

Introduction

The purpose of this document is to explain procedures for Operations and other personnel in relation to turning the trolley line power on and off and handling some problem resolution issues in relation to the trolley line power.

Overview

Trolley line power at 600 volts direct current (DC) is generated from commercially generated alternating current (AC) electricity using three rectifiers. Two of these are located at the East site substation and one at the West site substation adjacent to the Richfol stop. These three rectifiers are integrated into a single system as follows:

- One of the two rectifiers at the East site substation is the primary power source with Rectifier 1 used in odd-numbered months (Jan, Mar, etc.) and Rectifier 2 used in even-numbered months (Feb, Apr, etc.). Switching between the two rectifiers is performed by Power & Signal personnel and **does not involve Operations personnel**.
- The rectifier in the West site substation is used for load balancing purposes and comes on-line automatically as needed. The decision as to when this rectifier is used **does not involve Operations personnel**.

Control of the entire power system is integrated using a radio communications system. Power can be turned on and off from the West site (Richfol) substation by following the procedures described in this document. Access to the East site substation is not required for normal operations but may be necessary in problem situations. However, access to the East site substation is limited (by key and alarm code) to designated individuals in P&S and Operations who have been trained and given access to this substation. A contact list will be posted in the West substation so that Operations personnel will know who to contact should a problem occur that requires access to the East site substation.

Important Safety Warning

There are a number of cabinets at both substations that are part of the power management system. There are no controls or other components in these cabinets that are part of the regular operating procedures for the power system. These cabinets contain components that are not protected, contain high voltage and amperage and may be energized even when the trolley line power is turned off. The contents of these cabinets are extremely dangerous. ***UNDER NO CIRCUMSTANCES ARE INDIVIDUALS OTHER THAN THE DESIGNATED POWER & SIGNAL DEPARTMENT PERSONEL ALLOWED TO OPEN THESE CABINETS.***

In addition, many of the cabinets contain a protection mechanism that will cause the power to be turned off should the cabinet be opened. However,

even with the power turned off, there will still be components in these cabinets that are energized and dangerous.

Emergency Shutdown Procedures

This procedure covers shutting down the trolley line power in case of an emergency.

1. To turn off the trolley line power in an emergency situation, press the red button on the exterior of the power system cage at the West site (Richfol) substation.



2. Once line trolley power is turned off, it shall not be turned back on until (a) the situation causing the power to be turned off has been resolved and (b) all personnel who could be affected by the trolley line power being turned back on (car operators, P&S personnel, track crew, etc.) have been contacted (verbally or by radio) to insure that it is safe to turn the power back on.

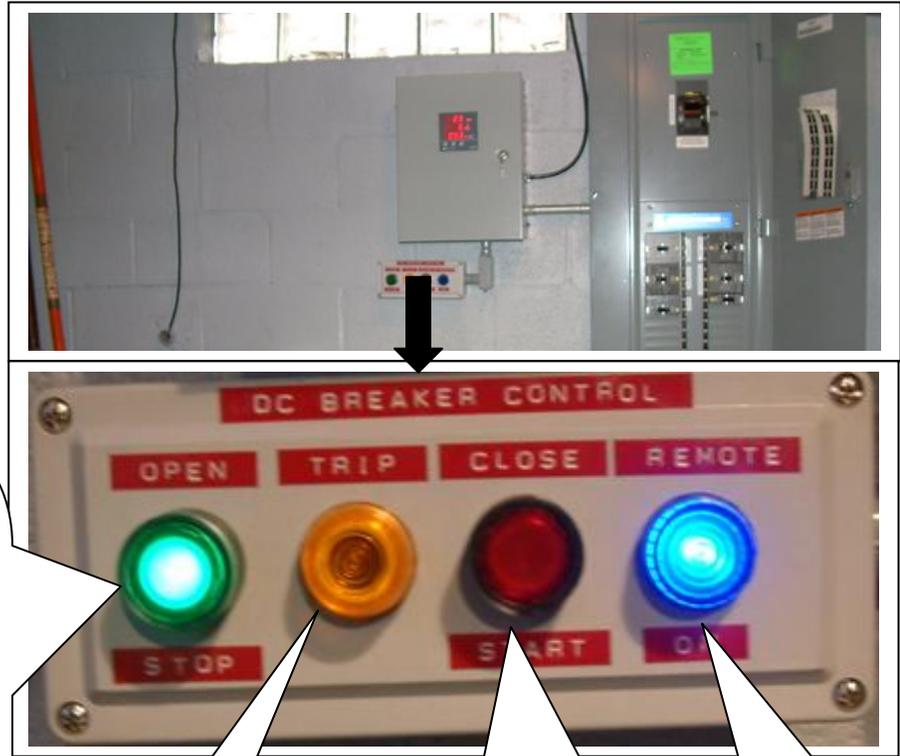
NOTE: If the blue light on the control panel at the back of the cage is off, the remote control radio link is down and **THE EMERGENCY SHUT OFF WILL NOT WORK**. However, all safety features will continue to function as designed. In this situation, all power system control must be done from the East Site substation control panel.

General Operating Procedures

These procedures apply to normal operations of the trolley line power from the West (Richfol) substation.

NOTE: If all lights on the control panel or the blue light are off, then the remote control link to the East substation is inoperative and power cannot be managed from this substation. All power system control must be done from the East Site substation control panel

The controls for the trolley line power are located on the panel at the back of the power cage. All trolley line power management functions are controlled by the DC Breaker panel



Green light indicates that the trolley line power is off. When the red light is on, (trolley line power on) press this button to turn off the trolley line power. When the green light goes on, the trolley line power is off and no further action is necessary.

Solid yellow light indicates a lockout condition. Power cannot be turned on until the condition causing the lockout has been corrected.
Flashing yellow during startup indicates that DC circuit breaker is load measuring before closing.

Red light indicates the trolley line power is on.
When green and blue lights are on, press this button to turn on the trolley line power. Yellow light will go on and off several times over a 15 to 20 second period and the red light should then come on indicating that the trolley line power is on.

Blue light indicates that radio link is active and power may be turned on or off from the West site (this panel)

Problems with Trolley Line Power

In case of problems with the trolley line power (ex. a system overload) the system will trip out. It will then try two times to restart the power. If the power cannot be restarted, the system will react the same as if the power was turned off. Handle this situation as follows:

1. Identify and resolve the problem before attempting to restart the power.
2. Check all cars with poles up to be sure that the controllers are in the "off" position.
3. Contact all personnel who could be affected by the trolley power being turned back on (car operators, P&S personnel, track crew, etc.) either verbally or by radio to insure that it is safe to turn the power back on.
4. Restart the power as follows:
 - a. Press the Power Off button. This should clear the yellow light (lockout condition) if yellow light is on. If yellow light does not go off, then do not proceed with turning on the power as the power will not go on.
 - b. Press the Power On button.
5. If the power does not restart or restarts and then shuts down again, consider pulling down the poles for all cars and trying again.

If power still does not restart, the situation cannot be resolved from the West site substation.

Loss of Power from Allegheny Power

A power loss from Allegheny Power will cause the trolley line power to be turned off. What happens when the power from Allegheny power comes back on depends upon how long the power was off:

- A. If the AC power is off for a short period (up to approximately three (3) hours), then the trolley line power can be turned back on in the normal manner as described in the General Operating Procedures section. However, before turning the trolley line power back on, do the following:
 1. Be sure that the controllers in all cars with poles up are in the "off" position and that all car heaters are turned off.
 2. Contact all personnel who could be affected by the trolley power being turned back on (car operators, P&S personnel, track crew, etc.) either verbally or by radio to insure that it is safe to turn the power back on.

- B. If the AC power is off for an extended period (in excess of approximately three (3) hours), then it will be necessary reset the main AC breaker on the rectifier which is currently in use. This procedure requires both access to the East substation and the authority to perform this function.

EAST SUBSTATION

This information is included for Operations personnel who (1) have been given access to the East substation (key and alarm code) and have been designated by both the Power & Signals and Operations departments to be able to operate the power controls at the East substation.

Operations personnel are limited to only the procedures covered in this section.

Turning Trolley Line Power On and Off



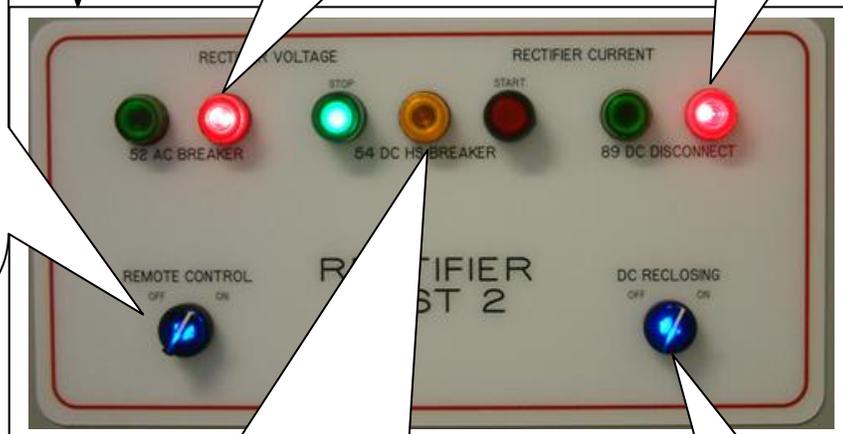
The rectifier that is being used is indicated by the two red lights as shown here. Turn line power on and off on this rectifier.

Indicates whether AC power is on (red light) or off (green light) to this rectifier.

Indicates whether DC connection to line is connected (red light) or not connected (green light).

Controls whether or not power can be turned on (blue light on) from the West substation.

DO NOT TOUCH THIS SWITCH



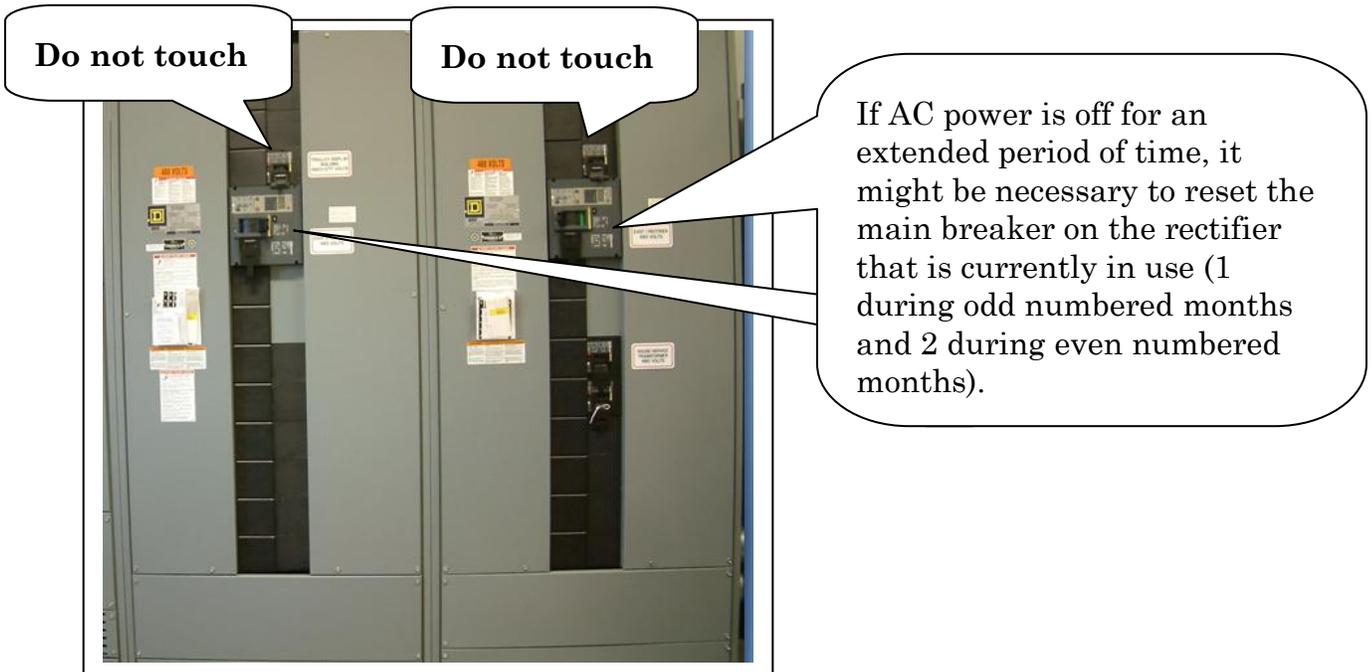
Buttons and lights in relation to line power:

- Green: Trolley line power off ... press to turn off if power is on (red light on)
- Red: Trolley line power on ... press to turn on if power is off (green light on)
- Yellow: Lockout condition which must be cleared by pressing the "Off" button before turning on trolley line power

Controls whether or not the rectifier recloses after a power trip.

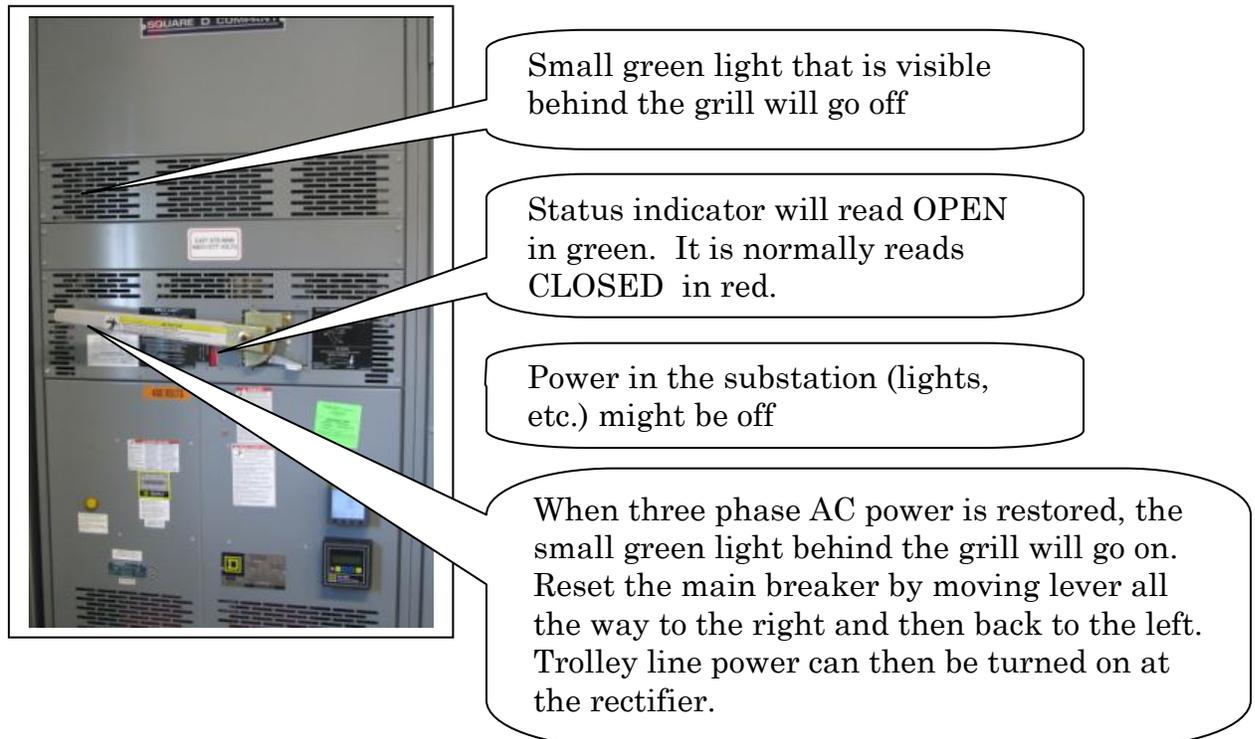
DO NOT TOUCH THIS SWITCH

Resetting Rectifier Circuit Breakers



Loss of One Phase of AC Power from Allegheny Power

A loss of one of the three phases of power that comes from Allegheny power will cause the trolley line power to turn off. This situation can be identified on the main power panel as follows:



TROLLEY LINE POWER LOCKOUT PROCEDURES

This information is included for all personnel who might have to lock out the trolley line power. **NOTE THAT THIS PROCEDURE WILL ONLY LOCK OUT THE TROLLEY LINE POWER; HOWEVER, IT DOES NOT GUARANTEE THAT THERE IS NO POWER IN THE LINE.** For example, if a power line from Allegheny Power or other power source comes in contact with the trolley line, there can still be power in the trolley line even if the power is locked out.

1. Turn off the trolley power if the trolley power is on.
2. Locks are located next to the double door at the East substation and on the west wall at the West substation.
3. At the East site substation, move the TWO (2) LINE DISCONNECT switches to the OPEN position and lock in this position.
4. At the West site substation, place the disconnect switch in the OFF (bottom) position and lock in this position.
5. The key should be kept by the person who placed the locks. If this individual leaves the site, then they must designate another person to be responsible for the keys. As part of the process of turning over the keys, information about why the power was locked out and any other relevant information must be given to the person receiving the key.
6. The locks cannot be removed until (1) all work is completed on the project or activity causing the power to be locked out AND (2) an inspection and/or other determination is made that it is safe to turn on the power.

UNDER NO CIRCUMSTANCES SHOULD ANYONE OTHER THAN THE PERSON HOLDING THE KEY TAKEN WHEN THE POWER WAS LOCKED OUT REMOVE A LOCK.

