

12.47 kV SYSTEM: GRIZZLY SUBSTATION (SW-A1 & SW-A2) EMERGENCY RESPONSES EMERGENCY PROCEDURE

APPLICATION

For use by Facilities Division electricians. This procedure is part of the operations manual for the 12-kV power system. See ADMN-056 for an overview of the manual's contents, including related procedures.

This procedure should be carried out **ONLY** by a qualified electrician who has been instructed and trained to work on the 12.47 kV system. Any Facilities personnel performing this procedure must be familiar with the general operating and information procedures regarding this system.

PURPOSE

Response to emergencies at Grizzly Substation.

SCOPE (by Work Steps)

The following Work Steps are guidelines for addressing conditions in the field:

- A. All Grizzly Substation Emergencies
- B. Phase Overcurrent (51) and Short Circuit for Incoming Main Breakers
- C. Ground Overcurrent (51N) (50G) for Incoming Main Breakers
- D. Phase Time Overcurrent (51) and Short Circuit for Feeder Breakers
- E. Ground Overcurrent (51N) (50G) for Feeder Breakers
- F. Bus Differential (87)

SPECIAL INSTRUCTIONS

Training required: Personnel performing this procedure must be:

- Qualified electricians instructed and trained to work on the 12.47 kV system, and
- Familiar with the general operating and information procedures regarding this system.

Equipment required:

- High voltage gloves, flash suit, or other protective clothing as required by LBNL.
- Switching tag; LBNL locks and tags.

WORK STEPS

A. All Grizzly Substation Emergencies

1. Refer to drawings 7R0734 and 7R0744.
2. **Locate breaker trip:** Determine which breaker(s) have tripped and go to the appropriate section in this procedure.

**NOTE: Spare breakers and spaces are included in the description.
However, the checkout is to be done for the tripped feeder circuit.**

- a. Check for incoming line main circuit breaker trip (52-A101 or 52-A102).
 - **IF** there is an incoming line PHASE OVERCURRENT relay (51) trip target (52-A101 or 52-A102), **GO TO Section B.**
 - **IF** there is an incoming line GROUND OVERCURRENT (51N) trip (52-A101 or 52-A102), **GO TO Section C.**

NOTE: For steps 2b, 2c, and 2d:
Spare breakers and spaces are included in the description.
However, the checkout is to be done for the tripped feeder circuit breaker.

- b. **IF** a feeder circuit breaker has tripped (52-A104 through 52-A119 and 52-A202 through 52-A209) **AND** there is a PHASE TIME OVERCURRENT target (51), an overload or short circuit condition existed on that particular feeder circuit. **GO TO Section D.** (The instantaneous elements (50) of these relays have been disabled because of coordination with downstream circuit breakers.)
- c. **IF** a feeder circuit breaker has tripped (52-A104 through 52-A119 and 52-A202 through 52-A209) **AND** there is a RESIDUAL TIME OVERCURRENT target (51N), **GO TO Section E.**
- d. **IF** all main and feeder breakers have tripped, **GO TO Section F.**

B. Phase Overcurrent (51) for Incoming Main Breakers

1. Check for an incoming line main circuit breaker trip (52-A101 or 52-A102).
2. Check incoming phase time relays (51).
 - **IF** there is a 51 relay TRIP target, check all feeder breakers (52-A104 through 52-A119 and 52-A202 through 52-A209).
3. Record all relay target conditions in the Substation Log.
4. Check feeder breakers.
 - a. **IF** all feeder breakers are still CLOSED, an overload condition or short circuit existed on the 12.47 kV incoming line. Complete LBNL switching tag, then **GO TO Step 5** below.
 - b. **IF** any feeder breakers have tripped OPEN **AND** there is a PHASE TIME OVERCURRENT relay target (51), an overload condition or short circuit existed on that particular feeder circuit. **GO TO Section D.**
5. Reset relay targets, **ONLY** with a Facilities electrical engineer's approval.
6. OPEN all feeder breakers on the affected bus.
7. Reclose the incoming line breaker, **ONLY** with a Facilities electrical engineer's approval.
 - **IF** it holds, reclose each feeder breaker, one at a time. Note the operating current of each feeder and compare with previously recorded SCADA readings.
 - **IF** a sustained overcurrent condition exists, take steps to reduce the load.
8. **IF** the circuit breaker trips again:
 - a. Note and record relay targets.
 - b. Tag the breaker control OFF. Rack out and lock out the breaker.
 - c. Troubleshoot the feeder circuits to isolate the problem.

C. Ground Overcurrent (51N) (50G) for Incoming Main Breakers

1. Check incoming line circuit breaker trip (52-A101 or 52-A102).
2. Check incoming line GROUND OVERCURRENT relay (51N).
 - a. **IF** there is a 51N target, check all feeder breakers.
 - b. **IF** there is a feeder GROUND OVERCURRENT relay target (50/51G) or (51N), the ground fault condition existed on that particular circuit. **GO TO Section F.**
 - c. **IF** there is NOT a feeder GROUND OVERCURRENT relay target (50G) or (51N), this indicates a ground fault condition existed in the switchgear, ahead of the feeder ground relays. **GO TO Step 3.**
3. Test 12.47 kV bus for grounds.

- a. Remove all circuit breakers, including the tie breaker and bus PT tray. If necessary, transfer station power to the other bus and pull out the CPT fuse tray on the bus station transformer.

**CAUTION: Unless primary transformer bank switch is opened,
the line side of the test cart will be energized.**

- b. Insert the test cart in the main breaker cubicle, probe and hi-pot bus (load side of the test cart) to isolate and correct the ground condition.

D. Phase Time Overcurrent (51) and Short Circuit for Feeder Breakers

1. Check for feeder circuit breaker trip (52-A104 through 52-A119 and 52-A202 through 52-A209).
2. Check SCADA printout and protective equipment at area switching station or substation for possible indication of overload or short circuit condition.
3. Record trip target in log.
4. Check protective equipment at area switching station or substation for possible indication of short circuit.
 - **IF** short circuit is **NOT** found, isolate the feeder cable by opening disconnect device at load end.
5. Remove the feeder breaker.

**CAUTION: Unless the incoming line main breaker has been opened,
the bus side of the test cart will be energized.**

6. Insert the test cart.
7. Probe each load cable.
8. Hi-pot test each load phase cable to locate possible shorted cables.
9. **IF** cables test clear, hi-pot test load area equipment and cables for possible short circuits.
10. Restore feeder power when circuits are cleared.

E. Ground Overcurrent (51N) (50/51G) for Feeder Breakers

1. Check for feeder circuit breaker trip (52-A104 through 52-A119) and (52-A201 through 52-209).
2. Check protective equipment at area switching station or substation for possible indication of ground fault.
 - **IF** ground fault is **NOT** found, isolate the feeder cable by opening disconnect device at load end.
3. Remove the feeder breaker.

**CAUTION: Unless the incoming line main breaker has been opened,
the bus side of the test cart will be energized.**

4. Insert the test cart.
5. Probe each load cable.
6. Hi-pot each load phase cable to locate possible grounded cable. Repair as required.
7. **IF** cables test clear, hi-pot load area equipment and cables for possible grounds. Repair as required.
8. Restore feeder power when grounds are cleared.

F. Bus Differential (87)

9. Check breaker trip. Verify all main and feeder breakers are tripped.
10. Check the bus differential relays (87B1 and 87B2).
 - **IF** there is a bus differential (87) relay target...
AND a differential LOCKOUT Relay (86B1 or 86B2) has operated...
AND all feeder breakers on that bus are open...
DO NOT reclose any breakers.

NOTE: The operation of one of these relays indicates a serious condition within the 12.47 kV switchgear. Before it is energized, the bus section affected by the relay operations must be isolated and tested to locate and clear the fault. The bus section should receive a hi-pot test in accordance with Westinghouse instructions. The bus differential lockout relays must be reset before power can be restored.

REFERENCES

1. ADMN-056, 12.47 kV System Operations Manual Binder Document Control.
2. Drawings 7R0734 and 7R0744, Meter and Relay Diagrams for Grizzly Substation SW-A1 and SW-A2, in the 12-kV Power System Operations Manual.
3. INFO-048, 12.47 kV System: Protective Relays.

RESPONSIBILITIES AND CONTROLS

Completion of the following signature lines constitutes approval of this procedure:

REV NO.	SME	REVIEWED BY	APPROVED BY / DATE	REVISION DATE
3	<i>James Murphy</i> Elec Shop Super	<i>Lawrence D. Domanski</i> Chief Elec Eng	<i>Martin Johnson</i> 5/21/07 Utilities Mgr	5/10/07
	<u>James Murphy</u> (Print Name)	<u>LAWRENCE D. DOMANSKI</u> (Print Name)	<u>MARTIN JOHNSON</u> (Print Name)	EMRG-068