



Constellation Energy®

**Harbor Cable
PJM Queue W3-123
SPS Proposal**

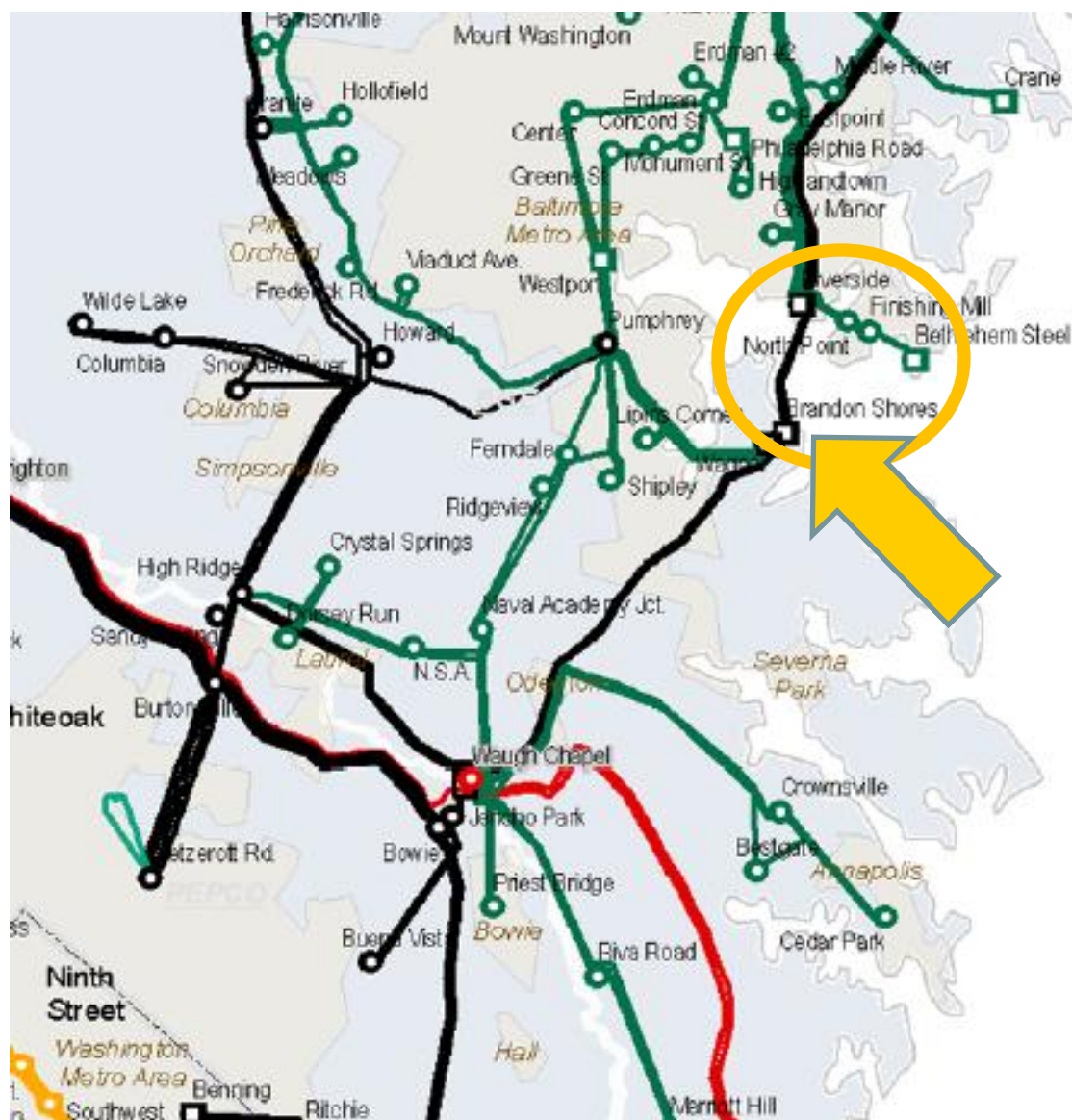
Purpose

- To relieve thermal pre-contingency flow overloads on both the BRANDONS-RIVERSIDE 2344 and BRANDONS-RIVERSIDE 2345 230 kV circuits (the Harbor Cables)
 - PJM reported Gross Congestion Cost for Harbor Cable constraints of \$56.6M in 2010
- Temporary scheme to be retired upon the in-service date of W3-122 merchant transmission project permanently increasing the Harbor Cable ratings

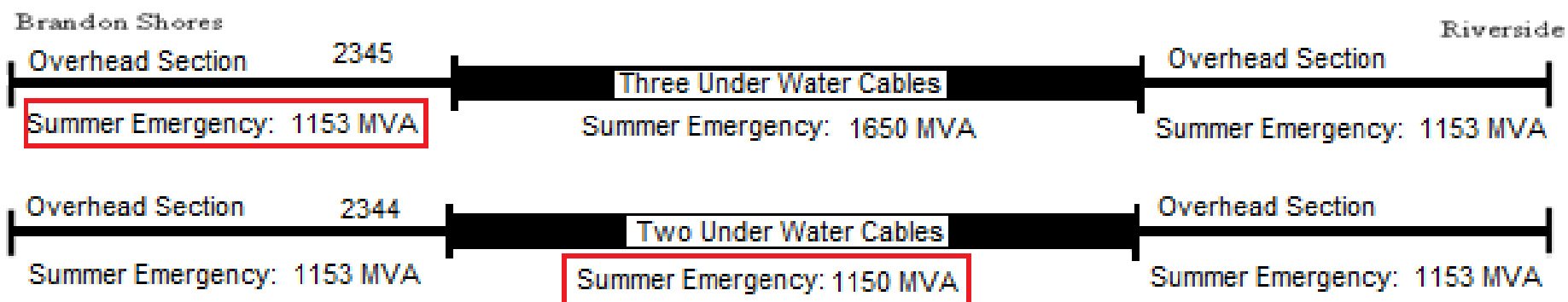
Location

Baltimore-
Washington
Metro Area
Transmission

LEGEND:
Red=500 kV
Black=230 kV
Green=115 kV



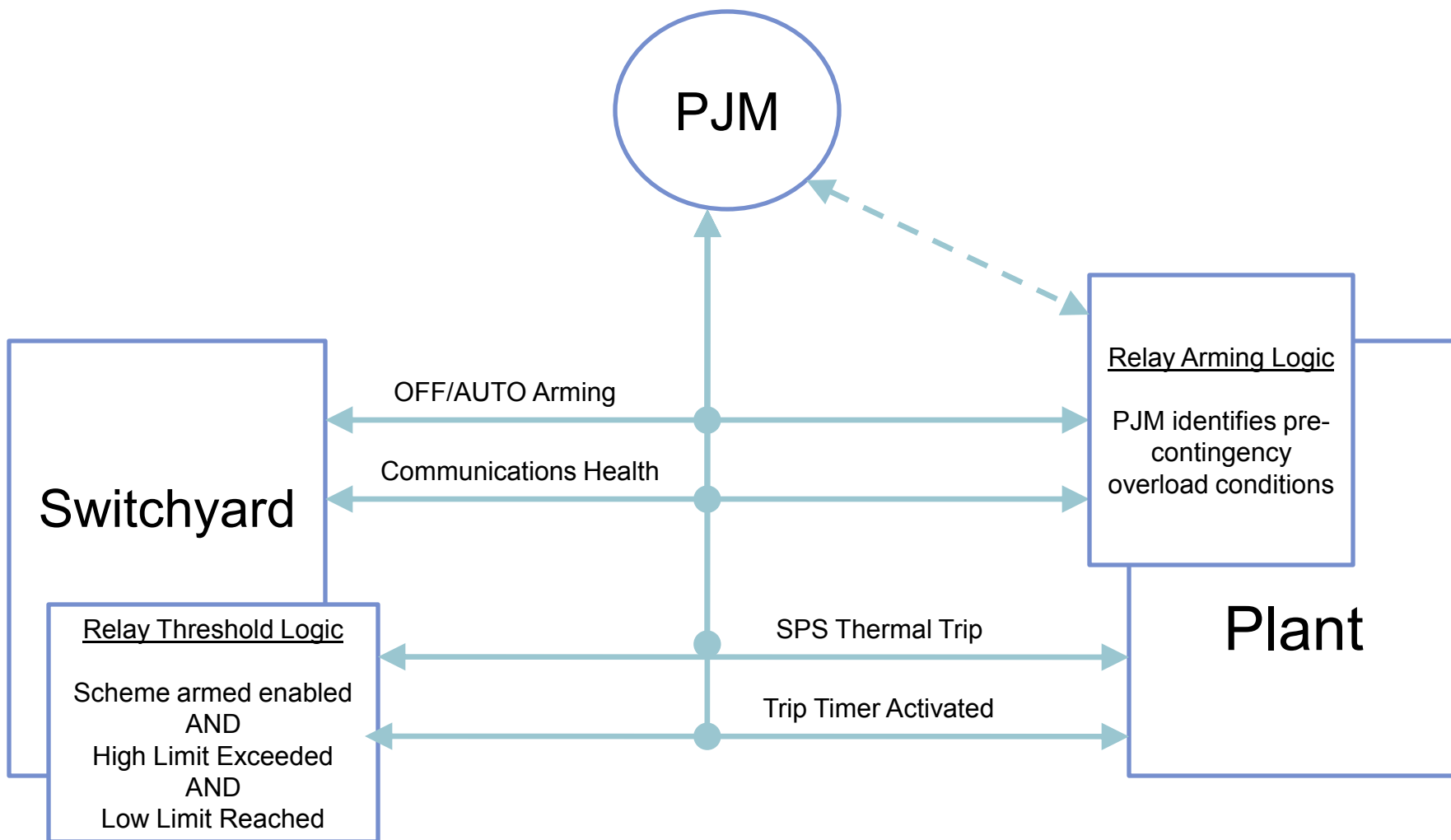
Single Line



Scheme Description

- Scheme is enabled when PJM identifies contingency overload conditions on 2344 or 2345
- Sense current on each Harbor Cable circuits and compare it to temperature based emergency rating provided by BGE
- Transmit trip signal to Brandon Shores generating unit when current on one circuit reads zero and current on opposite circuit exceeds the setting for 30 seconds
 - Originally proposed generator run-back scheme was not capable of responding quickly enough
- Brandon Shores generating unit is tripped through Distributed Control System (DCS) main fuel trip

Schematic



Communication

- Redundant SEL 387 relays use existing redundant fiber between switchyard and Air Quality Control System (AQCS) control building.
- Relay contacts on a contact transfer device located at the plant are hardwired to the Unit 1 and Unit 2 specific DCS I/O.
- Plant DCS output shall be extended to same contact transfer device to enable SPS Off/Auto control.
- DCS inputs shall be extended from the plant contact transfer module for:
 - SPS Active feedback
 - SPS Unit Choice
 - SPS Relay System Trouble Alarm
 - SPS Trip Unit

Design Features

- Redundant detection schemes (based upon SEL387) connected in series with primary and backup 2344 and 2345 line protection packages
- Application of existing redundant fiber between the switchyard and the AQCS system
- Master OFF/AUTO switch control for arming both detection schemes
- OFF/AUTO status indication at the plant side (dry contact) and switchyard control house (lamp) for each detection scheme
- SPS trouble indication at the plant side for each detection scheme
- Application of independent current thresholds for detection and declaration of SPS generator trip initiate for overloads on either 2344 or 2345 circuits
- Provision of time delay trip supervision as security against false generator trip declaration; timer to be set reasonably short (30 seconds), taking good engineering practices into account
- ReliabilityFirst SPS committee review expected in April 2011

Thank You