 4. For a complete list, see Drawing 25-J-020-W5.

8.1 Perform the following for loss of SUB 1:

8.1.1 Notify CMRO that required loads are being aligned to SUB 4.

8.1.2 OPEN the CBs in 53P-DP04/28 (S400/W30) as required.

8.1.3 Switch 53P-SW04/113 (S400/W30) to FED FROM 53P-SBD04/4.

8.1.4 CLOSE the CBs in 53P-DP04/28 as required.

8.1.5 OPEN the Main CB in 53P-DP04/7, (S90/E20).

8.1.6 Switch 53P-SW04/115 (S90/E20) to FED FROM 53P-SBD04/4.

8.1.7 CLOSE the Main CB in 53P-DP04/7.

9.0 REALIGNMENT OF 53P-DP04/10 (S700/W120)

9.1 Open CBs as required.

9.1.1 Switch 53PSW04/114 (S700/W120) to FED FROM 53P-SBD04/4.

9.1.2 CLOSE the CBs in 53P-DP04/10 as required.

10.0 REALIGNMENT OF 53P-DP04/31 (N215/W620)

10.1 Open CBs as required.

10.2 Switch 53P-SW04/82 (N300/W620) to FED FROM 53P-SBD04/4.

10.3 CLOSE the CBs in 53P-DP04/31 as required.

10.4 OPEN the CBs at 53P-DP04/9 (S80/E300) as required.

10.5 OPEN main breaker.

10.6 Switch 53P-SW04/178 (S90/E120) to FED FROM 53P-SBD04/4.

10.7 CLOSE main breaker in 53P-DP04/9.

10.8 CLOSE CBs in 53P-DP04/9 as required.

10.9 Inform CMRO that required loads are being supplied from SUB 4.

11.0 RESTORATION OF REQUIRED LOADS

11.1 Notify CMRO that required loads are being aligned to SUB 1.

11.2 OPEN the CBs in 53P-DP04/28 as required.

11.3 Switch 53P-SW04/113 (S400/W30) to FED FROM 53P-SBD04/5.

11.4 OPEN the following CBs at 53P-DP04/9 (S80/E300) as required.

11.5 OPEN main breaker.

11.6 Switch 53P-SW04/178 (S90/E120) to FED FROM 53P-SBD04/5.

11.7 CLOSE main breaker in 53P-DP04/9.

11.8 CLOSE CBs in 53P-DP04/9 as required.

11.9 CLOSE the CBs in 53P-DP04/28 as required.

11.10 OPEN the Main CB in 53P-DP04/7 (S90/E20).

11.11 Switch 53P-SW04/115 (S90/E20) to FED FROM 53P-SBD04/5.

11.12 CLOSE the Main CB in 53P-DP04/7.

11.13 OPEN the CBs in 53P-DP04/10 (S700/W120) as required.

11.14 Switch 53PSW04/114 (S700/W120) to FED FROM 53P-SBD04/5.

11.15 CLOSE the CBs in 53P-DP04/10 as required.

11.16 OPEN the CBs in 53P-DP04/31 (N215/W620) as required.

11.17 Switch 53P-SW04/82 (N300/W620) to FED FROM 53P-SBD04/5.

11.18 CLOSE the CBs in 53P-DP04/31 as required.

11.19 Inform CMRO that required loads are being supplied from SUB 1.

12.0 NORMAL POWER SUPPLY FOR SUB 3

12.1 Use CB-5 at SS 2.

NOTE

The alternate PPC (Portable Power Center) for SUB 3 is any U/G PPC.

13.0 ALTERNATE U/G PPC

13.1 Use any U/G PPC, via CB-5 at SS 2.

13.2 Use any U/G PPC, via CB-2 at SS 5.

13.3 Use any U/G PPC, via CB-3 at SS 5.

NOTE

This section is performed weekly or following maintenance on the CIMCO controller to ensure proper operation.

14.0 CIMCO CONTROLLER TESTING ON 53P-TR15/4 AND 53P-TR15/1

14.1 Notify Underground Facility Engineer (UFE) that test will be conducted.

14.2 Check (green) Power ON light is **ON**.

14.3 Check Fans Mode Control (amber) AUTO light is **ON**.

14.4 Depress and hold Maximum Temperature Memory read button and note reading.

14.5 **IF** reading is greater than 100°C,
THEN notify UFE.

14.6 Depress Reset.

14.7 Depress and hold in Left Phase Temperature button until reading is displayed.

14.8 Release Left Phase Temperature button.

14.9 Depress and hold in Center Phase temperature button until reading is displayed.

14.10 Release Center Phase Temperature button.

14.11 Depress and hold in Right Phase temperature button until reading is displayed.

14.12 Release Right Phase Temperature button.

NOTE

Steps 14.13 and 14.14 are performed together.

14.13 Depress and hold both the System Test button and the Test Mode button simultaneously.

14.14 Check Fans ON (yellow) light comes **ON** at 120 (116 - 124) °C.

14.15 Check the following occur when temperature reaches 180 (175 -185) °C:

- Alarm (red) light comes **ON**.
- Local alarm buzzer activates.

NOTE

Beacon is located at S90/W620 (for Transformer 53P-TR15/4 Only).

- Beacon light is activated.

14.16 Check Trip (red) light comes **ON** at 210 (205 - 215) °C.

14.17 Release Test Mode button.

14.18 Release System Test button.

14.19 Check temperature returns to normal.

14.20 Notify UFE of completion of test.

NOTE

The following section is performed in conjunction with approved maintenance procedures **ONLY**.

15.0 OPERATION OF TRANSFORMER 53P-TR15/4 and 53P-TR15/1 INTERLOCK BYPASS

15.1 Obtain permission from Cognizant Engineer to perform test.

15.2 Notify CMRO that test is being performed.

15.3 Obtain Bypass Switch and Isolation Switch keys from U/G Facility Operations office.

15.4 Verify bifolds have been set at the entrance to SS 4 with a sign stating: "Warning - Thermographic Testing is in Progress."

15.5 Verify one operator is stationed at SS 4 or SS 1, CB-3 for 53P-TR15/4.

15.6 Verify one operator is stationed at SS 1, CB-1 for 53P-TR15/1.

NOTE

Bypass Switch is located on control panel on east side of transformer.

15.7 Insert key in Bypass Switch.

15.8 Switch Bypass Switch to BYPASS.

NOTE

Isolation Switch is located under Bypass Switch.

15.9 Remove control lock on Isolation Switch.

15.10 Switch Isolation Switch to DISABLE.

15.11 Notify Instrument and Calibration Technician or Electrician, that transformer is ready for Thermographic Testing.

15.12 Perform the following after completion of testing or maintenance:

NOTE

Safety Door Switch terminations are located inside cabinet on Isolation Switch cover. Continuity is tested between wires numbered 31A and 39A.

15.12.1 Direct Electrician to verify continuity of Safety Door Switches at Isolation Switch.

15.12.2 Switch Isolation Switch to ENABLE.

15.12.3 Install Isolation Switch control lock.

15.12.4 Switch Bypass Switch to NORMAL and remove key.

15.12.5 Return keys to U/G Facility Operations office.

15.12.6 Inform CMRO of test completion.

15.12.7 Remove the bi-folds.

Attachment 1 - Site Electrical Normal and Alternate Lineups

SITE ELECTRICAL NORMAL AND ALTERNATE LINEUPS

LOAD	NORMAL 13.8 kV LINEUP	ALTERNATE 13.8 KV LINEUP	ALTERNATE 480V LINEUP
		SUPPLY	SUPPLY
SUB 7	CB-10 via 25P-SW15/9A & 97	CB-8 via 25P-SW15/9B & 97	N/A
Salt Hoist SUB	CB-1	N/A	N/A
Salt Shaft Feeder, SS 1	CB-2	CB-1 via SS 4 & SS 2	N/A
SUB 2	CB-3	CB-6	N/A
SUB 4	CB-3	CB-6	N/A
SUB 6	CB-3	CB-6	N/A
SUB 3A	CB-4	CB-7 via SUB 3 CB-9	SUB 1 CB-8 to SUB 3 CB-18 Support Building SUB CB-5 to SUB 3 CB-1
Waste Shaft Feeder, SS 4	CB-5	CB-3 via SS 1	N/A
SUB 1	CB-6	CB-7 via SUB 1 LIS 25P-SW15/1B1	SUB 3 CB-18 to SUB 1 CB-8
SUB 3B	CB-7	CB-4 via SUB 3 CB-9	N/A
Support Building SUB	CB-7	CB-4	SUB 3 CB-1 to Support Building SUB CB-5
Waste Hoist SUB	CB-7	CB-4	N/A
SUB 5	CB-8	N/A	N/A
SUB 8	CB-10 via 25P-SW15/9A & 98	CB-8 via 25P-SW15/9B & 98	N/A
SS 5	SS 1 CB- 2	SS 2 CB-4	N/A
SS 6	SS 1 CB-4	SS 2 CB-2	N/A