

**Federal Railroad Administration
Status Update on Positive Train Control
Implementation**



August 2016

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1. Introduction

The U.S. Department of Transportation (DOT) and the Federal Railroad Administration (FRA) are providing this status update on railroads' Positive Train Control (PTC) implementation. This update informs the public of: (1) the background of the PTC mandate; (2) the actions FRA has taken and continues to take to support railroads' implementation of PTC systems; and (3) the current status of each railroad's progress towards implementing a PTC system.

2. Background

History of PTC technology and calls for implementation

Positive Train Control technology is the single-most important rail safety development in more than a century. Simply put: PTC prevents many incidents caused by human error and saves lives.

While the term “positive train control” did not appear until a report to Congress from FRA in 1994, the technology is not completely new. Since the early 20th century, rudimentary elements of PTC have existed, and regulators and safety advocates have been calling on the rail industry to implement some form of PTC for decades. In Germany, Great Britain, and France, there has been some form of automatic train control in place since the 1930s¹.

In 1922, the Interstate Commerce Commission (ICC) used its authority under the 1920 Transportation Act to require railroads to install a train control system on at least one division over which passenger trains operated.² The ICC's mandate was expanded in 1924 to include an additional passenger division on each railroad. The ICC set minimum standards that required train stop systems to operate automatically and apply brakes until the train was brought to a stop if an engineer failed to acknowledge a restricting signal or failed to take action to control the speed of the train in accordance with signal indications. Railroads petitioned the ICC for approval to install the Automatic Cab Signal System (ACS), which provides a warning when signal aspects change to more restrictive aspects on their line, in lieu of a train stop or train control system. In 1930, the ICC approved the ACS¹.

In 1970, the National Transportation Safety Board (NTSB) issued its first official recommendation on the need for the rail industry to implement a train control technology like PTC after four people were killed and 43 people were injured near Darien, Connecticut, when an engineer failed to stop at a red signal and two Penn Central Commuter trains collided head-on.³ In the early 1980s, railroads actively explored implementing PTC. In 1984, the Association of American Railroads (AAR) and the Railway Association of Canada

¹ FRA, Railroad Communications and Train Control Report to Congress, (July 8, 1994).

² A division is an organizational unit (including line of road and yard operation) of a railroad based on common elements such as labor contracts, operating and safety rules, traffic, topography and geography. The intent is to centralize management of the railroad. The railroads have regions, divisions, and crew districts—each one more specific than the previous.

³ NTSB, (August 4, 2015). http://www.nts.gov/safety/mwl/Pages/mwl8_2014.aspx.

published a report that outlined the core functions that a PTC-like system would be required to perform. During that same decade, BNSF Railway Company (BNSF) partnered with Rockwell International to develop a system called Advanced Railroad Electronics System (ARES). ARES depended on using wayside equipment and radios like the Advanced Train Control System (ATCS) that was being developed at the time. However, unlike ATCS, ARES relied on Global Positioning System (GPS) to determine train locations. Both systems were eventually abandoned.

In 1990, after years of recommending railroads adopt PTC, the NTSB included PTC on its Most Wanted List – listing PTC as one of the top 10 most urgent and important safety needs for the country.

In the 1990s, Amtrak started to deploy its version of PTC – Advanced Civil Speed Enforcement System (ACSES) – on its Northeast Corridor property. Amtrak also deployed the Incremental Train Control System (ITCS) on approximately 60 route miles between Chicago and Detroit, and BNSF deployed the Electronic Train Management System (ETMS) on a limited number of pilot territories, for revenue testing and demonstration purposes.

By the close of the 1990s, CSX Transportation, Inc. (CSX) had also started to develop a PTC system that used GPS to identify the exact location of trains.

Congressional mandate for PTC

The 2008 Southern California Regional Rail Authority (Metrolink) accident in Chatsworth, California, is often cited as the event that propelled Congress to pass a mandate for PTC. However, in addition to the increasing calls for implementation of the technology over the last 40 years, momentum had been building following a string of deadly incidents – not just one. Specifically, a total of 15 freight and 10 passenger accidents over the seven-year period between 2001 and 2008 resulted in more than 34 deaths and 600 injuries. According to the NTSB, all of the accidents were PTC preventable.⁴

Three of those deadly accidents—which occurred in Mississippi, Texas, and South Carolina—focused public attention on rail accidents and the need for a system that would override human error. The worst of the three accidents took place in Graniteville, South Carolina, when a Norfolk Southern train collided with a stationary Norfolk Southern train, resulting in a deadly release of chlorine – killing nine people, sending 600 to the hospital, and requiring thousands of people to evacuate for days.

On October 17, 2007, the House of Representatives passed legislation (H.R. 2095) requiring PTC to be implemented on track owned by the Class I railroads by December 31, 2014. While the House legislation permitted the Secretary of Transportation to grant two-year extensions if he or she determined that it would lead to a more effective PTC system, Congress ultimately removed any authority to extend the deadline in the proposed legislation.

⁴ NTSB's PTC Preventable Accident List. http://www.nts.gov/news/speeches/T-Bella-Dinh-Zarr/Documents/20150610_PTC_Preventable_Accident_List.xls.

The Senate then passed legislation (S. 1889) on August 1, 2008, to require PTC in limited, certain circumstances with an implementation date of no later than December 31, 2018.

On September 12, 2008, a Metrolink commuter train collided head-on with a Union Pacific Railroad train in the Chatsworth district of Los Angeles, California, killing 25 people and injuring more than 100 others. The accident was PTC preventable – the engineer of the Metrolink train was texting and failed to stop for a red signal.

Weeks after the Metrolink accident, Congress passed the Rail Safety Improvement Act of 2008 (RSIA) that established the December 31, 2015, PTC implementation deadline. RSIA statutorily defined a PTC system as “a system designed to prevent train-to-train collisions, over-speed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position.” 49 U.S.C. § 20157(i)(5), *as amended*. President George W. Bush signed the legislation on October 16, 2008.

For the first time in nearly three decades, the NTSB removed PTC from its Most Wanted List, approximately one year after RSIA was enacted⁵.

PTC today

Today’s PTC systems use a combination of digital radio communications, global positioning, and fixed wayside signal systems to send and receive a continuous stream of data about the location, direction, and speed of trains. Systems process this information in real time to aid dispatchers and train crews to safely and efficiently manage train movements through automatic application of brakes whenever a train crew fails to properly operate within specified safety parameters.

Since the enactment of RSIA, industry has continued to develop these and other systems in order to provide a range of technological solutions for the various implementation needs of the rail industry. These systems vary in capability and scalability, depending on the size and complexity of a host railroad’s operations.

The three most widely used systems are: (1) the Interoperable Electronic Train Management System (I-ETMS), a derivative of BNSF’s original ETMS system, and the predominant system being implemented by the Class I railroads; (2) an updated version of ACSES (known as ACSES-II), modernized to comply with the statutory and regulatory requirements of PTC and being implemented by most of the railroads operating on the Northeast Corridor; and (3) Enhanced Automatic Train Control (E-ATC). In addition, there are some individual “one off” systems being deployed by railroads, which make use of the features from one or more of these three most common systems.

Missing original PTC deadline and Amtrak 188 derailment

In 2012, FRA submitted its first PTC progress report to Congress, warning that railroads were not making sufficient progress toward implementation—despite the agency’s technical and financial assistance, and repeated budget requests for additional funding. A year later,

recognizing that railroads were not making sufficient progress toward implementation, the NTSB added PTC back to its Most Wanted List.⁵ In 2013 the Government Accountability Office (GAO) issued a report stating that most railroads did not anticipate meeting the 2015 implementation deadline.⁶ In 2015, FRA and GAO again reported that many railroads expected to not meet the December 31, 2015 deadline due to many of the same challenges documented in the 2013 GAO report and 2012 FRA report.⁷ As the December 31, 2015, PTC implementation deadline approached, members of Congress introduced legislation in early 2015 to extend the deadline on a year-by-year basis or a five-year extension.⁸

While Congress considered different proposals, on May 12, 2015, Amtrak Train 188 derailed at the Frankford Junction just north of Philadelphia. The incident killed eight passengers, and injured more than 200. It was eventually determined that the Amtrak engineer accelerated into the Frankford Junction curve at 102 mph, more than twice the authorized speed. The NTSB's investigation found that this accident would have been prevented had a PTC system been active at the Frankford Junction location.⁹

Following the derailment of Amtrak Train 188, both chambers of Congress held hearings on PTC as they worked toward completion of a long-term transportation bill. Both the acting FRA Administrator and FRA's Chief Safety Officer testified at these hearings, where they faced questions about whether FRA had the authority to extend the PTC deadline. Each official stated that FRA did not have the authority to extend the statutory deadline, and that FRA intended to enforce the December 31, 2015, deadline.

Congress extends PTC deadline by at least three years

Approximately two months before the December 2015 PTC implementation deadline, the House and Senate overwhelmingly passed the Positive Train Control Enforcement and Implementation Act of 2015 (PTCEI Act). The legislation was signed into law on October 29, 2015.¹⁰

The legislation extended the original statutory deadline for implementing PTC systems to at least December 31, 2018. The law also authorizes the Secretary of Transportation, and FRA by delegation,¹¹ to provide, on a railroad-by-railroad basis, up to a two-year, additional

⁵ See NTSB Most Wanted List, 2013, 2014, 2015, 2016.

⁶ http://www.nts.gov/safety/mwl/Pages/mwl_archive.aspx.

⁷ GAO, Positive Train Control: Additional Authorities Could Benefit Implementation, GAO-13-720 (Aug. 16, 2013).

⁸ GAO, Positive Train Control: Additional Oversight Needed as Most Railroads Do Not Expect to Meet the 2015 Implementation Deadline, GAO-15-739 (Sept. 16, 2015). See also FRA, Report to Congress on the Status of Positive Train Control Implementation (Aug. 7, 2015). <https://www.fra.dot.gov/eLib/details/L16962>.

⁹ See, e.g., S. 650. Railroad Safety and Positive Train Control Extension Act; S. 1006 Positive Train Control Safety Act.

¹⁰ <http://www.nts.gov/news/events/Pages/2016-Amtrak-BMG.aspx>

¹¹ Pub. L. No. 114-73, 129 Stat. 568, 576-82 (Oct. 29, 2015), amending 49 U.S.C. § 20157.

¹² See 49 CFR § 1.89.

extension¹² if the railroad can demonstrate to the satisfaction of the Secretary that it has fulfilled statutory prerequisites, including:

- Installed all PTC hardware by December 31, 2018;
- Acquired all spectrum necessary for implementation of the PTC system by December 31, 2018;
- Completed employee training required under FRA's PTC regulations;
- For Class I railroads and Amtrak, implemented a PTC system or initiated revenue service demonstration (RSD) on the majority of its territories (e.g., subdivisions or districts) or route miles it owns or controls that must have PTC-governed operations;
- For other railroads or entities that are not Class I railroads or Amtrak, initiated RSD on at least one territory required to have PTC-governed operations, or met any other criteria established by the Secretary;
- Included in its revised PTC implementation plan an alternative schedule and sequence for implementing PTC as soon as practicable; and
- Certified to the Secretary in writing that it will be in full compliance with the requirements of 49 U.S.C. § 20157 on or before the date in the alternative schedule and sequence, subject to FRA approval.¹³

3. Ongoing Efforts by FRA to Monitor PTC implementation

FRA continues to spend considerable time and resources monitoring railroads' progress toward full PTC implementation.

Implementing the Positive Train Control Enforcement and Implementation Act of 2015

Under the PTCEI Act, each railroad was required to submit to FRA by January 27, 2016, a revised PTC implementation plan (PTCIP or implementation plan) with each of the content requirements specified in the PTCEI Act.¹⁴ These revised implementation plans outline how and when each railroad plans to achieve full PTC implementation.

While Congress removed FRA's authority to approve or disapprove a revised implementation plan when it passed the Fixing America's Surface Transportation Act (FAST Act), the FAST Act also clarifies that FRA may review the revised implementation plans and require a railroad to modify its revised implementation plan to comply with the PTCEI Act.¹⁵ FRA may still enforce the PTCEI Act requirements. Thus far, FRA has required only two commuter railroads, SunRail and Massachusetts Bay Transportation Authority, to modify their revised implementation plans to comply with the PTCEI Act's requirements.

On February 29, 2016, as mandated under the PTCEI Act, FRA issued a Final Rule amending the PTC implementation deadline and other date-specific deadlines in 49 CFR part

¹² FRA may approve a railroad's alternative schedule and sequence and grant an additional extension up to December 31, 2020, only for the implementation of certain operational, non-hardware aspects of PTC systems. 49 U.S.C. § 20157(a)(2)(B)–(3)(C).

¹³ 49 U.S.C. § 20157(a)(3)(B)–(C).

¹⁴ 49 U.S.C. § 20157(a)(1)–(2).

¹⁵ Pub. L. No. 114-94, § 11315(d), 129 Stat. 1312, 1675 (Dec. 4, 2015), *amending* 49 U.S.C. § 20157.

236, subpart I, *Positive Train Control Systems*, to conform with the PTCEI Act.¹⁶

Annual Reports

The PTCEI Act also required each railroad to submit a report on its progress toward implementing a PTC system to FRA by March 31, 2016, and then annually until the railroad completes its PTC implementation.¹⁷ The PTCEI Act specifically outlines the categories of information railroads must submit in the annual progress reports, and it required railroads to provide any other information requested by the Secretary in the annual reports.¹⁸

As required by the PTCEI Act, FRA published railroads' annual PTC progress reports for 2015 on its website within 60 days of receiving the reports.¹⁹ The public may view the annual reports at <https://www.fra.dot.gov/Page/P0628>.

Quarterly Reports and Compliance Reviews

The PTCEI Act also requires FRA to conduct compliance reviews at least annually to verify whether each railroad is complying with its revised implementation plan.²⁰ To effectively comply with this mandate and to provide Congress and the public with railroads' current implementation status, FRA also requires each railroad to submit quarterly reports on its implementation progress under FRA's statutory and regulatory investigative authorities.²¹ Starting July 31, 2016, the quarterly reports must be submitted to FRA on the dates in the following table until a railroad completes PTC implementation:²²

	Coverage Period	Due Dates for Quarterly Reports
Q1	January 1 – March 31	April 30
Q2	April 1 – June 30	July 31
Q3	July 1 – September 30	October 31
Q4	October 1 – December 31	January 31

Receiving annual and quarterly PTC progress reports enables FRA to effectively monitor railroads' implementation progress and compliance with the revised implementation plans, as well as perform its roles of industry oversight and enforcement. The quarterly reports allow FRA to identify potential trends and ongoing challenges before they become industry-wide obstacles to implementation, and to provide efficient and useful technical assistance to the

¹⁶ 81 Fed. Reg. 10126 (Feb. 29, 2016).

¹⁷ 49 U.S.C. § 20157(c)(1).

¹⁸ FRA developed a mandatory annual reporting form that subject railroads must complete and submit to FRA, entitled the Annual PTC Progress Report (Form FRA F 6180.166, OMB Control No. 2130-0553). The annual form is available for download on FRA's website at <https://www.fra.dot.gov/eLib/details/L17366>.

¹⁹ See 49 U.S.C. § 20157(c)(3).

²⁰ 49 U.S.C. § 20157(c)(2).

²¹ 49 U.S.C. §§ 20107, 20157(c)(2), 20902; 49 CFR § 236.1009(h).

²² FRA developed a mandatory quarterly reporting form that subject railroads must complete and submit to FRA, entitled the Quarterly PTC Progress Report (Form FRA F 6180.165, OMB Control No. 2130-0553). The quarterly form is available for download on FRA's website at <https://www.fra.dot.gov/eLib/details/L17365>.

industry. Data from both the annual and the quarterly reports are made public on FRA's website.

Provisional Operations of a PTC System in Revenue Service

Although railroads are generally prohibited from operating an uncertified PTC system in revenue service (i.e., transporting passengers or freight) under the PTCEI Act, FRA may authorize a railroad to begin provisional operations of its PTC system in revenue service to the extent necessary to enable the safe implementation and operation of the PTC system in phases.²³

Based on FRA's partial review of railroads' PTC Safety Plans (PTCSP or safety plan), successful functional field testing, and other factors, to date, FRA has authorized: Amtrak, CSX, Southeastern Pennsylvania Transportation Authority, and Southern California Regional Rail Authority to begin provisional revenue service operations of the railroads' PTC systems. FRA has provided BNSF with conditional certification of its PTC system.

FRA's authorization to conduct provisional revenue service operations, however, does not represent or guarantee that FRA will ultimately certify the railroad's PTC system. FRA is reviewing each railroad's safety plan and will issue a letter to the railroad approving, approving with conditions, or denying the safety plan, as appropriate, under FRA's regulations.²⁴

4. FRA's Ongoing Support to Help Railroads Implement PTC

In the eight years since RSIA's enactment, FRA has dedicated significant resources and worked closely with railroads to ensure timely compliance with the PTC safety mandate, including the following actions:

- Built a PTC system test bed at the Transportation Technology Center in Pueblo, Colorado. This test bed is available to railroads as they work to successfully test and integrate all of the component technologies necessary to achieve full PTC implementation;
- Worked directly with the Federal Communications Commission and the Advisory Council on Historic Preservation to resolve spectrum purchase and use issues and improve the PTC communication towers and ancillary equipment approval process;
- Established the PTC Implementation Task Force, which manages and monitors railroads' progress to ensure that FRA has real-time information on PTC implementation status. The team supplements FRA's technical staff already dedicated full time to PTC implementation;

²³ 49 U.S.C. § 20157(h)(2).

²⁴ See, e.g., 49 CFR §§ 236.1009(j)(2), 236.1015.

- Made loans available through the Railroad Rehabilitation and Improvement Financing (RRIF) program to applicants interested in assistance in paying for PTC implementation. In 2015, FRA issued a nearly \$1 billion loan to the Metropolitan Transit Authority (MTA) in New York for implementation of PTC on the Long Island Rail Road (LIRR) and Metro-North Commuter Railroad Company (Metro-North);
- Awarded \$25 million in grants on August 16, 2016 to railroads, railroad suppliers, and state and local governments for PTC implementation projects that have a public benefit of improved safety and network efficiency, as Congress authorized in the Consolidated Appropriations Act of 2016. These grant awards will also help railroads achieve PTC interoperability;
- Worked with the Federal Transit Administration (FTA) to notify railroads and the public of the \$199 million available in FY2017 to commuter railroads and state and local governments for PTC implementation grants under the FAST Act;
- Consistently participating in industry's system design reviews, test readiness reviews, lab testing, and field testing;
- Conducted preliminary reviews of railroads' required PTC implementation and safety plan submissions to identify regulatory noncompliance as soon as possible to minimize cost and schedule impact for railroads; and
- Provided information on specific items and data quality levels that FRA requires to approve safety plans and identified omissions that would result in FRA rejecting the PTCSP.

5. Ongoing Challenges

Public Sector Funding

FRA has long stated the need for public sector funding will result in unwanted delays in fully implementing PTC, especially for commuter railroads. Commuter railroads lack the billions of dollars necessary for PTC implementation. Similarly, many short line railroads lack funds to equip their locomotives with the PTC technology necessary to operate over Class I PTC territory. The American Public Transportation Association (APTA) estimates commuter and passenger railroads will need to spend approximately \$3.5 billion to implement PTC.²⁵ Based on its previous experience working with railroads, FRA expects that railroads' PTC project costs may escalate as they move into the implementation phases.

²⁵ See American Public Transportation Alert, Legislative Alert (June 25, 2015). <http://www.apta.com/gap/legupdatealert/2015/Pages/Senate-Commerce-Committee-Approves-Railroad-Reform-Legislation.aspx>.

Since Fiscal Year (FY) 2011, the President’s Budget has included requests for funding for PTC development and implementation. A guaranteed, reliable revenue stream for implementing PTC on commuter railroads has not been provided. The following table illustrates each year’s request in comparison to appropriated funding.

PTC Funding
President’s Budget Requests vs. Annual Congressional Appropriation Bills Enacted Levels
FY 2011 – FY 2017

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017
Request	\$50M	\$50M	\$74M	\$4.17B	\$825M	\$825M	\$1.25B
Enacted	\$0	\$0	\$0	\$42M	\$0	\$25 M	\$199M ²⁶

Despite this challenge, FRA is using all available resources to help railroads implement PTC. FRA has provided approximately \$650 million in grant funds to support PTC. This includes nearly \$400 million in American Recovery and Reinvestment Act of 2009 grants through the High-Speed Intercity Passenger Rail program, as well as Amtrak grants. FRA has also provided a nearly \$1 billion Railroad Rehabilitation & Improvement Financing loan to Long Island Rail Road and Metro-North Railroad.

FRA and FTA also jointly announced on July 29, 2016, that FRA is currently accepting applications for the \$199 million Congress authorized in the FAST Act for commuter railroads and state and local governments for PTC implementation grants.²⁷

On August 16, 2016, as authorized by the Consolidated Appropriations Act of 2016, FRA awarded \$25 million in competitive grant funding for 11 projects. Many of these awards will help railroads achieve interoperability between the different types of PTC systems being deployed.²⁸

FRA requested \$1.25 billion in the FY 2017 budget for PTC implementation grants for commuter and short line railroads. In this budget request, FRA also requested \$6.6 million for its Safety and Operations Account to ensure FRA has adequate resources to review railroads’ PTC safety plans, oversee PTC implementation, and take enforcement action, if necessary.

Interoperability

As railroads continue to implement PTC systems on their own track and equipment, interoperability between railroads’ PTC systems remains largely uncharted territory. The majority of track segments where PTC will be implemented throughout the U.S. have yet to reach an advanced stage of testing where these issues can be identified and resolved, particularly for railroads implementing I-ETMS.

²⁶ Although the funding is in both House and Senate FY2017 appropriations bills, the funding will not be available until Congress passes the legislations and the president signs it into law.

²⁷ 81 Fed. Reg. 50047 (July 29, 2016); *see* Pub. L. No. 114-94, § 3028, 129 Stat. 1312, 1495 (Dec. 4, 2015).

²⁸ 81 Fed. Reg. 19705 (Apr. 5, 2016); *see* Pub. L. No. 114-113 (Dec. 18, 2015).

FRA has provided and continues to provide ongoing technical support and financial assistance to help railroads achieve interoperability of their PTC systems. FRA staff holds regular calls with the industry to address these challenges and works to develop best practices with the railroads as common challenges arrives. FRA also awarded much of the \$25 million in PTC grants for projects focused on interoperability.

6. Status of PTC Implementation and Individual Railroad PTC Implementation Status

The appendices in this report show each railroad's status in implementing PTC according to the most recent information provided by the railroads. The three pictographs visually depict: (1) each railroad's targeted full PTC implementation year as reported to FRA; (2) the overall implementation status of the railroad industry broken down by freight and passenger railroads; and (3) the implementation status of each railroad required to implement PTC.²⁹

Of the approximately 38 PTC safety plans FRA expects to receive, FRA has received seven, which FRA must evaluate and approve before it can grant PTC System Certification under 49 CFR part 236, subpart I. An additional 13 railroads plan to submit a PTC safety plan to FRA in 2016, but the majority of submissions are not expected until 2018, according to railroads' annual progress reports. Submission and approval of a PTCSP does not mean a railroad has completed PTC implementation on all necessary track segments; a railroad may submit a PTC safety plan when it believes there is enough data to support its safety case for system certification.

Approval of a railroad's safety plan is how FRA certifies that a PTC system, as described in a railroad's PTC Development Plan (PTCDP) or implemented based on a previously "Type Approved" system, has demonstrated that it complies with all applicable regulatory requirements. In many cases, railroads will continue to implement PTC after their PTCSP is approved, until all required track segments have installed PTC and been sufficiently tested.

7. Conclusion

Since Congress extended the December 31, 2015, PTC deadline, FRA has been clear that it views the new deadline as the last possible moment for railroads to have PTC fully implemented and continues to aggressively push railroads to implement PTC because PTC saves lives.³⁰

The agency has repeatedly urged railroads to work to beat the deadline by as much as possible. Sadly, the list of PTC-preventable incidents and deaths has grown since FRA's last

²⁹ The pictograph displaying the implementation status of each railroad required to implement PTC shows each railroad's progress toward completing several of the necessary components for PTC implementation: (1) locomotives equipped; (2) track segments completed; (3) radio towers installed; (4) number of railroad employees trained; (5) route miles in PTC operation; (6) submission of PTC Safety Plan; and (7) spectrum.

³⁰ http://www.fra.dot.gov/eLib/details/L17251#p1_z25_gD_IPS.

PTC report. On June 28, 2016, two BNSF intermodal freight trains collided head-on in Panhandle, Texas³¹.

Three crew members were killed.

³¹ BNSF, statement. June 28, 2016. “Our investigation is in the very early stages but based on the limited information we have reviewed, it appears that this is the type of incident that PTC is intended to prevent.”

8. Appendixes

Figure 1: Railroads' Targeted PTC Full Implementation Year

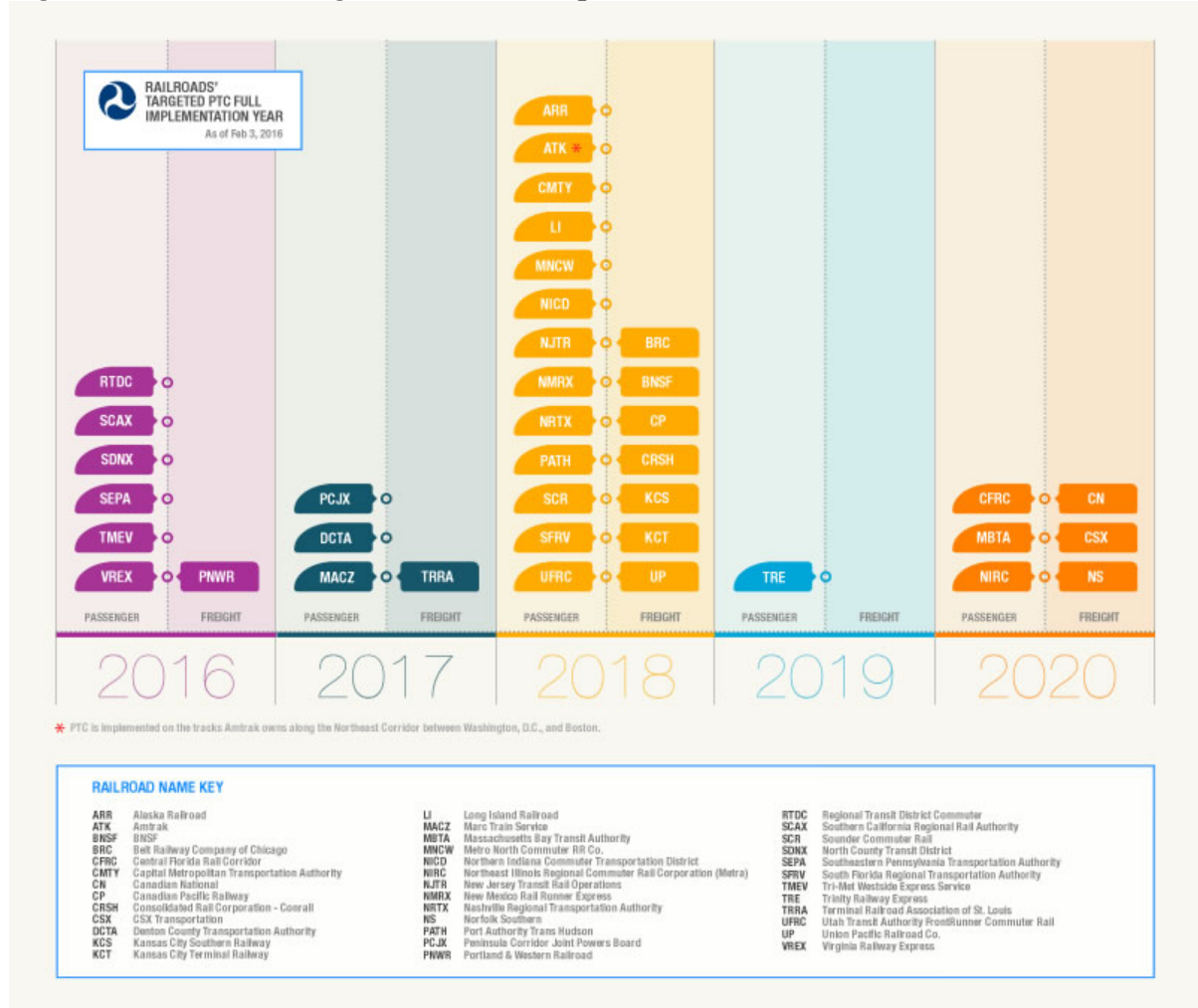


Figure 2: PTC Implementation Status by Freight and Passenger Rail

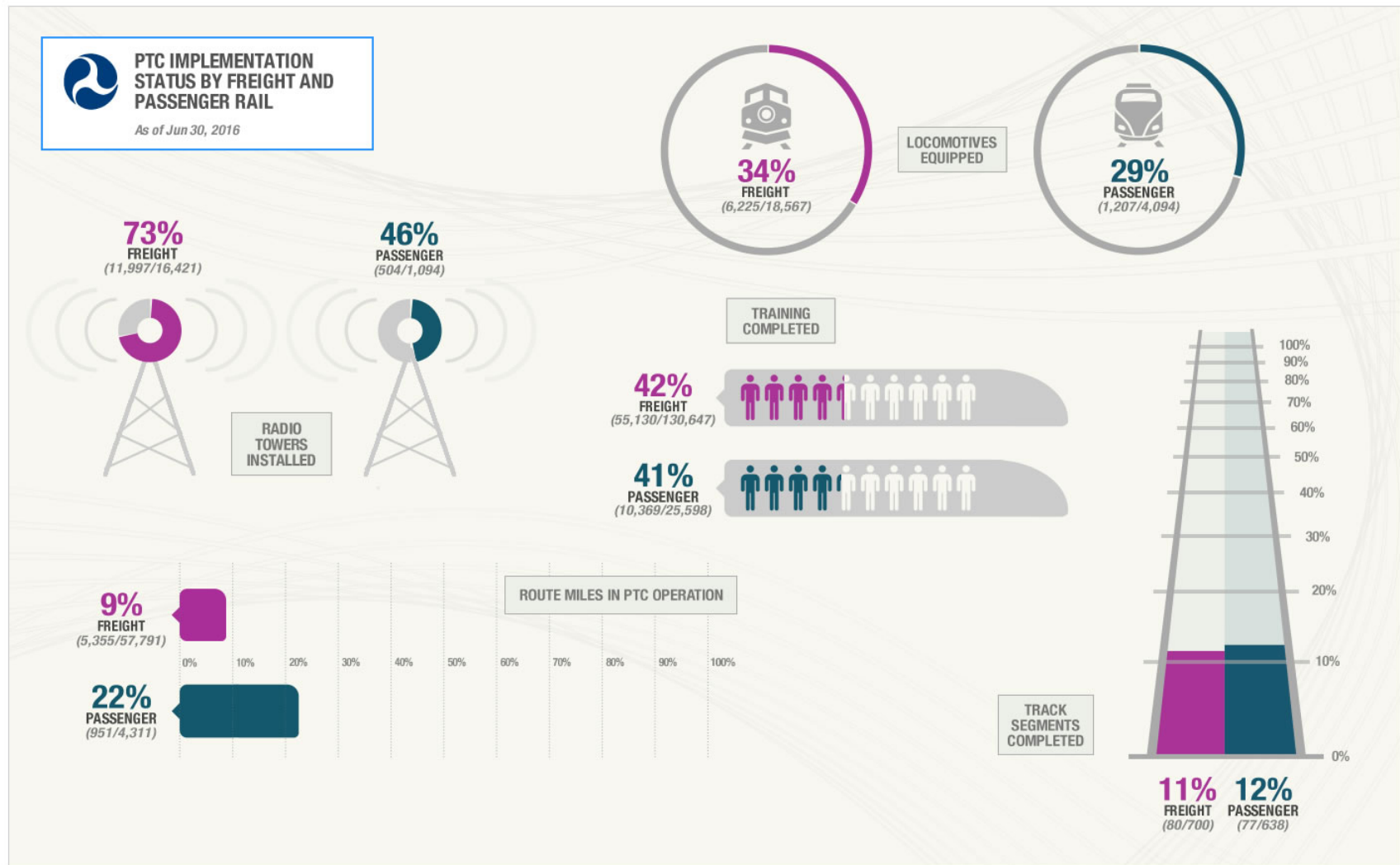
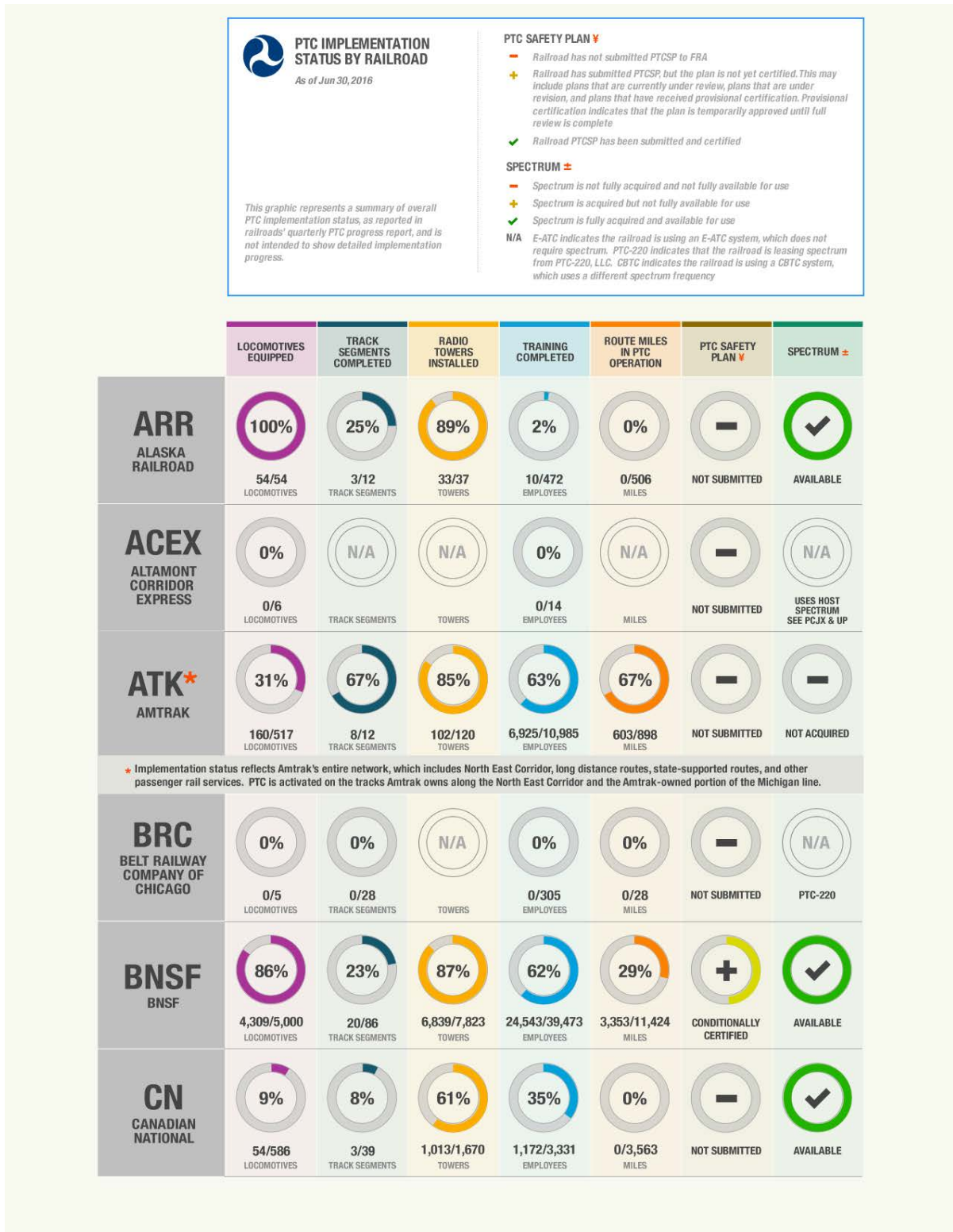




























































Figure 3: Railroad-by-Railroad PTC Implementation Status



	LOCOMOTIVES EQUIPPED	TRACK SEGMENTS COMPLETED	RADIO TOWERS INSTALLED	TRAINING COMPLETED	ROUTE MILES IN PTC OPERATION	PTC SAFETY PLAN	SPECTRUM
CP CANADIAN PACIFIC	 26% 129/505 LOCOMOTIVES	 5% 1/22 TRACK SEGMENTS	 62% 625/1,001 TOWERS	 36% 993/2,775 EMPLOYEES	 0% 0/2,112 MILES	 SUBMITTED	 AVAILABLE
CMTY CAPITAL METRO	 0% 0/26 LOCOMOTIVES	 0% 0/1 TRACK SEGMENTS	 0% 0/15 TOWERS	 0% 0/148 EMPLOYEES	 0% 0/32 MILES	 NOT SUBMITTED	 N/A E-ATC
CFRC CENTRAL FLORIDA RAIL CORRIDOR	 0% 0/24 LOCOMOTIVES	 0% 0/110 TRACK SEGMENTS	 0% 0/5 TOWERS	 0% 0/94 EMPLOYEES	 0% 0/61 MILES	 NOT SUBMITTED	 NOT ACQUIRED
CR CONRAIL	 0% 0/47 LOCOMOTIVES	 100% 1/1 TRACK SEGMENTS	 0% 0/5 TOWERS	 0% 0/693 EMPLOYEES	 0% 0/6 MILES	 NOT SUBMITTED	 AVAILABLE
CSX CSX	 26% 836/3,200 LOCOMOTIVES	 12% 16/130 TRACK SEGMENTS	 34% 146/434 TOWERS	 94% 18,471/19,595 EMPLOYEES	 21% 2,002/9,590 MILES	 PROVISIONALLY CERTIFIED	 AVAILABLE
DCTA DENTON COUNTY TRANSPORTATION AUTHORITY	 0% 0/11 LOCOMOTIVES	 0% 0/1 TRACK SEGMENTS	 0% 0/2 TOWERS	 0% 0/50 EMPLOYEES	 0% 0/21 MILES	 NOT SUBMITTED	 N/A E-ATC
HIES HOOSIER STATE	 0% 0/3 LOCOMOTIVES	 N/A	 N/A	 0% 0/2 EMPLOYEES	 0% 0/196 MILES	 NOT SUBMITTED	 N/A USES HOST SPECTRUM SEE ATK & CSX
KCS KANSAS CITY SOUTHERN	 1% 4/614 LOCOMOTIVES	 12% 2/17 TRACK SEGMENTS	 50% 425/856 TOWERS	 16% 404/2,483 EMPLOYEES	 0% 0/2,153 MILES	 NOT SUBMITTED	 AVAILABLE
KCT KANSAS CITY TERMINAL	 50% 2/4 LOCOMOTIVES	 0% 0/1 TRACK SEGMENTS	 31% 5/16 TOWERS	 0% 0/14 EMPLOYEES	 0% 0/29 MILES	 NOT SUBMITTED	 NOT ACQUIRED

	LOCOMOTIVES EQUIPPED	TRACK SEGMENTS COMPLETED	RADIO TOWERS INSTALLED	TRAINING COMPLETED	ROUTE MILES IN PTC OPERATION	PTC SAFETY PLAN	SPECTRUM
LI LONG ISLAND RAILROAD	 0% 2/580 LOCOMOTIVES	 0% 0/14 TRACK SEGMENTS	 0% 0/113 TOWERS	 2% 57/3,194 EMPLOYEES	 0% 0/321 MILES	 NOT SUBMITTED	 AVAILABLE
MACZ MARYLAND AREA REGIONAL COMMUTER	 0% 0/84 LOCOMOTIVES	 N/A TRACK SEGMENTS	 N/A TOWERS	 0% 0/100 EMPLOYEES	 N/A MILES	 NOT SUBMITTED	 N/A PTC-220
MBTA MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	 99% 188/189 LOCOMOTIVES	 11% 38/347 TRACK SEGMENTS	 0% 11/TBD TOWERS	 23% 215/922 EMPLOYEES	 11% 38/347 MILES	 NOT SUBMITTED	 AVAILABLE
MNCW METRO NORTH	 0% 0/561 LOCOMOTIVES	 0% 0/12 TRACK SEGMENTS	 0% 0/104 TOWERS	 17% 506/2,915 EMPLOYEES	 0% 0/384 MILES	 NOT SUBMITTED	 NOT ACQUIRED
NSCR MINNESOTA NORTH STAR	 0% 0/12 LOCOMOTIVES	 N/A TRACK SEGMENTS	 N/A TOWERS	 100% 18/18 EMPLOYEES	 0% 0/39 MILES	 NOT SUBMITTED	 N/A PTC-220
NRTX NASHVILLE AND EASTERN	 0% 0/14 LOCOMOTIVES	 0% 0/58 TRACK SEGMENTS	 0% 0/1 TOWERS	 0% 0/15 EMPLOYEES	 0% 0/33 MILES	 NOT SUBMITTED	 AVAILABLE
NJTR NEW JERSEY TRANSIT RAIL	 0% 0/440 LOCOMOTIVES	 0% 0/11 TRACK SEGMENTS	 0% 0/124 TOWERS	 0% 0/1,100 EMPLOYEES	 0% 0/326 MILES	 NOT SUBMITTED	 NOT ACQUIRED
NMRX NEW MEXICO RAIL RUNNER EXPRESS	 0% 0/18 LOCOMOTIVES	 0% 0/7 TRACK SEGMENTS	 0% 0/22 TOWERS	 0% 0/88 EMPLOYEES	 0% 0/96 MILES	 NOT SUBMITTED	 NOT ACQUIRED
NS NORFOLK SOUTHERN	 29% 848/2,900 LOCOMOTIVES	 9% 12/132 TRACK SEGMENTS	 63% 2,307/3,670 TOWERS	 26% 5,587/21,446 EMPLOYEES	 0% 0/8,028 MILES	 NOT SUBMITTED	 AVAILABLE

	LOCOMOTIVES EQUIPPED	TRACK SEGMENTS COMPLETED	RADIO TOWERS INSTALLED	TRAINING COMPLETED	ROUTE MILES IN PTC OPERATION	PTC SAFETY PLAN	SPECTRUM
SDNX NORTH COUNTY TRANSIT DISTRICT	 100% 17/17 LOCOMOTIVES	 100% 1/1 TRACK SEGMENTS	 100% 19/19 TOWERS	 95% 83/87 EMPLOYEES	 0% 0/58 MILES	 NOT SUBMITTED	 AVAILABLE
NIRC METRA	 0% 0/531 LOCOMOTIVES	 0% 0/9 TRACK SEGMENTS	 16% 36/221 TOWERS	 0% 0/1,801 EMPLOYEES	 0% 0/218 MILES	 NOT SUBMITTED	 AVAILABLE
NICD N. INDIANA COMMUTER TRANSPORTATION DISTRICT	 0% 0/73 LOCOMOTIVES	 0% 0/1 TRACK SEGMENTS	 N/A TOWERS	 0% 0/259 EMPLOYEES	 0% 0/72 MILES	 NOT SUBMITTED	 N/A PTC-220
PCJX PENINSULA CORRIDOR JOINT POWERS BOARD	 100% 67/67 LOCOMOTIVES	 100% 3/3 TRACK SEGMENTS	 100% 14/14 TOWERS	 44% 87/199 EMPLOYEES	 0% 0/52 MILES	 NOT SUBMITTED	 AVAILABLE
PATH PORT AUTHORITY TRANS-HUDSON	 86% 198/230 LOCOMOTIVES	 0% 0/7 TRACK SEGMENTS	 N/A TOWERS	 89% 818/921 EMPLOYEES	 0% 0/43 MILES	 SUBMITTED	 N/A CBTC
PNWR PORTLAND AND WESTERN	 91% 30/33 LOCOMOTIVES	 100% 9/9 TRACK SEGMENTS	 N/A TOWERS	 55% 18/33 EMPLOYEES	 N/A MILES	 NOT SUBMITTED	 N/A E-ATC
RTDC REGIONAL TRANSPORTATION DISTRICT	 93% 50/54 LOCOMOTIVES	 100% 3/3 TRACK SEGMENTS	 100% 50/50 TOWERS	 91% 106/116 EMPLOYEES	 65% 23/36 MILES	 NOT SUBMITTED	 AQUIRED
SCR SOUNDER COMMUTER RAIL	 100% 32/32 LOCOMOTIVES	 100% 1/1 TRACK SEGMENTS	 100% 5/5 TOWERS	 50% 2/4 EMPLOYEES	 0% 0/10 MILES	 NOT SUBMITTED	 AVAILABLE
SFRV SOUTH FLORIDA REGIONAL TRANSIT AUTHORITY	 0% 0/47 LOCOMOTIVES	 0% 0/1 TRACK SEGMENTS	 0% 0/7 TOWERS	 0% 0/184 EMPLOYEES	 0% 0/73 MILES	 NOT SUBMITTED	 NOT ACQUIRED

	LOCOMOTIVES EQUIPPED	TRACK SEGMENTS COMPLETED	RADIO TOWERS INSTALLED	TRAINING COMPLETED	ROUTE MILES IN PTC OPERATION	PTC SAFETY PLAN 	SPECTRUM 
SEPA SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY	 100% 288/288 LOCOMOTIVES	 100% 12/12 TRACK SEGMENTS	 100% 36/36 TOWERS	 100% 1,192/1,192 EMPLOYEES	 34% 41/120 MILES	 PROVISIONALLY CERTIFIED	 AVAILABLE
SCAX SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY	 100% 112/112 LOCOMOTIVES	 80% 8/10 TRACK SEGMENTS	 100% 198/196 TOWERS	 100% 350/330 EMPLOYEES	 99% 246/249 MILES	 PROVISIONALLY CERTIFIED	 AVAILABLE
TRRA TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS	 0% 0/17 LOCOMOTIVES	 0% 0/4 TRACK SEGMENTS	 0% 0/21 TOWERS	 0% 0/230 EMPLOYEES	 N/A MILES	 NOT SUBMITTED	 NOT ACQUIRED
TMEV TRI-MET (See PNWR)	 100% 6/6 LOCOMOTIVES	 N/A TRACK SEGMENTS	 N/A TOWERS	 N/A EMPLOYEES	 N/A MILES	 N/A	 E-ATC
TRE TRINITY RAILWAY EXPRESS	 0% 0/17 LOCOMOTIVES	 0% 0/3 TRACK SEGMENTS	 0% 0/3 TOWERS	 0% 0/80 EMPLOYEES	 0% 0/32 MILES	 NOT SUBMITTED	 NOT ACQUIRED
UP UNION PACIFIC	 0% 13/5,656 LOCOMOTIVES	 7% 16/231 TRACK SEGMENTS	 69% 637/925 TOWERS	 10% 3,942/40,269 EMPLOYEES	 0% 0/20,858 MILES	 SUBMITTED	 AVAILABLE
UFRC UTAH TRANSIT AUTHORITY	 0% 0/40 LOCOMOTIVES	 0% 0/2 TRACK SEGMENTS	 N/A TOWERS	 0% 0/200 EMPLOYEES	 0% 0/88 MILES	 NOT SUBMITTED	 E-ATC
VREX VIRGINIA RAILWAY EXPRESS	 80% 33/41 LOCOMOTIVES	 N/A TRACK SEGMENTS	 N/A TOWERS	 0% 0/108 EMPLOYEES	 N/A MILES	 NOT SUBMITTED	 PTC-220