UNION PACIFIC'S FIRST QUARTER 2017
Positive Train Control Update

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Union Pacific continues to make strides implementing positive train control. Accomplishments in the first quarter 2017 include:

- Preparing 18 additional track segments for PTC operations, bringing the total number of track segments to 77 (26% complete). These 18 track segments are equipped with wayside devices (signals, switches and radios) and have defined GPS coordinates, which identify thousands of precise locations for systemwide PTC coordination. The first quarter's new PTC-ready segments stretch from western Idaho east through Pocatello; across northeastern Nevada along two sets of main lines leading to Ogden and Salt Lake City, Utah; and southwest of Salt Lake City. These newly ready lines build on progress completed in 2016 covering a wide swath of UP's Western Region, from Southern California to Portland; from Portland to Pocatello, Idaho; and from Roseville, California, through Reno to Elko, Nevada.

- Educating more than 5,000 additional employees on PTC operations, bringing the total number of employees trained to about 12,500 (31%). Diverse training materials are tailored to a variety of employee roles, including engineer, conductor, dispatcher, maintenance of way/engineering, mechanical, signal, telecom and information technologies.

- Increasing by 1,500 the number of route miles in PTC operation, bringing the total number of route miles in Revenue Service Demonstration (RSD) to 3,950 (19%).

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8000

Progress through 3/31/17

LOCOMOTIVES EQUIPPED	TRACK SEGMENTS	RADIO TOWERS INSTALLED	TRAINING COMPLETED	ROUTE MILES IN PTC OPERATION	PTC SAFETY PLAN*	SPECTRUM
70% 3,968 / 5,656	**33%** 77 / 231	**86%** 826 / 962	**31%** 12,523 / 40,269	**19%** 3,950 / 20,858	**+** APPROVED	**✓** AVAILABLE
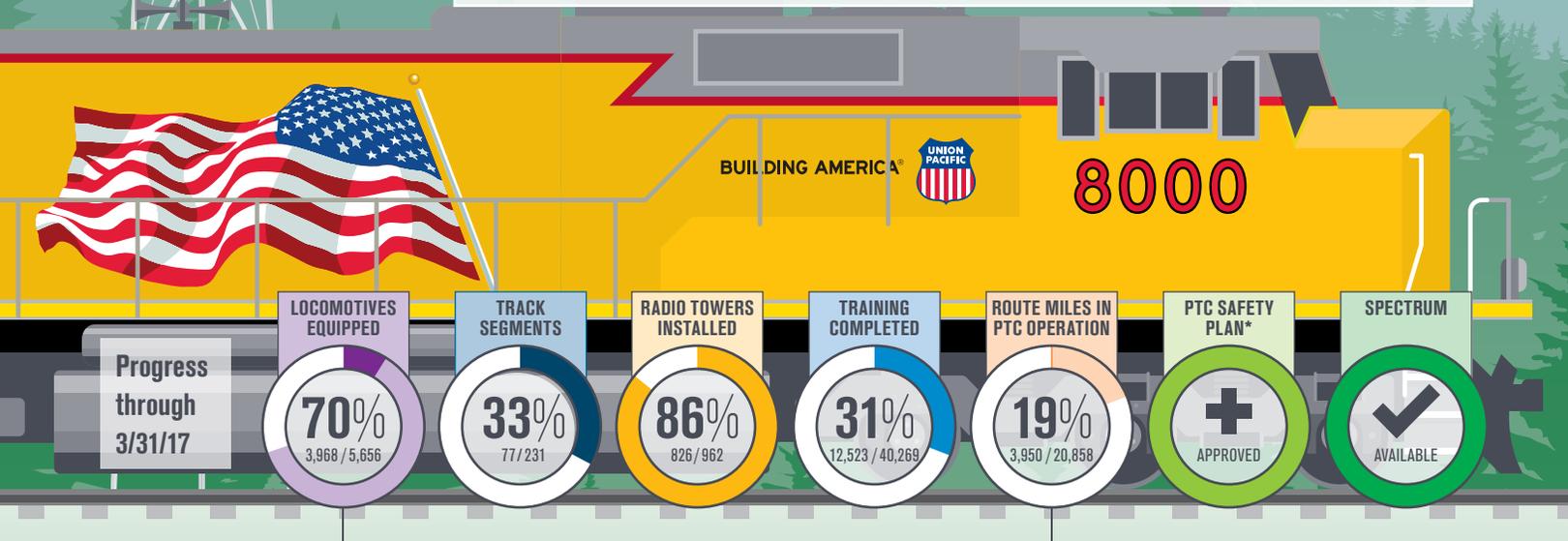
While the FRA notes only 507 (9%) UP locomotives are PTC equipped, nearly 4,000 are fully PTC equipped with the exception of a single component: the PTC-compatible, crash-hardened memory ("black box"). We expect to make significant locomotive installation progress in the second half of 2017 as the supplier-related black box issue is resolved.

Union Pacific is running PTC operations on nearly 4,000 route miles in California, Oregon, Idaho, Nevada and Washington as part of revenue service demonstration (RSD), an ongoing and multifaceted test of the PTC system in a defined rail corridor. Upon FRA approving UP's safety plan, these miles will become officially PTC operable.

The FRA approved UP's PTC safety plan in April 2017.

WHAT PTC DOES:

✅ Automatically stops a train before certain accidents caused by human error occur, including train-to-train collisions, derailments caused by excessive train speed, unauthorized train entry into work zones or movements through misaligned track switches.

WHAT PTC DOES NOT DO:

❌ Will not prevent vehicle-train accidents at railroad crossings, stop trains when pedestrians are on the tracks, or prevent incidents due to track or equipment malfunctions.

MAY 2017 SYSTEM UPDATE

Developing and implementing a PTC system is a multi-dimensional process requiring a cross-functional, systemwide approach. Union Pacific's PTC system consists of multiple technologies functioning together to constantly monitor and manage train movements. These involve integrating signal and telecom elements; GPS; wayside, base station and locomotive radios; antennas and satellites – all to predict whether the train crew should be alerted to take action or if the technology should take control to slow or stop the train.

Through March 31, 2017, Union Pacific:

- Installed 95 percent, or 16,361 miles, of required route miles with PTC signal hardware.

- Partially installed PTC hardware on 93 percent of its 5,656 locomotives earmarked for the technology.

- Equipped 2,735 locomotives with PTC hardware and software for revenue service demonstration (a test of the PTC system in a defined rail corridor).

- Installed 97 percent of the wayside antennas needed to support PTC along the company's right of way.

Union Pacific plans to spend $300 million on PTC in 2017 toward the current total estimated $2.9 billion cost.

SYSTEMWIDE PTC IMPLEMENTATION PROGRESS

Nearly 4,000 of UP's 20,858 PTC-required miles were in revenue service demonstration status as of March 31, 2017, as shown in green. In the second quarter 2017, Union Pacific crews will work eastward to prepare the additional track miles shown in blue. The remainder of PTC-required segments will be addressed in 2017's third and fourth quarters and into 2018.

Legend:
- Implemented
- Implementation Plan for 2Q 2017
- Implementation Plan for 3Q 2017-4Q 2018
- PTC Not Required
- <5mgt Per Year
- Haulage or Trackage Rights