Subject: Collision of Q194-23 with rear end of Q618-22 at Monroe, NC on 5/24/2011

Train Q194-23 collided with the rear of Q618-22 on the Monroe Subdivision main line at MP SG 314.1, approximately 0340 AM on May 24, 2011. The following details the potential enforcements, if any, to prevent or reduce the severity of this collision.

At the time of this writing, it is not known what the actual speed of Q194-23 was when it struck the rear of Q618-22.

Assumptions:

1. Signal System functioning as intended.
2. Q618-22 stopped just south of intermediate signal SG 313.8 at MP SG 314 with 9 Cars and 664 feet of train.
3. Q618-22 is stopped waiting for better signal, due to Q616-23 ahead, and signal trouble approximately 10 Miles ahead at Richardson Creek, MP SG 303.9
4. Q616-23 on the move, or has just started to move North at SE Monroe.

Q194-23 would have had an approach signal at NE Waxhaw(SG 318.4), and a restricted proceed signal at the Intermediate signal at MP SG 316.1.

- *Approach Signal, requires a train exceeding 30 MPH to immediately begin a reduction to 30 MPH, as soon as the locomotive passes the approach signal.*
- *Restricted Proceed requires a train to operate at restricted speed, i.e. not exceed 15 MPH and be prepared to stop within one-half the range of vision.*

1. At NE Waxhaw, upon receiving an approach signal, the Q194-23 is required by CSX operating rules to begin slowing their train to 30 MPH, and be prepared to stop at the intermediate signal SG 316.1 The PTC Onboard display will indicate to the engineer that it's next target is the intermediate signal at SG 316.1 for restricted speed (15 MPH). The PTC system does not enforce the approach signal by requiring a reduction to medium speed, but does provide for a "soft target" speed of 30 MPH.

   - *Soft Target, in an approach block, once the locomotive engineer reduces the speed of the train to 30 MPH, the PTC on-board will enforce a 30 MPH limit, and warn the engineer when speed increases to 33 MPH and will stop the train if the speed reaches 35 MPH. The system does not enforce until the speed is reduced, so if the engineer maintains a speed above 30 MPH the system will not warn or enforce a stop.*

2. At the intermediate signal at SG 316.1, the PTC on-board system would have set an enforceable target speed of restricted speed(15 MPH). Depending on the speed and the on-board brake algorithm's predicted speed, the engineer will receive a warning to slow the train. If the engineer's actions are not sufficient, the onboard system will stop the train.

3. Once past the intermediate signal at SG 316.1, the PTC on-board would enforce Restricted speed's upper limit of 15 MPH.

   - *The PTC Onboard system has no way of knowing where the rear end of a train ahead is, and does not enforce Restricted Speed's half the range of vision component, However, the system does enforce the 15 MPH cap on restricted speed. When the speed of the locomotive reaches 18 MPH the Onboard displays a warning prompt to the engineer of the over speed. If the speed reaches 20 MPH the Onboard system will stop the train.*