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POSITIVE TRAIN CONTROL SYSTEMS

Regulatory Impact Analysis

Federal Railroad Administration
Office of Safety Analysis
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Contents

Executive Summary	1
1. Introduction.....	5
2. Background.....	5
2.1 Regulatory history	5
2.2 Litigation and Congressional Hearings	7
2.3 Public Hearing, Comments, and FRA Response.....	9
2.3.2 Common Carrier Obligations.....	14
2.3.3 Passenger Rail Impact.....	17
2.3.4 Cost-Benefit Analysis	18
3. Section-by-Section Analysis	27
3.1 Amendments to Title 49 Code of Federal Regulations Part 236.....	27
Section 236.1003 Definitions.....	27
Section 236.1005 Requirements for PTC systems.....	27
Section 236.1020 Exclusion of track segments for implementation due to cessation of PIH materials service or rerouting.....	28
3.3 Benefits of the final rule (relevant costs of the final PTC rule)	29
3.4 Locomotive cost savings (benefit of the final rule).....	33
3.5 Maintenance cost savings (benefit of the final rule)	34
3.6 Timing of savings.....	34
3.7 Rail-to-rail at-grade crossings	35
3.8 Total initial cost saving benefits	35
4. Costs – Diminished Benefit of Accident Reduction	44
5. Relationship Between Benefits and Costs	51

Executive Summary

In an accompanying final rule, the Federal Railroad Administration (FRA) amends regulations implementing a requirement of the Rail Safety Improvement Act of 2008 (RSIA) that railroads must install Positive Train Control (PTC) systems along certain lines that carry passengers and any quantity of poison-by-inhalation hazardous (PIH) materials. FRA is removing various regulatory requirements that require railroads to meet two tests in order to avoid PTC system implementation on track segments that were used to transport PIH materials traffic in 2008 and carried 5 million or more gross tons of traffic but that, as of December 31, 2015, do not transport PIH materials traffic and are not used for intercity or commuter rail passenger transportation that otherwise require PTC installation under the rules. As a result, substantial cost savings will accrue largely from not installing PTC system wayside components or implementing mitigation measures along approximately 10,000 miles of track. Although these rail lines will forego some risk reduction measures, the reductions in risk will likely be small since these lines pose a much lower risk of accidents because they generally do not carry passenger trains or PIH materials and generally have lower exposure, because of lower traffic volumes, than an average of all segments subject to the PTC requirement. The following analysis shows that if the assumptions are correct, the savings of the action far outweigh the cost.

The largest part of the cost savings benefit comes from reducing the extent of wayside that must be equipped with PTC systems. Some of these lines would have qualified for exemption by passing the two tests contained in the 2010 PTC final rule, while others may not have. In addition, benefits will come from reducing the number of locomotives belonging to Class II and Class III (small) railroads that must be equipped with PTC systems because they run on Class I railroads' track that will no longer need to be equipped with PTC systems. Although these benefits will be small relative to the wayside equipment savings, they will be large relative to the size of the railroads being impacted. Finally, Class III railroads will avoid operational costs associated with having to reduce operating speeds to cross over two rail-to-rail at-grade crossings at an annual cost of \$43,800. These benefits to small railroads are a subset of the total benefits of reduced wayside costs described above. For purposes of assessing the sensitivity of the findings, FRA also analyzed the impacts of scenarios in which the mileage no longer requiring PTC systems is 7,000 miles (low case) and 14,000 miles (high case). The tables below present the total estimated cost avoided benefits of the final rule as well as the breakdown by element.

Table E-1. Summary of Costs Avoided (Rule Benefits) Over 20 Years

Total of all Benefits				
	Total Discounted Benefits		Annualized Discounted Benefits	
Discount Factor	7%	3%	7%	3%
Expected Case	\$619,969,287	\$818,031,752	\$58,520,715	\$54,984,583
High Case	\$831,239,473	\$1,096,796,723	\$78,463,126	\$73,721,968
Low Case	\$461,516,648	\$608,958,024	\$43,563,907	\$40,931,544

Table E-2. Costs Avoided (Rule Benefits) By Category Over 20 Years

Reduced Mitigation Costs, Including Maintenance				
	Total Discounted Benefits		Annualized Discounted Benefits	
Discount Factor	7%	3%	7%	3%
Expected Case	\$91,793,822	\$121,119,324	\$8,664,687	\$8,141,121
High Case	\$121,704,169	\$160,585,172	\$11,488,013	\$10,793,846
Low Case	\$72,197,388	\$95,262,390	\$6,814,923	\$6,403,129
Reduced Wayside Costs, Including Maintenance				
	Total Discounted Benefits		Annualized Discounted Benefits	
Discount Factor	7%	3%	7%	3%
Expected Case	\$515,695,631	\$680,445,643	\$48,678,019	\$45,736,635
High Case	\$721,973,883	\$952,623,900	\$68,149,227	\$64,031,290
Low Case	\$360,986,942	\$476,311,950	\$34,074,614	\$32,015,645
Reduced Locomotive Costs, Including Maintenance				
	Total Discounted Benefits		Annualized Discounted Benefits	
Discount Factor	7%	3%	7%	3%
Expected Case	\$12,479,834	\$16,466,785	\$1,178,008	\$1,106,827
High Case	\$17,471,768	\$23,053,498	\$1,649,211	\$1,549,557
Low Case	\$8,735,884	\$11,526,749	\$824,606	\$774,779

Total costs may also be broken down into initial investment and maintenance. FRA estimates avoiding installation on 10,000 miles will let railroads avoid \$300.5 million in initial installation costs (not discounted). Maintenance cost savings will be as follows:

Table E-3 Maintenance Costs Avoided (Rule Benefit) Over 20 Years

Reduced Total Maintenance Costs				
	Total Discounted Costs		Annualized Discounted Costs	
Discount Factor	7%	3%	7%	3%
Expected Case	\$366,044,119	\$538,860,239	\$34,551,975	\$36,219,872
High Case	\$490,782,893	\$722,490,469	\$46,326,433	\$48,562,708
Low Case	\$272,490,038	\$401,137,566	\$25,721,132	\$26,962,745

Regulatory costs will come from reducing the potential for accident reduction. A substantial part of the accident cost reduction that FRA expected from PTC systems under the prior final rule comes from reducing high-consequence accidents involving passenger trains or the release of PIH materials. FRA believes that the lines impacted by this final rule pose significantly less risk because they generally do not carry passenger trains or PIH materials and generally have lower accident exposure because they have relatively lower traffic volumes than an average of all segments subject to the PTC requirement. The following tables present the total costs of the final rule as well as the breakdown of the costs by element.

Table E-4. Summary of Costs of the Final Rule (Reduced Risk Reduction)

Costs of the proposed rule by category (20-year, 7% discount)			
Foregone Reductions in:	Expected Case	High Case	Low Case
Fatality Prevention	\$11,453,106	\$16,034,349	\$8,017,174
Injury Prevention	\$4,254,484	\$5,956,278	\$2,978,139
Train Delay	\$117,793	\$164,911	\$82,455
Property Damage	\$10,163,835	\$14,229,369	\$7,114,685
Equipment Cleanup	\$143,273	\$200,583	\$100,291
Environmental Cleanup	\$430,995	\$603,393	\$301,696
Evacuations	\$138,780	\$194,292	\$97,146
Total	\$26,702,267	\$37,383,174	\$18,691,587
Costs of the final rule by category (20-year, 3% discount)			
Foregone Reductions in:	Expected Case	High Case	Low Case
Fatality Prevention	\$16,860,327	\$23,604,458	\$11,802,229
Injury Prevention	\$6,263,104	\$8,768,346	\$4,384,173
Train Delay	\$173,406	\$242,768	\$121,384
Property Damage	\$14,962,367	\$20,947,314	\$10,473,657
Equipment Cleanup	\$210,915	\$295,282	\$147,641
Environmental Cleanup	\$634,475	\$888,265	\$444,133
Evacuations	\$204,301	\$286,021	\$143,011
Total	\$39,308,896	\$55,032,454	\$27,516,227
Annualized Costs of the final rule by category (20-year, 7% discount)			
Foregone Reductions in:	Expected Case	High Case	Low Case
Fatality Prevention	\$1,081,092	\$1,513,529	\$756,765
Injury Prevention	\$401,593	\$562,231	\$281,115
Train Delay	\$11,119	\$15,566	\$7,783
Property Damage	\$959,394	\$1,343,152	\$671,576
Equipment Cleanup	\$13,524	\$18,934	\$9,467
Environmental Cleanup	\$40,683	\$56,956	\$28,478
Evacuations	\$13,100	\$18,340	\$9,170
Total	\$2,520,505	\$3,528,707	\$1,764,354

Table E-4. (continued)			
Annualized Costs of the final rule by category (20-year, 3% discount)			
Foregone Reductions in:	Expected Case	High Case	Low Case
Fatality Reduction	\$1,133,279	\$1,586,590	\$793,295
Injury Reduction	\$420,979	\$589,371	\$294,685
Train Delay	\$11,656	\$16,318	\$8,159
Property Damage	\$1,005,706	\$1,407,989	\$703,994
Equipment Cleanup	\$14,177	\$19,848	\$9,924
Environmental Cleanup	\$42,647	\$59,705	\$29,853
Evacuations	\$13,732	\$19,225	\$9,613
Total	\$2,642,175	\$3,699,045	\$1,849,523

In addition, some distributional impacts may result from elimination of the two tests, which may result in certain lines required to be equipped with PTC solely because they carry passenger traffic.

The net annualized benefits (annualized benefits minus annualized costs) under the expected case are \$56 million, discounted at 7 percent per year, and \$52 million, discounted at 3 percent per year, with 20-year discounted net benefits of \$590 million over 20 years, discounted at 7 percent per year; and \$780 million over 20 years, discounted at 3 percent per year. The timing of benefits and costs are such that a large benefit in terms of capital investment is avoided in early years, while the benefit of avoided maintenance and the disbenefit (costs) of accidents not avoided will be realized annually in later years. All other scenarios analyzed for sensitivity purposes assuming different levels of lines benefiting from regulatory relief also show net benefits.

Table E-5. Net Societal Benefits of the Rule (20 years)

	Total Discounted Net Benefits		Annualized Net Benefits	
	7%	3%	7%	3%
Expected Case	\$593,267,020	\$778,722,856	\$56,000,210	\$52,342,408
High Case	\$793,856,299	\$1,041,764,269	\$74,934,419	\$70,022,922
Low Case	\$442,825,061	\$581,441,797	\$41,799,553	\$39,082,022

Further, the benefit/cost ratios under various scenarios range between 20:1 and 25:1.

Table E-6. Benefit/Cost Ratio of the Rule (20 years)

Discount Factor	7%	3%
Expected Case	23.22	20.81
High Case	22.24	19.93
Low Case	24.69	22.13

1. Introduction

In an accompanying final rule, FRA amends regulations implementing a requirement of the RSIA that certain passenger and freight railroads install PTC systems. The amendments remove certain regulatory requirements that may require railroads to install PTC systems on track segments that carried PIH materials traffic in 2008 but will no longer carry PIH materials traffic on December 31, 2015.

2. Background

2.1 Regulatory history

As a consequence of the severity of certain very public accidents, coupled with a series of other less publicized accidents, Congress passed the RSIA, mandating implementation of PTC systems by December 31, 2015. Under the RSIA, such PTC system implementation must be done by each Class I railroad carrier and each entity providing regularly scheduled intercity or commuter rail passenger transportation on:

- (A) its main line over which intercity rail passenger transportation or commuter rail passenger transportation, as defined in section 24102, is regularly provided;
- (B) its main line over which poison- or toxic-by-inhalation hazardous materials, as defined in parts 171.8, 173.115, and 173.132 of title 49, Code of Federal Regulations, are transported; and
- (C) such other tracks as the Secretary may prescribe by regulation or order.

49 U.S.C. § 20157(a)(1)

Poison-by-inhalation (PIH) and toxic-by-inhalation (TIH) materials refers to the same hazardous materials and will hereafter be referred to as PIH materials.

The statute further defined “main line” to mean:

- ...a segment or route of railroad tracks over which 5,000,000 or more gross tons of railroad traffic is transported annually, except that—
- (A) the Secretary may, through regulations under subsection (g), designate additional tracks as main line as appropriate for this section; and
- (B) for intercity rail passenger transportation or commuter rail passenger transportation routes or segments over which limited or no freight railroad operations occur, the Secretary shall define the term “main line” by regulation.

49 U.S.C. § 20157(i)(2)

To effectuate this goal, the RSIA required the railroads to submit for FRA approval a PTC Implementation Plan (PTCIP) within 18 months (i.e., by April 16, 2010).

The Secretary has delegated his authority under § 20157 to the FRA Administrator. See 49 CFR § 1.49(o). Consistent with the mandate of § 20157, FRA published a final rule with request for further comments on January 15, 2010, which established new regulations codified primarily in subpart I to title 49 Code of Federal Regulations (CFR) part 236 (the “PTC rule”). Subsequently, FRA received a number of petitions for reconsideration to the final rule and a number of comments responding to the request for further comments. In a letter dated July 8, 2010, FRA denied all of the petitions for reconsideration. On September 27, 2010, FRA issued a new final rule with clarifying amendments to the PTC rule.

Under the current regulations, each PTCIP must include the sequence and schedule in which track segments required to be equipped with a PTC system will be so equipped and the basis for those decisions. See 49 CFR section 236.1011. This list of track segments must include all track segments that fit the statutory criteria for calendar year 2008. See §§ 236.1005(b)(1) and (b)(2).

While the statutory PTC system implementation deadline is December 31, 2015, FRA recognized a need for a starting point in time to determine when such implementation must occur. The final rule indicates that such a starting baseline should be based on the facts and data known in 2008 (the “2008 baseline”). Using 2009 data would have been difficult given the proximity to the PTCIP submission deadline and the notably atypical traffic levels caused by the down turn in the economy.

Although each railroad’s initial PTCIP includes a future PTC system implementation route map reflecting 2008 data, FRA recognized that PIH materials traffic levels and routings could change in the period between the end of 2008 and the start of 2016. Accordingly, in the event of changed circumstances, the PTC rule provides railroads with the option to file a request for amendment (RFA) of its PTCIP to not equip a track segment that the railroad was initially, but may no longer be, required to implement a PTC system. If a particular track segment included in a PTCIP no longer carries PIH materials traffic, and its PTC system implementation is scheduled, but not yet effectuated, then the host railroad might avoid actual PTC system implementation by filing a supported RFA for FRA approval. Each such RFA must be supported with the data defined under §§ 236.1005(b)(2) and (b)(4)(i), and, under the rules existing prior to this final rule but no longer required, satisfy the two qualifying tests that were promulgated under FRA’s statutory authority to require PTC system installation on lines in addition to those required to be equipped by the RSIA. If a track segment would have failed either of these tests, FRA would have denied the request, thus requiring PTC system implementation on the line segment.

The first test, proverbially known as the “alternative route analysis,” was initially codified at § 236.1005(b)(4)(i)(A), and subsequently moved to a new section, § 236.1020. Under this test, the railroad must establish that current or prospective rerouting to one or more alternative track segments is justified. If a railroad reroutes all PIH materials off of a track segment requiring PTC system implementation under the 2008 baseline, and onto a new line, PTC system implementation on the initial line may not be required if the new line would have substantially the same overall safety and security risk as the initial line, assuming PTC system implementation on both lines. If the initial track segment is determined to pose less overall safety and security risks under this analysis, then a PTC system must still be installed. PTC system implementation may also be required on the new line if it meets the 5 million or more gross ton threshold of

annual traffic and does not qualify under the *de minimis* PIH risk exception of the rule.

The second test that the railroad would have had to satisfy in order to avoid having to install a PTC system on a track segment requiring implementation under the 2008 baseline was the so-called “residual risk test.” Under this test, the railroad must show that the remaining risk on the 2008 line—pertaining to events that can be prevented or mitigated in severity by a PTC system—is less than the national average equivalent risk per route mile on track segments required to be equipped with PTC systems due to statutory reasons other than passenger traffic presence. When FRA issued its PTC rule amendments on September 27, 2010, FRA indicated that it was delaying the effective date of § 236.1005(b)(4)(i)(A)(2)(iii), as revised under § 236.1020, pending the completion of a separate rulemaking to determine how residual risk is to be determined. While FRA has made steps to determine a suitable methodology to determine such residual risk, no rulemaking proceeding on this test has yet occurred.

2.2 Litigation and Congressional Hearings

After FRA issued its PTC final rule on January 15, 2010, and denied reconsideration on July 8, 2010, AAR filed a petition for review of the rule with the U.S. Court of Appeals for the District of Columbia Circuit. Once FRA issued its PTC final rule amendments, AAR filed another petition for review of those amendments on October 5, 2010. The court consolidated those two petitions on October 22, 2010 (collectively, “Petition for Review”). In its brief, AAR challenged FRA’s determination to use 2008 as the baseline year, arguing that it rests on a fundamental legal error and was arbitrary and capricious.

FRA and AAR entered into the Settlement Agreement on March 2, 2011. The terms and conditions of the Settlement Agreement included the joint filing of a motion to hold the Petition for Review in abeyance pending the completion of this rulemaking. That motion was filed on March 2, 2011, and was granted by the court on March 3, 2011. The Settlement Agreement provides that FRA will issue two NPRMs. The first NPRM, published in the Federal Register on August 24, 2011, and culminating with this final rule, addresses the elimination of the two qualifying tests. The Settlement Agreement provides that upon the completion of this rulemaking proceeding, the parties will determine whether to file a joint motion to dismiss the lawsuit in its entirety. As previously noted, the Settlement Agreement also provides that FRA will issue a separate NPRM that will address other possible changes to the PTC rule; that NPRM is under development.

On March 17, 2011, FRA and AAR testified before the Subcommittee on Railroads, Pipelines, and Hazardous Materials, Committee on Transportation and Infrastructure, U.S. House of Representatives. In addition to reporting on the Settlement Agreement, FRA’s testimony discussed PTC system implementation planning and progress made thus far and highlighted the various ways that FRA has assisted the industry in meeting the statutory and regulatory goals. In particular, FRA has supported PTC system implementation by developing and approving certain implementation exceptions, providing technical assistance, and granting financial assistance. During its congressional testimony, made jointly with Norfolk Southern Railway (NS), AAR asserted that, “If unchanged, the 2008 base-year provision means railroads would have to spend more than \$500 million in the next few years to deploy PTC systems on more than 10,000 miles

of rail lines on which neither passenger nor TIH materials will be moving in 2015.”¹ FRA continues to understand AAR to assume that these 10,000 miles would still require PTC system implementation because they would not be able to pass the alternative route analysis and residual risk analysis tests. However, upon its own analysis, FRA assumes that 50 percent of the 10,000 miles would be able to pass both tests with the implementation of mitigation measures. In the NPRM to this proceeding, FRA sought comment on this assumption.

Under the regulatory impact analysis (RIA) that accompanied the original PTC final rule, FRA estimated that the railroads would need to implement PTC systems on approximately 70,000 miles of track. FRA estimated that PTC system implementation could be avoided on 3,204 miles of those 70,000 miles of track because PIH materials traffic will have ceased by 2015 and the subject track segments would pass the alternative route analysis and residual risk analysis tests. During the earlier rulemakings, no entity, including AAR or NS, challenged or otherwise commented on these conclusions.

FRA also estimated that PTC system implementation could be avoided on 304 miles of track because gross tonnage will fall below 5 million gross tons per year, or passenger service would end so that neither of the two tests above would apply. Between the two categories, FRA estimated that railroads could exclude more than 3,500 miles. Assuming that the 3,500 miles represents about 50% of those tracks where PIH materials traffic will have ceased, FRA was implicitly estimating that there would be about 7,000 miles of track where PIH materials traffic will have ceased. The AAR and its members appear to have been more effective in the future reduction of PIH materials traffic than FRA had initially estimated based on AAR’s congressional testimony and subsequent submissions to FRA. In its RIA associated with the NPRM in this proceeding, FRA estimated that PIH materials traffic would cease on 10,000 miles of track on which the installation of PTC systems would have been required had the traffic not ceased. FRA considered cases where 7,000 miles, 10,000 miles and, for sensitivity, 14,000 miles of track might be excluded from PTC requirements because of changes in PIH materials traffic. As FRA was completing its analysis of the proposal, AAR submitted data that indicated its member railroads believe that they can cease PIH materials traffic on 11,128 miles of track prior to December 31, 2015, of which 9,566 miles have no passenger traffic. In analyzing the final rule, FRA continues to use the cases where 7,000 miles, 10,000 miles, and 14,000 miles of track might be excluded from PTC implementation requirements due to PIH traffic changes, because those values encompass the ranges submitted by AAR. Some of the passenger traffic miles identified by AAR may later qualify for a separate exclusion from the requirement to install a PTC system. For more discussion of those miles from which PIH traffic is removed, but on which passenger traffic remains, see FRA’s Regulatory Impact Assessment, in this rulemaking docket.

¹ Hearing Before the Subcommittee on Railroads, Pipelines, and Hazardous Materials of the Transportation and Infrastructure Committee, U.S. House of Representatives, 112th Cong. (2011) (Joint statement of Edward R. Hamberger, President and Chief Executive Officer of the AAR, and Mark D. Manion, Executive Vice President and Chief Operating Officer of the Norfolk Southern Railway, on behalf of the AAR’s member railroads) [hereinafter AAR CONGRESSIONAL TESTIMONY].

2.3 Public Hearing, Comments, and FRA Response

After publication of the NPRM to this proceeding on August 24, 2011, which initially provided a 60-day comment period to end on October 24, 2011, the Chlorine Institute (CI) filed on September 29, 2011, a request for a hearing “to allow for a complete discussion and understanding of the many issues and concerns that would result from adoption of the Proposed Rule that would have the effect of reducing the rail routes available to shippers and receivers of chlorine and the other Toxic-by-Inhalation products that are so necessary to the health, safety and economy of the Nation.” On October 14, 2011, FRA published in the Federal Register a notice of public hearing and extension of the comment period to November 25, 2011. See 76 FR 63,899 (October 14, 2011).

In accordance with that notice, FRA held a hearing on November 10, 2011, in Washington, DC. Those who testified included Frank Chirumbole, President of Olin Chlor Alkali Products, Olin Corporation (Olin); Frank Reiner, President, CI; Thomas Schick, American Chemistry Council (ACC); Dr. Howard Kaplan, US Magnesium, LLC (US Magnesium); and Michael J. Rush, AAR.

By November 25, 2011, FRA received comments from AAR; ACC, CI, and The Fertilizer Institute (TFI) (collectively, the “Trade Associations”); the National Railroad Passenger Corporation (Amtrak); the Brotherhood of Maintenance of Way Employees Division (BMWED/IBT) and Brotherhood of Railroad Signalmen (BRS) (collectively, the “Labor Organizations”); E. I. du Pont de Nemours and Company (DuPont); and PPG Industries, Inc. (PPG).

The Trade Associations’ testimony and comments relied primarily on reports developed by L.E. Peabody & Associates, Inc. (Peabody), a firm specializing in solving economic, financial, marketing, and transportation problems. Peabody developed its reports (Peabody Reports) on behalf of CI, which also invited Peabody to testify at the hearing regarding its own evaluation of the costs and benefits associated with PTC system implementation, and on the proposed rule’s potential economic harm to the PIH shippers.

At the hearing, ACC supported FRA’s effort to minimize unnecessary regulatory burdens and recognized that certain operational factors may affect some rail lines by no longer requiring PTC system installation. ACC asserted that these implementation changes must not prevent chemical manufacturers from shipping their products.

CI—a 200-member trade association comprising primarily producers, repackagers, and users of chlorine, and suppliers to the chlor-alkali industry—testified at the hearing that, “Since many of the most significant rail accidents have been the result of operational errors,” it has long advocated the adoption of new technologies, including PTC, to improve rail operational safety. According to CI’s testimony, “While the statute only requires positive train control on TIH and passenger mainlines, all traffic on the equipped lines will derive the benefits of safer operation and improved operational efficiency.” In their jointly filed comments, the Trade Associations representing shippers and receivers of PIH materials strongly support FRA’s efforts to enhance rail safety, including the deployment of new technologies like PTC.

The remainder of this section will discuss the various commenter's concerns with FRA's proposal.

2.3.1 Routing Concerns and Shipper Participation

The Labor Organizations asserted that by removing the two qualifying tests from the PTC rule, railroads may consequently be allowed to avoid PTC system implementation, hampering FRA's ability to identify routes that could be of higher risk. If the alternative route analysis test is eliminated, the Labor Organizations believed that PIH materials traffic may be rerouted to Class II railroad lines, which the Labor Organizations asserted have poorer track conditions, older rolling stock, and a less robust or no signal system, thus increasing the total public risk. The Labor Organizations believed that FRA should establish a mechanism to assess the risks related to the rerouting of PIH materials traffic onto lines that will not require PTC systems implementation, and that such rerouting should be subject to FRA approval.

The routes railroads use to provide PIH materials transportation is governed by the routing regulations of the Pipeline and Hazardous Materials Safety Administration (PHMSA) at 49 C.F.R. § 172.820. Under the PHMSA regulations, a railroad carrier is required to: compile annual data on shipments of PIH materials and other security sensitive materials; use the data to analyze safety and security risks along rail routes used by the carrier to transport those materials and practicable alternative routes over which the carrier has authority to operate; seek information from state, local and tribal officials regarding security risks to high-consequence targets along or in proximity to the routes; consider mitigation measures to reduce safety and security risk; and select and use the practicable routes that pose the least overall safety and security risk. FRA enforces PHMSA's regulation (49 CFR part 209, subpart F). The routing of PIH materials is also impacted by the security regulations of the Transportation Security Administration at 49 CFR part 1580, which requires chain of custody requirements to ensure a positive and secure exchange of PIH materials transported by rail.

FRA does not agree with the Labor Organizations' contention that PIH materials traffic will be rerouted to Class II railroads. FRA is not aware of Class I railroads attempting such rerouting; rather, consistent with the PHMSA regulations, the removal of PIH materials from certain routes is the result of Class I railroads rerouting the traffic to other lines that they operate because those other lines pose the least overall safety and security risk for the movement of this traffic. In its filed comments, the Labor Organizations also requested clarification of some of FRA's statements. For instance, in the NPRM, FRA stated, "AAR submitted data that indicates its member railroads believe that they can cease PIH materials traffic on 11,128 miles of track of which 9,566 miles have no passenger traffic. Some of the passenger traffic miles may later qualify for exclusion from the system on which PTC is required." 76 FR 52,922 (Aug. 24, 2011). The Labor Organizations assumed, but were not completely confident, that the reference to "exclusion from the system" related to the possibility that some of the passenger train operations over the remaining 1,562 miles of track might be eligible for a *de minimis* exception. The Labor Organizations requested that FRA clarify whether passenger train operations exceeding the *de minimis* exclusion would require PTC system installation regardless of the absence of PIH material on the line.

With respect to the Labor Organizations' request for clarification, the existing PTC rule provides for exceptions to the requirement to install PTC systems for certain passenger train operations, as provided for in 49 CFR § 236.1019. In the NPRM, FRA explained that AAR member railroads believed they can cease PIH materials traffic on 11,128 miles of track, over which 9,566 miles have no passenger traffic. The statement highlighted by the Labor Organizations meant only that, of the remaining 1,562 miles of track that would now only require PTC systems as a result of passenger traffic, some of those miles of track would qualify for one of the passenger-specific exceptions and therefore be excluded from the PTC requirement entirely. The *de minimis* exception would not apply here, since there is passenger traffic on the line.

CI expressed concerns with the lack of shipper participation in PTC system implementation and proposed that a system such as the STB line abandonment process be implemented if a line is to be proposed to be dropped from the coverage plan. The Trade Associations echoed this in their comments, indicating that they would like shippers to be part of the process in determining where PTC systems should be implemented. They noted that there are no express provisions allowing PIH materials shippers or receivers to file PTCIP requests for amendments or requiring notification that a railroad seeks to add or remove lines from its PTCIP. Without shipper input, the Trade Associations believed the final rule would result in PIH materials transport restrictions or infeasibility. The Trade Associations suggested that FRA establish a process that would provide PIH materials shippers and consignees an opportunity to petition the agency to require additional PTC lines to accommodate new or expanded PIH materials-related business ventures.

RSIA requires that only certain railroads submit a PTCIP. Since each railroad is legally responsible for implementing PTC systems on its own lines, FRA believes this makes sense. While FRA also requires a joint PTCIP filing where a tenant railroad would have been required to install a PTC system if the host railroad had not otherwise been required to do so, this exception exists primarily to ensure PTC system interoperability. Otherwise, FRA has not provided opportunities for parties other than the host railroad to file a PTCIP. For the same reason, FRA will not provide opportunities for third parties to file requests for amendments. To do so would create confusion and potentially impose additional burdens on the railroad. In any event, third parties do have an opportunity to express their views on the plans submitted pursuant to the PTC rule. 49 CFR § 236.1011(e) continues to provide that, upon receipt of a PTCIP, NPI, PTCDP, or PTCSP, FRA will post on its public website a notice of receipt and reference to the public docket in which a copy of the filing has been placed. By extension, FRA also considers this paragraph applicable to any RFA that seeks to modify either of those plans and has endeavored to ensure that all plans and their RFAs are placed in their respective public dockets. FRA will consider any public comment on these documents to the extent practicable within the time allowed by law and without delaying PTC system implementation.

PPG—an international diversified chemical manufacturer that receives chlorine by rail in the United States—expressed concern over the lack of transparency regarding the rail lines that would be implicated by the proposed rule, denying it the opportunity to effectively evaluate the impact of the proposal on its existing and future business plans. Moreover, PPG stated, the existing PTC rule does not provide any audit or review process by which FRA may verify a railroad's traffic assertions or any appeals process by which a shipper can contest a railroad's

decision to not install a PTC system on a particular rail line. PPG also stated that if a PTC system is not installed on a particular line before 2016, then a railroad could attempt to condition any future service for PIH commodities at very high rates, stifling the shipper's business and impeding the national economy.

The Trade Associations are also concerned with the availability of routes. According to CI, the lack of shipper participation could either restrict chlorine transportation by rail or render it unfeasible between some origins and destinations, ultimately restricting chlorine commerce and availability.

If FRA were to eliminate the two qualifying tests, Peabody believed that FRA was allowing the railroads to determine which track segments will be equipped with PTC without regulatory oversight regarding the determination of the level of safety and security on the subject segment. Peabody also expressed concerns that FRA, when making the proposal, considered the impact on the railroads, but not the shippers or the public.

The Trade Associations believed that elimination of the two qualifying tests would produce an opportunity for the railroads to unilaterally, arbitrarily, and without regulatory oversight, determine where PTC systems must be installed and reduce the transportation of PIH materials by rail. According to the Trade Associations, "[t]he opportunity cannot be examined in a vacuum but must be evaluated through the prism of the railroads' other actions to greatly reduce the common carrier obligation." Although FRA will continue to approve any requests to modify a railroad's PTCIP, the Trade Associations perceived that such approval would be automatic and based solely on the railroad's own traffic projections and without consideration of the shippers' PIH market projections.

Dupont, a member of CI and ACC, provided additional comments. DuPont was concerned that, by removing the two qualifying tests, rail carriers would be granted the unlimited right and incentivized to refuse to provide service just by choosing routes without PTC systems despite any STB action. According to DuPont, it has experienced rail carriers moving PIH materials traffic onto inefficient routes and shifting the resulting costs elsewhere. DuPont stated that allowing the railroads to unilaterally deny the most direct route, the railroads would be allowed to violate their fundamental common carrier obligations.

Accordingly, DuPont asserted that FRA should maintain the two qualifying tests, which allow each railroad to amend its PTCIP when certain population and market positions change, and when the railroad is able to meet certain analyses and risk assessments. DuPont also suggested that FRA expand the existing PTC rule by promulgating a self-implementation regulation providing each shipper with the power to direct its rail carrier to transport its goods on lines where PTC systems would otherwise be required and which are not so equipped and providing each railroad the ability to self-certify a risk assessment for each such line.

Olin also provided hearing testimony in favor of not eliminating the two qualifying tests. In particular, Olin was concerned that the proposed amendments will allow railroads to significantly restrict PIH shipments without shipper input or adequate FRA oversight. Olin stated that the elimination of the two qualifying tests would effectively grant rail carriers *carte*

blanche to determine PTC system implementation locations, which could ultimately allow rail carriers to dictate and limit efficient PIH shipments and would potentially result in increased transit times, longer shipping distances, limited customer access, restriction to overall commerce, and additional shipping costs. According to Olin, “Allowing rail carriers to potentially limit the shipment of TIH without the protections of the ‘alternative route analysis test’ and the ‘residual risk test,’ or another appropriate process, would not only pose risks to shippers, it would also likely contradict the federal common carrier obligation which has been a keystone of U.S. rail policy for more than a century” by opening “a back door around the common carrier obligations for rail carriers.” Olin also expressed concern that the overall cost of PTC system implementation would be disproportionately placed on PIH shippers and that there were no provisions to examine shipper impact or address timely action for future PIH required rail lines.

PPG also provided comments directly relating to the purposes of the two qualifying tests. According to PPG, FRA took a crucial and important step in the original PTC rule when it required the use of 2008 as the baseline traffic year to determine which rail lines would require PTC system implementation. PPG stated, “By using a historical year as the baseline, FRA largely eliminated the possibility for railroads to manipulate their traffic statistics in light of the looming PTC requirement.”

By removing the two qualifying tests, PPG was concerned that this possibility remains. More specifically, without the two qualifying tests, PPG feared that railroads could dissuade PIH shipments by providing substandard service or by charging excessive transportation rates. Questions relating to the quality of service provided PIH shippers and rates charged by railroad carriers for the movement of PIH materials are outside the scope of FRA’s authority and properly lie with the STB.

Each of the arguments made by the Trade Associations and the other railroad shippers rested on the premise that, by rerouting PIH materials traffic to avoid the installation of PTC systems, railroad carriers would somehow be able to “lock in” certain routes as the only routes available to carry PIH materials after the 2015 deadline. Ultimately, however, this premise is incorrect. FRA does not view the PTC mandate as limiting the common carrier obligation of railroad carriers as enforced by STB, and consequently does not view a smaller map of PTC-equipped line segments as restricting the availability of rail transportation for PIH materials in the future. FRA recognizes that equipping fewer line segments with PTC systems before 2016 will increase the probability that a future PIH materials shipment would eventually require access to an unequipped line in order to reach its destination; however, such concerns would exist with any requirement to install a PTC system that does not cover all line segments. The arguments of the Trade Associations and other railroad shippers are over-inclusive, insofar as they lead to the conclusion that FRA should simply require PTC systems to be installed on as many line segments as possible. However, reducing the probability of future controversies over future installation of PTC systems is insufficient justification for potentially using the two qualifying tests as a means to require additional PTC systems implementation prior to the 2015 deadline.

FRA also rejects the premise that railroads will have an uninhibited means of rerouting PIH material traffic without meaningful oversight. As previously discussed, the rail routing of PIH materials is governed by the PHMSA routing rule. In their comments, the Trade Associations

view the rail routing rule as satisfying the needs from a shipper perspective in three ways:

- “1. Routing changes are to be based on 27 different risk-based factors and not solely on any one factor, such as cost, distance or time;
 2. No matter what routing changes are made, existing origin-destination pairs are still accommodated and TIH traffic is not eliminated;
 3. There is nothing in the rule that indicates that future needs for TIH traffic would be limited or avoided.
- Despite potential increases in shipment cost or time, the shippers’ need to transport TIH materials is essentially met.”

AAR generally supports elimination of the two qualifying tests asserting that the two tests would require PTC systems to be installed on an estimated 10,000 miles more than that required by the RSIA, at costs which substantially outweigh the safety benefits. The AAR did, however, suggest that FRA adopt slightly different regulatory language than that proposed in the NPRM; these suggested changes are discussed in the section-by-section analysis. The AAR responded to the shippers’ concerns by noting that the routing of PIH materials is governed by the PHMSA rail routing rule, and that nothing in FRA’s proposed rule changes, prevents, or in any manner affects, the transportation by rail of PIH materials from origin to destination.

FRA agrees with AAR that the rerouting of PIH materials traffic is properly constrained by the PHMSA rail routing rule. FRA also agrees with AAR that PIH materials traffic will continue to move on rail lines that do not have PTC systems consistent with the requirements of 49 CFR § 236.1005(b)(3), and that the elimination of the two qualifying tests does not affect the railroads’ common carrier obligation with respect to the transportation of PIH materials. Finally, removal of the two qualifying tests will not preclude FRA’s ability or discretion under 49 U.S.C. § 20502 to require PTC system implementation on additional lines in the future based on risk or other relevant factors.

2.3.2 Common Carrier Obligations

According to the Trade Associations, although FRA has made it clear in the past that it does not intend for matters within its jurisdiction to trump the railroads’ common carrier obligation, FRA’s determinations affect the location of PTC system implementation and thus, where, when, how, and if PIH materials are to be moved.

Accordingly, the Trade Associations were concerned that the railroads will use PTC system implementation as a means to limit their common carrier obligations with respect to PIH materials. More specifically, at the hearing, CI expressed that, “We’re concerned that FRA’s [PTC] rule will be used to attempt to alter that common carrier obligation, which we fully understand is under the STB jurisdiction.” While the Trade Associations recognized that it is not FRA’s responsibility to enforce the railroads’ common carrier obligation to transport PIH materials, they assert that PTC system implementation must not erode that obligation. The Trade Associations provide examples where FRA has considered the common carrier obligation in the past. For instance, in 2008, the Department testified before the STB, stating:

[R]ailroads have a common carrier obligation to transport hazardous materials and cannot refuse to provide service merely because to do so would be inconvenient or unprofitable. While the railroads have expressed concern over this obligation, particularly with respect to their potential liability exposure arising from train accidents involving the release of poisonous by inhalation hazard or toxic inhalation hazard (referred to as PIH or TIH) materials, DOT believes that there is no reason to change this common carrier obligation.²

The Trade Associations also stated that the Department is on record as saying that railroads would be violating the common carrier obligation if they attempted, through their interchange rules, to prevent the movement of hazardous materials through the application of tank car specifications different from those duly considered and approved by the Department.³

Moreover, the Trade Associations requested that FRA confirm its interpretation of 49 CFR § 236.1005(b)(3)(ii), which states: “If PIH traffic is carried on a track segment as a result of a request for rail service or rerouting warranted under part 172 of this title, and if the line carries in excess of 5 million gross tons of rail traffic as determined under this paragraph, a PTCIP or its amendment is required.” The Trade Associations believed that this language, consistent with the common carrier obligation, implied that a rail carrier may not deny a shipper’s request to transport PIH materials solely on the grounds that a PTC system is not installed on any line segment necessary to complete the requested transportation. The Trade Associations believed that this regulation required the railroad to accept the PIH materials traffic for transportation consistent with its common carrier obligation, amend its PTCIP, and equip the necessary track with a PTC system within 24 months, pursuant to 49 CFR § 236.1005(b)(3)(iii).

PPG also believed that FRA must be mindful of the interplay between the PTC regulations and the railroads’ common carrier obligation, which required the carriers to provide service on reasonable request. PPG expressed similar concerns with the regulatory provision cited by the Trade Associations and complained that seeking STB enforcement could take months, if not longer, to resolve. Accordingly, PPG urged FRA to clarify that this regulatory provision does not permit a railroad to refuse PIH service because a rail line does not have a PTC system installed, and that rail service or PIH commodities may be provided over a non-PTC line pending approval of FRA and the actual construction to add a PTC system to such line.

US Magnesium also testified at the hearing. While extracting magnesium from the Great Salt Lake brines, US Magnesium produces chlorine as a co-product. Since chlorine cannot be vented or stored, US Magnesium must ship or sell it. However, according to US Magnesium, the chlorine market is seasonable and dynamic, with customers and demand levels always changing, requiring the company to change chlorine shipping routes to meet market conditions. US

² Testimony of Clifford Eby, Deputy Federal Railroad Administrator, Common Carrier Obligation of Railroads, STB Ex Parte No. 677 (Sub-No. 1) (July 22, 2008).

³ See 73 Fed. Reg. 17818, 17824-25 (April 1, 2008). FRA does not have the authority to determine what violates a railroad’s common carrier obligation. In the rulemaking cited by the Trade Associations, FRA discussed the test used by STB to determine the reasonableness of interchange requirements in assessing if those requirements violate the common carrier obligation before ultimately concluding that FRA did not view the particular interchange requirement at issue as reasonable.

Magnesium believed that PTC technology would contribute greatly to continuing incident free performance and it claimed that it had been affected by the railroads' interest in limiting or ceasing PIH shipments. While it recognized the STB's resistance to railroad attempts to unilaterally restrict PIH routings, US Magnesium believed that removal of the two qualifying tests would allow elimination of lines from a PTCIP, thus facilitating the railroads' efforts to limit their common carrier obligation. US Magnesium expected the railroads to argue to the STB that they should not be ordered to provide PIH service over routes where they have informed FRA that no PTC system will be installed.

These comments indicated some confusion over the jurisdiction of the various Federal agencies governing the rail transportation of hazardous materials. Specifically, these commenter's suggested that the PTC requirement might be construed by FRA or STB to limit over which line segments PIH materials may travel. The structure of 49 CFR Part 236, Subpart I, requires that PTC systems be installed on most line segments over which PIH materials are transported; it does not in any way govern the movements of PIH materials.

While both FRA and STB are vested with authority to ensure safety in the railroad industry, each agency recognizes the other agency's expertise in regulating the industry.⁴ FRA has expertise in the safety of all facets of railroad operations, and is authorized to promote safety in every area of railroad operations and reduce railroad-related accidents and injuries. 49 U.S.C. §§ 20101 and 20102. Concurrently, the Board has expertise in economic regulation and assessment of environmental impacts in the railroad industry, as an economic regulatory agency charged by Congress with resolving railroad rate and service disputes and reviewing proposed railroad mergers and acquisitions. Together, the agencies appreciate that their unique experience and oversight of railroads complement each other's interest in promoting a safe and viable industry.

Accordingly, FRA recognizes that conflicts between railroad carriers and railroad shippers relating to common carrier obligations are best resolved by STB. The Board has previously ruled on railroad obligations to quote common carrier rates and provide service for the transportation of PIH materials such as chlorine. *Union Pacific Railroad Company*, STB Finance Docket No. 35219 (2009); see also *Akron, Canton & Youngstown Railroad Company v. Interstate Commerce Commission*, 611 P.2d 1162 (6th Cir. 1979). FRA does not seek to interfere with STB's role in providing economic oversight of the railroad industry. Rather, just as STB has previously declined to substitute its safety and security judgments for those of FRA, FRA presently declines to substitute its economic judgments for those of STB. In establishing and modifying rules governing the installation of PTC system implementation, FRA does not regulate what route over which PIH materials must move, as responsibility for such regulations lies with PHMSA. See 73 FR 72182 (November 26, 2008). FRA's PTC regulations expressly allow for new PIH material traffic over a line segment that previously lacked such traffic, and as such does not preempt the oversight and regulatory functions of either PHMSA or STB.

⁴ The rail transportation policy, 49 U.S.C. § 10101, establishes the basic policy directive against which all of the statutory provisions the Board administers must be evaluated. The RTP provides, in relevant part, that "[i]n regulating the railroad industry, it is the policy of the United States Government . . . to promote a safe and efficient rail transportation" by allowing rail carriers to "operate transportation facilities and equipment without detriment to the public health and safety." See, e.g., 49 CFR Part 244; 67 FR 11582 (March 15, 2002).

FRA is aware that the impact of the present rulemaking will be to reduce the number of line segments included within the overall map of PTC system installations. The Trade Associations argue that the result of this reduction will be an ability of railroad carriers to unilaterally restrict PIH materials shipments by reducing the number of PTC-equipped line segments and subsequently refusing to carry PIH materials that would require straying from these line segments. However, because neither the prior or instant PTC rulemakings limit or restrict the common carrier obligation, enforced by STB, FRA does not view a reduction in PTC-equipped line segments as causing a reduction in available service for future PIH shipments. Additionally, there are substantial checks on a railroad's ability to modify its routes in such a manner. Oversight by the STB and FRA (in enforcing PHMSA's rail routing regulation) may preclude or even require certain rerouting decisions. Furthermore, because railroads will likely seek to maximize the return on their investment in PTC system installation, railroads can be reasonably expected to maximize the connectivity of PTC-equipped segments to limit where additional PTC systems may ultimately be required. As discussed above, even where a railroad is able to reroute its PIH materials traffic such that a line is excluded, resulting in future PIH materials traffic needing to traverse a line segment in order to travel from its source to its destination, FRA does not view such rerouting as a barrier to future PIH materials traffic. While STB is the agency ultimately responsible for the enforcement of the common carrier obligation, and FRA recognizes that PTC system implementation may affect STB's review of rates, FRA does not view the requirement to install PTC systems on certain rail lines as affecting the common carrier obligation in any way.

With respect to the application of 49 CFR § 236.1005(b)(3), FRA views the provision as agnostic with respect to the common carrier obligation. Where new PIH materials traffic exists, whether by the railroad's acceptance of the PIH material for transportation or by STB action to require such transportation, where tonnage exceeds 5 MGT, and the segment is not excluded by de minimis provisions, the rule requires the railroad carrier to file a PTCIP or RFA as soon as possible and to implement a PTC system on that line segment within 24 months. FRA expects that the PTCIP or RFA will include risk mitigation and other measures necessary to effectively and efficiently implement the new PTC system so that PIH materials may safely traverse the line segment during those intervening 2 years. If the filings do not sufficiently address these issues, FRA may approve the PTCIP or grant the RFA with conditions intended to ensure as much.

2.3.3 Passenger Rail Impact

In its filed comments, Amtrak reiterated its support of PTC system implementation and noted that it expects it will complete installation on its lines in advance of the statutory deadline. Amtrak's comments are otherwise limited to concerns relating to the impact of this rulemaking on passenger railroads, and on Federal and State funding requirements for passenger rail service. Amtrak stated that if the proposed rule is adopted, railroads will not be required to install PTC systems on rail lines that were used to transport PIH shipments in 2008, but are no longer being used for PIH materials traffic as of December 31, 2015. Amtrak expressed concern that passenger rail operators—whose presence may now be the sole reason for mandatory PTC system implementation on those lines—may be asked to bear some or all of the costs of PTC system installation that would have been borne by freight railroads under the original rule. Amtrak believed that this rule may pose a risk to the continued operation of affected passenger

rail services since they do not generate profits, rely on constrained taxpayer funding, and are already burdened by the need to fund PTC system installations on lines it owns.

Amtrak stated that the impact of the proposed rule on passenger railroads cannot be determined from the record in this proceeding. While the RIA invited comments on the accuracy of the data submitted by AAR—indicating that its member railroads have 1,562 route miles used for passenger rail service on which PIH materials traffic was handled in 2008, but on which PIH materials traffic is expected to cease by 2015—Amtrak argued that the data was insufficient to determine the affected route segments that have passenger rail service. Amtrak asserted that additional Federal funding is limited.

FRA understands that, upon cessation of PIH materials traffic, a line segment may still require PTC system implementation due to the existence of passenger traffic. In some situations not under the control of FRA, this may result in the shifting of costs from freight railroads to passenger railroads. However, as was the case with respect to similar concerns expressed by the Trade Associations and shippers, this distributional concern alone does not provide adequate justification for maintaining the two qualifying tests. In response to Amtrak's concerns relating to insufficient funding, the availability of funds to support passenger railroads in the installation of PTC systems is outside the scope of this rulemaking. In regards to Amtrak's concerns regarding insufficient data to determine the affected route segments, it is FRA's understanding that the host and tenant railroads, through their discussions, would be able to communicate this information. To provide that information in this proceeding risks exposing certain sensitive security information.

2.3.4 Cost-Benefit Analysis

Trade Associations

The Trade Associations also take issue with FRA's cost-benefit analysis, asserting that FRA's cost-benefit analysis is flawed. The Trade Associations support the Peabody Reports' assertion that FRA relied upon a cost-benefit analysis that substantially and erroneously excluded business benefits accruing to railroads, shippers and the public. According to the Trade Associations, this exclusion of business benefits violates Office of Management and Budget ("OMB") Circular A-4, which governs cost-benefit analyses conducted by federal agencies and resulted in an erroneous cost-benefit ratio of 20:1 in the PTC final rule published on January 15, 2010. The Trade Associations assert that the flaws in the January 2010 cost-benefit analysis accompanying the original final rule are continued and more extensive in the instant rulemaking.

Ultimately, the Trade Associations and Peabody contend that FRA's cost-benefit analysis should have considered business benefits that they contend would significantly reduce the gap between the required PTC system implementation's costs and benefits. These parties discuss a 2004 report produced by Zeta-Tech Associates, commissioned by FRA, quantifying the business benefits of positive train control, with direct and indirect business benefits ranging between \$2.2

and \$3.8 billion annually, in 2001 dollars.⁵ According to the Trade Associations, these benefits include increased line capacity; fuel savings; improved rail dispatching operations; and societal benefits from reduced highway crashes and reduced pollution emissions. Using these findings, in conjunction with other sources, in 2004 FRA submitted a report to Congress offering differing opinions as to whether or not PTC systems could generate business benefits. One point of view was that PTC systems could create net societal benefits that ranged from \$2.1 to \$3.9 billion annually, including significant accident-avoidance benefits as a result of modal diversion from highway to rail transportation.

Peabody posits that Congress passed RSIA in 2008 based in part on FRA's report. Peabody also indicates that as part of the rulemaking developing the 2010 PTC rule, FRA updated each element of the 2004 report, but did not include them in the RIA for that rule, which considered only direct railroad safety benefits and total direct implementation costs in their cost benefit analysis. If FRA had included the business benefits as part of its economic analysis associated with the initial PTC rulemaking published on January 15, 2010, Peabody contends that the cost-benefit ratio would have been restated as 1.1:1.0. Peabody's own May 2010 report asserts that a 0.86:1.00 cost-benefit ratio is more realistic. However, by not including those benefits, FRA's RIA reflected a cost-benefit ratio of 21.7:1.0.

In its report, Peabody asserts that FRA's cost-benefit analysis in this rulemaking should be based on the "no action scenario" (i.e., where PTC systems are not required), which would result in a much lower cost-benefit ratio than the 1:20 ratio contemplated by this rulemaking. In other words, Peabody believes that FRA should determine the change in costs and benefits where PTC systems have not yet been installed, not where PTC systems will be installed in the future. According to Peabody, FRA's cost-benefit analyses support a perceived effort by the railroads to limit routes, forcing more PIH onto the roads or increasing shipper costs.

FRA disagrees with Peabody. The "no action scenario" would leave the final rule in place and PTC system implementation would be required without the relief on this rulemaking. Peabody misstates what result occurs in a "no action scenario" for this rulemaking. Contrary to Peabody's assumptions, if FRA were not to publish this final rule, the result would be a continuation of the requirement to install PTC systems on certain line segments. In Circular A-4, Regulatory Analysis, the Office of Management and Budget, says "[i]t may be reasonable to forecast that the world absent the regulation will resemble the present. If this is the case, however, your baseline should reflect the future effect of current government programs and policies." The future effect of the prior final rules is that PTC systems will be installed on a number of line segments. Accordingly, the no-action alternative includes the cost of PTC systems on those line segments and the commensurate costs and benefits. Peabody, as well as the Trade Associations generally, also relies on the Zeta-Tech Report to claim that FRA has failed to account for some business

⁵ Zeta-Tech Associates, Quantification of the Business Benefits of Positive Train Control (Mar. 15, 2004) at 10-11. The Zeta-Tech analysis' estimate of benefits ranged as low as \$0.9 billion annually, including \$0.4 billion in benefits accruing to shippers. See also Federal Railroad Administration, Benefits and Costs of Positive Train Control (Aug. 2004) (noting the numerous assumptions made by the Zeta-Tech analysis and also noting that some of these benefits may already be realized or may be realized without the PTC system implementation).

benefits that result from PTC system implementation. However, as FRA stated in its contemporaneous report to Congress, many of these benefits were speculative or achievable through other means. The intervening years have validated FRA's concerns with the report. The PTC systems that presently exist lack some of the features that Zeta-Tech used to justify its benefit assumptions, and railroads have already achieved some of the operational benefits without PTC system implementation. Accordingly, FRA cannot treat these benefits as attributable to PTC system implementation.

Peabody asserts that FRA does not consider the costs or benefits to shippers or the public in its analysis. Peabody comes to this conclusion based on the exclusion of business and other societal benefits. Peabody also claims that FRA includes only railroad safety benefits in its economic analyses and continues to exclude business and other societal benefits that FRA had itself identified, quantified, and championed for much of the previous decade. FRA specifically did account for safety benefits accruing to society at large, such as evacuations. The costs of removing these benefits are accounted for in this final rule.

In analyzing the PTC rule, FRA included a sensitivity analysis with business benefits when it appeared there was a possibility that a railroad would adopt a PTC system capable of generating business benefits. According to the railroads' PTC implementation plans submitted to FRA, there are no PTC systems that would generate business benefits, other than from train pacing, in the 20-year analysis period. The only business benefit that FRA had included in its base analysis of the PTC final rule was fuel savings that would result from train pacing. Only one railroad has adopted train pacing systems integrated with its PTC system, and that railroad is not likely to change the number of locomotives equipped for train pacing, and thus is not likely to see any change in its business benefits. In other words, issuance of this final rule will not impact fuel saving benefit levels. To the extent that PTC systems planned for implementation would not include aspects to facilitate business benefit realization, there is no impact on business benefits from reducing the mileage over which wayside components will be installed. FRA does not anticipate the other forms of business benefits identified in the Zeta-Tech Report—improved work order reporting and precision dispatch systems—to be present in the PTC systems implemented by railroads. No such systems have been described in the PTC system implementation plans of any railroad; furthermore, while some railroads are implementing work order reporting and precision dispatch systems, these railroads are not integrating the systems into their PTC system due to technological infeasibility.

FRA does not have any evidence that railroads installing PTC systems have found a way to make a profit by integrating additional equipment that would generate the kinds of business benefits described in the Peabody analysis. The railroads have long argued that there was no way for them to make a profit from PTC systems, and their behavior is consistent with that assertion. In FRA's 2004 letter report to Congress, the suggested business benefits would have been relatively large, but very little of that business benefit would have accrued to railroads. The business benefits would have gone in large measure (roughly 80 percent) to shippers, who in turn would have created even larger societal benefits. There is no market mechanism for railroads to share in most of those benefits. FRA therefore has no reason to believe that railroads will perform technological integrations that will create large business benefits.

According to Peabody, FRA relies on several unsupported assumptions and estimates to derive its cost and benefit calculations. This appears to be a criticism of two assumptions that FRA relied upon in order to estimate this rule's impact: that 50 percent of segments submitted for exclusion from the system would have passed the "two tests" and that, under the prior rule mitigation costs, the costs of risk mitigating technologies currently referenced under § 236.1020, would have averaged \$10,000 per mile. While AAR also questioned the assumption that 50 percent of segments would pass the two tests, AAR did not comment on the estimate for mitigation costs.

To perform a cost-benefit analysis in this proceeding, FRA required an estimated number of miles in the PTC network that would be affected by the final rule, and therefore estimated the number of miles in the PTC network that would fail one or both of the two qualifying tests and would have been required to be PTC-equipped. The two qualifying tests were intended to ensure that PTC systems were installed on certain risk-sensitive line segments. The tests would have no impact had all segments or no segments met the requirements of both tests. In order to estimate the affected mileage, FRA needed an estimate of how many miles the railroads could justify and likely remove from their systems—a figure provided by AAR (estimated at 10,000 miles in the base case)—and an estimated probability of how likely those segments meet the minimum requirements of the two qualifying tests had the prior final rule remained unchanged.

As noted, the two qualifying tests were never fully implemented and applied to track segments, so it is impossible to make inferences about the test results. Since the residual risk test was not developed, FRA cannot make an informed estimate of the proportion of segments likely to fail one or both of the two qualifying tests. FRA chose 50 percent as an estimate of the proportion of segments the railroads want to remove from PIH materials service that would pass both tests, because it provides the lowest expected difference from a percentage chosen at random in the possible range of 0 percent to 100 percent. No party has offered an alternative estimate, and no party has provided a means of deriving an alternative estimate, despite FRA's request for comments and information on this issue. See 76 FR 52,918, 52,921, 52,924. If FRA were to conduct a sensitivity analysis on this range, it would be difficult to choose a range of passing percentages for the undeveloped test. For the purposes of argument, FRA uses a range of 25 percent to 75 percent, representing a broad range of possible percentages covering half of the possible range from 0 percent to 100 percent.

Given this reasonable range, an additional sensitivity analysis is unnecessary, as such an analysis would yield similar results as the analysis already present. In the sensitivity analysis of the NPRM, which estimated the range of miles of line segments over which PIH materials would be removed, FRA calculated benefits with the number of miles equaling 7,000 miles, 10,000 miles, and 14,000 miles. As discussed above, some of these miles would have no longer been required to have an implemented PTC system under the prior rules; FRA estimated that only half of these miles would be required to install PTC systems under the prior rules. As such, FRA calculated the benefits of removing PTC systems from 3,500, 5,000, and 7,000 miles – 50 percent respectively of 7,000, 10,000, and 14,000 miles. Were FRA to perform a new sensitivity analysis on the percentage of miles that would have no longer been required to have a PTC system implemented, the estimates of 25 percent, 50 percent, and 75 percent of miles passing the two qualifying tests and not requiring PTC systems would result in 7,500, 5,000, and 2,500 miles

– 75 percent, 50 percent, and 25 percent of 10,000, respectively – that would have nonetheless required PTC systems. Accordingly, FRA would calculate the benefits of removing PTC systems from 2,500, 5,000, and 7,500 miles. The analysis of mileage estimates so similar to those used by FRA in its existing sensitivity analysis would not yield meaningful new data, and therefore additional sensitivity analysis on the percentage of segments passing both tests would be redundant.

Peabody also objects to the estimates of mitigation costs avoided. Under the PTC final rule issued in January 2010, in order to remove some segments from the PTC system network, and to compensate for the resulting safety reductions, the railroads would have had to propose mitigations of the additional risk created by that removal. FRA purposefully avoided defining such mitigations, providing the railroads the flexibility to propose their own solutions, which would then be subject to FRA approval. Even if FRA had fully developed the methodologies for the two qualifying tests, FRA still would not have prescribed particular mitigations, and therefore would not require mitigation that would be more costly than the estimates provided and where less costly solutions are available. To estimate these mitigation costs, FRA made the reasonable assumption that mitigation costs could only rise to a certain percentage of the total wayside costs of implementing PTC technologies; as the cost of mitigations rises, the likelihood rises of a railroad deciding to install a PTC system rather than incur the mitigation costs. Despite FRA's request for comments on its calculation of costs, no commenter provided alternative estimates or methodologies for the agency to use in lieu of the present estimates.

Peabody also states that FRA should include business benefits because FRA included some uncertain figures without including other uncertain figures. More specifically, according to Peabody, FRA is uncertain about the correct values of the two figures it included in its business economic estimates (i.e., the proportion passing both qualifying tests and the cost per mile for mitigations) and FRA was also uncertain (in analyzing the PTC rule) about whether business benefits would be generated, which FRA did not include. FRA is certain that a percentage of track segments would have passed the two qualifying tests, and is using the best estimate available to calculate the impacts. FRA is also certain that some segments would have required mitigation, and is using the best information available regarding the expected cost of the mitigations. FRA was required to estimate these values, and FRA has pointed out that within reasonable ranges the exact value of these estimates will not affect FRA's conclusions. The final rule still provides net societal benefits regardless of the range of impact. In other words, since the costs exceed the benefits for any given mile of PTC system implementation, removing the requirement to install a PTC system for any number of miles in the scope proposed will result in a net benefit. At this time, FRA is less uncertain about whether the PTC systems being adopted under the PTC rule will create business benefits of the type and magnitude explored in the sensitivity analysis of the prior final rule, for the reasons described above. It is clear that with minor exceptions, unaffected by this final rule, the railroads have adopted PTC systems that will not create the kinds of business and societal benefits suggested in the sensitivity analysis of the prior final rule.

Peabody asserts that in many cases FRA accepts, without question, AAR's estimates and assumptions. Peabody also claims that FRA improperly focuses on the net costs and benefits associated with PTC system implementation based on the AAR's estimated 10,000 track miles

that would be PTC-equipped but for the proposed rules changes. Peabody says that, in doing so, FRA fails to account for 3,500 track miles it had originally determined would not be equipped with PTC systems.

FRA did not accept or adopt any of AAR's estimates without first analyzing them. Peabody refers to estimates of how many miles of PTC system wayside equipment would be affected by this rule. FRA includes AAR's estimate as the base case, because railroads are the parties most likely to know how much wayside would be affected. The railroads' actions will determine how much of their systems may be excludable under the final rule, and they do not seem to have an incentive to misstate that amount.

As previously noted, FRA assumes that 50 percent of the segments that the railroads plan to remove from the PTC network could pass both tests. When analyzing the PTC rule published in January 2010, FRA had estimated that the railroads could exclude roughly 3,500 miles due to the cessation of PIH materials traffic. If those segments represent 50 percent of those that would have passed the two tests, this would imply that the railroads would have been interested in removing roughly 7,000 miles from their PTC networks, a figure that has become the low benefit case.

In its analysis for the NPRM in the instant proceeding, FRA assumed that the 3,500 miles are a subset of those 10,000 miles that would not be equipped with PTC systems, and are therefore accounted for. When analyzing the PTC rule published in January 2010, FRA needed to estimate the number of miles that might have been eligible to avoid PTC system implementation in the event that PIH materials traffic would be removed. FRA reviewed traffic patterns for segments from which FRA believed the railroads could remove PIH materials traffic with little or no difficulty. For that rulemaking, this information supported the conservative estimate used in the analysis of the NPRM. FRA did not receive any dissenting comments.

In analyzing the NPRM issued in the instant proceeding, FRA attempted to remain consistent with the aforementioned prior analysis, as it had subsequently become the subject of much discussion. From the railroads' submissions, it does not appear that the 10,000 miles are in addition to the 3,500 miles; rather, the 3,500 miles are a subset of the 10,000 miles. In its comments, AAR did not challenge or correct FRA's impression that the 10,000 miles were in addition to the 3,500 miles. FRA therefore continues to assume that the 3,500 miles are a subset of the mileage AAR intends to remove from PIH service. In reviewing AAR's data, FRA found that the 10,000 miles included many track segments that FRA, in previously arriving at the 3,500 mile figure, did not think it would have been practical to select for removal of PIH materials traffic when compared to the 3,500 miles for which there appeared to be several logical mitigation treatments. FRA was presented with several options for estimating the impact of this rule in light of the new data provided by AAR. While FRA could have analyzed a low case that consisted of removing the two tests from the 3,500 miles, yielding an estimate where the savings were the avoided costs of undergoing the two tests and undertaking mitigations, this does not seem to be a reasonable alternative to analyze as the railroads are already claiming that they intend to remove many more segments from PIH service. Alternatively, FRA could have treated the 3,500 miles as the only subset of the 10,000 miles that would pass the two tests. As a result, the percentage passing both tests would be 35 percent with a base mileage of 10,000 miles.

FRA has adopted this latter approach, and continues to believe the approach is sound.

Peabody also claims that, if FRA were to re-conduct its economic analysis of the prior final rules, the outcome would be a reduced estimate of the total cost of PTC wayside implementation. However, FRA is not updating its analysis of the prior final rule; the agency is only estimating the impacts of the changes induced by this final rule. This estimate relies upon PTC system implementation plan submissions to arrive at total PTC system mileage, though total mileage has relatively little impact on the analysis, and on AAR representations as to the affected mileage. Peabody also uses its mileage estimates to argue that fewer locomotives than FRA estimates will no longer need to be equipped with PTC onboard apparatuses. In making this comment, Peabody appears to rely on its mileage estimates that differ with FRA's. FRA's estimates are based on actual railroad PTC implementation plans, and on its estimates of affected mileage. The primary use of this calculation is for FRA to estimate the impact on locomotive costs on small entities. In doing so, FRA also estimated impact of this final rule on Class II railroads. Reduced locomotive costs account for roughly 2 percent of benefits. Even if FRA were to reduce that by 30 percent, as Peabody requests, the total societal benefits accruing from this rulemaking would be decreased by 0.6 percent. Use of the Peabody estimate would not impact the RIA's conclusion.

Peabody also asserts that FRA erred in assuming an annual PTC system maintenance cost of 15 percent of the total installation costs, substituting a 12.5 percent factor. However, FRA continues to believe maintenance costs will be relatively high compared to electronic equipment that does not need to pass strict qualification procedures. Railroads and their suppliers will use components developed for the general market, including microprocessors. The railroad segment is not sufficiently large to provide an incentive for chipmakers to develop or manufacture microprocessors exclusively for railroad use. Thus, when microprocessors become obsolete, the railroads and their suppliers will have to buy different microprocessors, and re-qualify their PTC systems using the newer microprocessors. This will increase the maintenance costs relative to the value of the installed base. FRA will continue to use its estimate that maintenance costs will be 15%, and will adjust only if future empirical evidence indicates otherwise. Maintenance cost savings were 59 percent of the total benefit using a 7 percent discount factor and 65 percent of the total benefit using a 3 percent discount factor. Reducing maintenance costs by one-sixth (12.5 percent instead of 15 percent) would reduce the total benefit estimate by 10-11 percent. Even assuming the lower number of locomotives estimated by Peabody and the lower maintenance savings estimated by Peabody would not have any impact on the conclusions of the analysis, that benefits far exceed costs.

Peabody also argues that FRA improperly shifted the analysis period from 2009-2028 to 2012-2031. However, as was the case in several of Peabody's other arguments, here Peabody fails to take heed of the fact that the instant rulemaking is a new proceeding. Accordingly, FRA has adopted a current starting point and twenty year time period for analysis. Decisions made prior to this rulemaking were not impacted by this rulemaking, and this analysis is appropriately forward-looking only.

Peabody claims that the exclusion of so-called headline accidents is unverified. FRA pointed out in its analysis that all of the headline accidents involved either passenger trains or release of

chlorine, a PIH material. Relief under this rulemaking will only apply to segments from which PIH materials traffic is removed (except for de minimis quantities) and do not have passenger traffic except on other than main lines as defined in the regulation. The conditions under which the headline accidents generally occur would not allow for line segments to get relief from PTC requirements. Thus, headline accidents are not relevant to the costs or benefits of this rule, as there is not a substantial risk of such accidents occurring on the line segments no longer required to be equipped with PTC systems as a result of this rule. Peabody also objects to applying a percentage to the risk of other PTC-preventable accidents on the segments. FRA reviewed data submitted by railroads for segments likely to be those from which PIH materials traffic would be removed, and made two observations. First, FRA observed that the railroads claimed that only 21 PTC preventable accidents had occurred over a seven year period, and average of 3 per year. This contrasts with the PTC-preventable accident data on which FRA based the PTC final rule, which showed an average of 52 PTC-preventable accidents per year, excluding headline accidents. FRA also observed that in general the segments appeared to have below-average tonnage volumes, although FRA does not have directly comparable volume data for the entire PTC network. It seemed improbable to FRA that roughly 16 percent of the PTC network had only 5.8 percent of the PTC-preventable accidents, but clearly the average risk per mile would be lower. The calculated probability of an accident on the miles to be removed was 36.2 percent of the likelihood on the entire PTC network.⁶ It also seemed unlikely that the risk per mile was identical between the entire PTC network and the miles to be removed from PIH materials service. As a conservative estimate, FRA used a value of 60% to estimate the accident benefits that would no longer occur on segments removed from the PTC network, a value that leads to a higher estimate of costs than a value of 36% would have. Peabody argues that the removal of the headline accidents was a sufficient reduction in estimated risk. FRA disagrees. In addition to the reduction of risk from the absence of PIH and passenger traffic, the available evidence indicates that the segments eligible for exclusion are less likely to have non-headline PTC-preventable accidents, and FRA has estimated the costs and benefits of excluding such segments accordingly.

Finally, Peabody objects to FRA's approach to annualization of costs. This approach is based on OMB guidance and used by DOT for all significant regulations.⁷ Accordingly, FRA will retain the annualized estimates.

AAR Comments

AAR recognizes the RSIA mandate that PTC systems must be implemented on main lines by December 31, 2015, to transport passengers or PIH and that FRA maintains the statutory discretion to require additional PTC system implementation. However, AAR asserts that FRA's discretion must be exercised reasonably. With a cost-benefit ratio of 20:1, AAR believes that it is patently unreasonable for FRA to exercise any discretion beyond the statute's minimum implementation requirements.

⁶ Calculation: $((3 \text{ accidents per year}) / (52 \text{ accidents per year})) / ((11,248.43 \text{ miles}) / (70,000 \text{ miles})) = 36.2 \text{ percent}$

⁷ OMB Circular A-4 at 45 ("You should present annualized benefits and costs using real discount rates of 3 and 7 percent.").

For the same reason, AAR states that the two qualifying tests are inconsistent with RSIA, because, “No additional prerequisites are appropriate unless FRA can justify additional PTC requirements beyond the statutory mandate. There is no justification for going beyond the statutory mandate in any event, but especially with such a disparate cost-benefit ratio.”

AAR believes that removal of the two qualifying tests could result in avoiding PTC system implementation on 10,000 track miles. AAR determined this amount based upon the difference between PIH route maps as they looked in 2008 and what they expect them to look like by the end of 2015. AAR expects a reduction in track miles upon which PIH will be transported due to a change of customer demands, regulatory compliance, and pro rata changes to become more efficient. AAR estimates PTC system installation-related savings of \$50,000 per mile, totaling \$500 million. AAR expects further savings from avoiding the associated maintenance costs.

With the removal of the two qualifying tests, AAR believes that a railroad should still be able to file an RFA to remove a track segment from the PTCIP’s implementation schedule if there is passenger service on the line that qualifies for a main line track exclusion under 49 CFR § 236.1019. According to AAR, the statement in the first sentence of proposed § 236.1005(b)(4)(i)—that a line qualifies only if there is a “cessation of passenger service”—could be interpreted as stating that a PTC system will be required for a line over which no PIH materials will be transported after 2015 if there is any passenger service, even if the passenger service qualifies for a main track exclusion. While FRA viewed the prior language as sufficient to allow for the exclusion of such lines, the rule text has nonetheless been further clarified to explicitly reference main line track exclusions.

In the preamble to the proposed amendments, FRA asked about the accuracy of its cost/benefit analysis. While there are some differences between AAR’s and FRA’s assessment of costs, the differences would not materially affect FRA’s conclusion that the costs to the industry that would be avoided far outweigh any benefits that would be lost.

While AAR indicated that removal of the two qualifying tests could potentially avoid PTC system implementation on 10,000 track miles, FRA also performed a sensitivity analysis in its proposed RIA, using 7,000 miles as a conservative low-number threshold. AAR believes that FRA underestimates the route miles at stake, because it presumably does not account for track miles potentially affected by the currently undeveloped residual risk analysis. Thus, AAR states that it does not know the basis for FRA’s assumption that 50 percent of the lines in question would have qualified under that criterion. FRA agrees that it is difficult to estimate the percentage of segments that would have met both tests, because both tests were not fully developed. As noted in its response to the Peabody study, FRA’s sensitivity analysis provides a view of what the outcome might have been under the base case had the percentage passing the two tests been higher or lower. Ultimately, regardless of the exact number of miles no longer requiring PTC system implementation, the societal benefits of the final rule are much greater than the societal costs.

AAR also contests statements made at the hearing by those representing some of the shippers, taking issue with the shippers’ reliance on the Peabody and Zeta-Tech studies, which AAR

asserts was already refuted by the Oliver Wyman study sent to FRA on April 27, 2010. In particular, while the Peabody and Zeta-Tech studies each provide a cost-benefit analysis that included business benefits, Oliver Wyman contends that with the advancements made since the writing of the Zeta-Tech report, this benefit would be “minimal.”

AAR believes that the shippers’ reference to the Zeta-Tech analysis is misplaced, because it analyzed hypothetical PTC systems and hypothetical business benefits. AAR asserts that some of those business benefits have already been achieved through implementation of other systems and that the PTC systems being installed will not enhance the capability to achieve those business benefits. Moreover, according to AAR, the PTC systems currently being installed will lack those business benefits and will likely face many operational inefficiencies, particularly as they relate to braking algorithm changes and the resultant effect on network velocity and capacity constraints. FRA did not include those business benefits in either the analysis of the NPRM or this analysis, and agrees with AAR that it would not have been proper to include those hypothetical benefits in either analysis. In addition, AAR contends that any discussions on pricing or common carrier obligations are not appropriate for this rulemaking. FRA agrees with the AAR, and has discussed this issue in detail in section 2.3.2 above.

3. Section-by-Section Analysis

Unless otherwise noted, all section references below refer to sections in title 49 of the Code of Federal Regulations.

3.1 Amendments to Title 49 Code of Federal Regulations Part 236

Section 236.1003 Definitions

FRA currently defines PIH materials within the rule text at § 236.1005(b)(1)(i), which some may find difficult to locate. Accordingly, for the purposes of clarity, FRA is adding the definition for PIH materials to the definitions section of Subpart I. The inclusion of this definition in § 236.1003 does not change the meaning of the term as understood under § 236.1005(b)(1)(i) or its cross-referenced §§ 171.8, 173.115, and 173.132. This amendment creates no new benefits or costs.

Section 236.1005 Requirements for PTC systems

In the final rule, FRA is eliminating the alternative route analysis and the residual risk analysis tests. When initially published in the PTC rule on January 15, 2010, these provisions were included in § 236.1005(b). On September 27, 2010, FRA issued amendments to the PTC rule, moving the text to a new § 236.1020 and providing more clarifying language. To ensure continuity and understanding, however, § 236.1005 contained various cross-references to § 236.1020. As indicated below, FRA is eliminating § 236.1020. Accordingly, FRA is also removing the relevant cross-references in § 236.1005. This amendment to § 236.1005 will create no new benefits or costs.

AAR had concerns regarding the text of proposed (b)(4). AAR believes that a railroad should

still be able to file an RFA to remove a track segment from the PTCIP's implementation schedule if there is passenger service on the line that qualifies the railroad to submit a main line track exclusion addendum (MTEA) under 49 CFR § 236.1019. According to AAR, the statement in the first sentence of proposed § 236.1005(b)(4)(i) – that explicitly references the “cessation of passenger service” but does not discuss MTEAs - could be interpreted as stating that a PTC system will be required over a line over which no PIH materials will be transported after 2015 if there is any passenger service, even if the passenger service qualifies for an MTEA. AAR also argues that this paragraph, if literally read, provides that FRA will approve a request for excluding a line segment from the PTC mandate if there is a cessation of passenger service or PIH materials service by December 31, 2015, or a decline in freight traffic below 5 million gross tons over a 2-year period. AAR stated that, “The first issue with proposed (b)(4)(ii) is a repetition of the problem presented by the first sentence of (b)(4)(i), a reference to a cessation of passenger service rather than a reduction to an amount qualifying for a main track exclusion. The second issue with proposed (b)(4)(ii) is the use of “or.” Under a strict reading of the proposed language, a line with over 5 million gross tons of freight traffic used for TIH and passenger service, for example, would qualify for an exclusion from the PTC mandate if passenger service ceased even if there were no changes in the freight volume and TIH traffic continued.”

In response to these concerns, FRA has clarified the language of paragraph (b)(4) without changing its intended meaning. Paragraph (b)(4)(i) now specifically mentions the approval of an MTEA as one cause for a routing change to allow for approval of an exclusion. Paragraph (b)(4)(ii) now more precisely states the set of conditions necessary to approve an exclusion. Specifically, an exclusion may only be granted where both of the following conditions are established by the railroad to be true as of December 31, 2015: first, that there is no passenger service, or any passenger service that exists is subject to an MTEA; second, that there is no PIH materials traffic or less than 5 million gross tons of freight traffic.

Section 236.1020 Exclusion of track segments for implementation due to cessation of PIH materials service or rerouting

The current PTC rule requires that, for each RFA seeking to exclude a track segment from PTC system implementation due to the cessation of PIH materials traffic, a railroad must satisfy both an alternative route analysis, and eventually a residual risk analysis test, in order to secure FRA's approval. FRA's cost-benefit analysis of the PTC rule indicates that the railroads will incur approximately \$20 in PTC costs for each \$1 in PTC safety benefits. In its congressional testimony, AAR testified that 2010 was the safest year for America's railroads, railroads have lower employee injury rates than most other major industries, only around 4 percent of all train accidents on Class I main lines are likely to be prevented by PTC systems, and there are many far less costly ways to provide greater improvements in rail safety than through the implementation of PTC systems on lines not required by Congress to be equipped.⁸ According to the testimony, if the PTC rule remains unchanged, railroads may be required to spend more than \$500 million in the next few years to deploy PTC systems on more than 10,000 miles of rail lines on which neither passengers nor PIH materials will be transported as of December 31,

⁸ See AAR Congressional Testimony, at 8-9.

2015.

FRA recognizes that the railroads have much work to do to have interoperable PTC systems implemented in accordance with the congressional mandate by the December 31, 2015, statutory deadline. FRA also recognizes that the alternative route analysis and residual risk tests could potentially require PTC system implementation at a great cost to the railroads on lines that will not carry PIH materials traffic or passenger traffic as of December 31, 2015. Lines that no longer carry PIH materials traffic can still pose significant safety risks associated with other hazardous material traffic on the lines and these safety risks may justify a requirement that the lines be equipped with PTC systems. However, as FRA noted when it last amended the PTC rule (75 FR 59111-59113 (Sept. 27, 2010)), FRA will need to develop an appropriate risk methodology through a separate rulemaking proceeding before it can require PTC systems to be installed on each line that no longer carries PIH materials or passenger traffic. FRA has had discussion with members of the railroad industry regarding an appropriate risk methodology but has yet to come up with a reasonable and satisfactory methodology that could form the basis of this further rulemaking. FRA is, therefore, eliminating the two qualifying tests that would potentially require PTC system implementation on lines not specifically mandated by Congress, consistent with Executive Order 13563. To achieve this end, FRA is eliminating § 236.1020. While FRA has removed these analyses from the PTC rule, FRA reserves its statutory and regulatory authority to require PTC system implementation on additional track segments in the future based on risk levels or other rational bases.

3.2 Analysis of benefits and costs

As the final rule reduces burdens imposed by an earlier rulemaking, the benefits of the final rule are a reduction in regulatory costs, and the costs of the final rule are a reduction in regulatory benefits. To help avoid confusion, sections are labeled with benefit or cost of the previous final rule as well as the accompanying final rule.

In addition, some distributional impacts may result from elimination of the two tests, which may result in certain lines required to be equipped with PTC systems solely because they carry passenger traffic. For example, under the 2010 PTC rule, a line along which both passengers and PIH materials moved in 2008, but along which PIH materials traffic is discontinued prior to 2015, is under the 2010 PTC rule, required to have a PTC system under the 2010 PTC rule due to the movement of both passenger trains and PIH carrying trains in 2008, but will only be required to have a PTC system implemented under the final rule due to the movement of passengers on the line.

3.3 Benefits of the final rule (relevant costs of the final PTC rule)

In its congressional testimony, AAR stated that its members (Class I railroads) would be able to reduce the required PTC system implementation on 10,000 miles of their systems. AAR subsequently submitted data to FRA showing as much as 15,355 miles of their systems might be excludable if the requirement to pass two tests were removed. AAR later clarified that 11,128 miles would be excludable under the proposal to eliminate the two tests and submitted a revised data set. AAR noted that the additional potential excludable mileage contained in the initial data

submission was dependent on changes in customer demand as well as a broadening of the existing *de minimis* exceptions as requested in its petition to amend FRA's rule.

FRA reviewed the original AAR data when it was first submitted and found that less than 14,000 miles of the 15,355 miles might be excludable under the proposed rule, now a final rule, but that the remaining miles not only had passenger traffic, but also had sufficient volumes to preclude any MTEA for the passenger service. Given the uncertainty associated with the initial data set, FRA chose to analyze two cases for sensitivity analysis in addition to the expected case. Thus, for the high case analysis, FRA assumed 14,000 miles could potentially be excluded. Although approximately 1,100 of those miles would not meet the criteria for being excluded because they carry passenger trains, for purposes of this analysis FRA assumed that the railroads would be able to pursue an exclusion of those miles from main track, and therefore from the requirement to install PTC systems, under provisions applying to passenger service, but would then require some kind of mitigation on those miles. This was done purely for analytical purposes and by no means assures that FRA would grant any such exclusion(s). FRA assumed 10,000 excludable miles (of which 550 miles are passenger miles that require some mitigation, based on the AAR's public estimates and a review of the data initially submitted by AAR) as the expected case (base case). FRA also assumed 7,000 excludable miles (with no passenger miles) as the low case. The 7,000 miles was loosely based on FRA's assumption that 3,204 miles would have passed the two tests in absence of this rulemaking with the implementation of some kind of mitigation to reduce the risk to a level below the threshold of the final rule. This is also consistent with an assumption that 50 percent of the miles from which PIH is rerouted or eliminated would have passed the two tests under the existing PTC rule. FRA requested, but did not receive any comments on the number of passenger miles that would require some mitigation in order to meet the MTEA criteria.

Based on the more recent information submitted by AAR, it seems that railroads would indeed be able to exclude 11,128 miles under the final rule. Although this estimate is more robust (less uncertain) than the initial estimate of 10,000 excludable miles, FRA believes that the outcome and findings of the analysis conducted using 10,000 miles would be unchanged. In the interest of expediting this rulemaking, which impacts the railroads ability to meet the statutory deadline for implementing PTC systems in a more cost effective manner, FRA did not adjust the base case. The two additional cases analyzed to determine sensitivity have also been retained as they continue to be meaningful, as well. FRA continues to believe there is a possibility that railroads will be able to exclude more miles based on changes in customer demand or otherwise and likewise that there is possibility that railroads may not be able to exclude as many miles as they currently anticipate due to unforeseen causes. Based on comments and information received in response to the NPRM and the NPRM Regulatory Impact Analysis, as discussed above, FRA retains the scenarios analyzed at the NPRM stage.

In its analysis of the PTC final rule, FRA estimated that PTC system installation requires about \$50,000 per mile in wayside costs along freight lines, in 2009 dollars. In its congressional testimony AAR has stated that wayside improvements needed for PTC systems cost \$50,000 per mile. FRA is using the estimate of \$50,000 per mile in initial costs for purposes of this analysis. FRA is using 2009 dollars throughout this analysis, to aid in comparison to the analysis of the PTC rule, and to avoid inflating accident consequences at a time when FRA continues to use the

same value of a statistical life as FRA used in analyzing the 2010 PTC rule. FRA assumes the base cost of \$50,000 per mile has not changed as a result of technological advancements. Further, FRA assumes this \$50,000 per mile estimate represents a variable cost estimate that is relatively constant across different segments of track.

FRA believes that some of the mileage under all three scenarios would be able to qualify for a MTEA under the 2010 PTC rule, but would require mitigation in order to have the exclusion approved. Mitigation treatment measures could include things such as reduction in train operating speeds, improvements in track physical infrastructure, elimination of at-grade highway-rail or rail-to-rail crossings, elimination of switches, changes in traffic volumes, changes in the underlying method of operation, introduction of switch monitoring or broken rail detection systems, addition of hot box detectors, and addition of other hazard detectors (slide and intrusion detectors, high water detectors, etc.). Other measures may include more rigorous operational efficiency testing and training that adapts to observed concerns, temporal separation, and a more rigorous track maintenance program. FRA sought comments regarding the difference between accident reduction benefits from PTC systems and accident reduction benefits from other mitigations, but did not receive any.

In the economic analysis of the 2010 PTC rule, FRA estimated that 3,204 miles would be excludable from the PTC network if the railroads adopted some mitigation that allowed them to pass the second of the two tests that FRA is now eliminating, at an average cost of \$10,000 per mile. FRA continues to believe that some line segments would have passed the tests with the implementation of some mitigation and is using the average cost of \$10,000 per mile in initial costs for segments that might have received mitigation treatment to that end. The \$10,000 per mile estimate includes resources that might have been expended to pass the tests. FRA received comment on this assumption, discussed above, and continues to rely on this assumption. This value (in 2009 dollars) has been subject to public comment, both at the NPRM stage and in the final rule for the 2010 PTC rule, and there were no objections to use of the value. The comments in response to the NPRM for this rule did not provide a basis for a better assumption. FRA believes the railroads and their customers have been able to divert or eliminate PIH materials traffic from more mileage than FRA had assumed in analyzing the PTC rule. The reduction in PIH materials traffic is partially due to a change in the shipment of commodities, which is an alternative approach to compliance that FRA had not considered in analyzing the PTC rule. For example, on November 2, 2009, the Clorox Company announced that it was transitioning its operations to produce end product bleach from transported high strength bleach instead of from chlorine gas, a PIH material.

For purposes of this analysis, FRA estimates that half (50 percent) of the mileage from which PIH materials traffic is eliminated or rerouted would have passed both tests under the 2010 PTC rule, and would have qualified for exclusion, but would have required some mitigation to do so. FRA chose 50 percent as a best estimate, because the affected segments would need to pass two tests, one of which has never been fully developed. FRA received comments on this assumption, but did not receive any comments which offered a basis to assume another estimate was better; therefore, FRA retains this assumption. The first test applies to rerouted PIH materials traffic, but not to eliminated PIH materials traffic. Under that test, the new route with PTC systems implemented must be at least as safe as the existing route would have been if the existing route

also been equipped with PTC systems. FRA believes that more than half of the rerouted traffic could pass this test, in part because railroads are trying to diminish risk with their rerouting. The second test, that would apply to both segments from which PIH materials traffic is rerouted and segments from which PIH materials traffic is eliminated, is that residual risk (with mitigations, if needed) is not higher than the average risk for Class I lines in the United States that are required to be PTC-equipped because of gross tonnage and the presence of PIH materials traffic. As noted in the discussion of costs through increased accident risk, the segments in question, based on FRA's review of the initial AAR data, appear on average to have lower than average traffic volumes than an average of all segments subject to the PTC requirement. FRA never fully developed that test, but FRA believes that some segments would have passed that test, although many might have needed some kind of mitigation. For purposes of this analysis, FRA continues to estimate the cost of mitigation at \$10,000 per mile in initial costs on the average and applies this to half of the segments subjected to the two tests. In other words, this analysis assumes that half of the mileage that may be excludable under the final rule would have been excludable under the 2010 PTC rule with some form of mitigation implemented, at an average cost of \$10,000 per mile. The \$10,000 per mile estimate includes resources that might have been expended to pass the tests.

Under the expected case, the assumptions presented mean that the mileage excluded (but that would have required mitigation) was 50 percent of 10,000 miles, or 5,000 miles. Therefore, the cost reduction (before the impact of passenger service is considered) would be \$10,000 per mile, multiplied by 5,000 miles, for a total of \$50 million. However, FRA notes from data submitted by AAR that many of the additional miles have passenger traffic. FRA did not consider those segments where an MTEA would not be available for the passenger traffic; but did consider segments that appeared to be eligible for an MTEA, though probably with some kind of mitigation. FRA used the same cost to estimate mitigation costs for these lines as well. In the expected case, FRA estimates that 550 miles of passenger routes will be affected and thus still requiring some mitigation to meet the MTEA criteria and offsetting the initial cost savings by 550 miles multiplied by \$10,000, for a total of \$5.5 million. In the expected case, the savings from eliminating the requirement for mitigation on the lines that would have passed the two tests with some mitigation will be \$44.5 million in initial costs (\$50 million minus \$5.5 million). All savings on initial costs will then be coupled with avoided maintenance costs throughout the remainder of the period analyzed.

FRA also notes that the mileage assumed to be affected by mitigation costs avoided is 3,500 miles at \$10,000 per mile in the low case and 7,000 miles at \$10,000 per mile in the high case.

As described above, under the 2010 PTC rule, FRA believes that only 50 percent of the segments from which PIH is removed would qualify for exclusion. The remaining segments would still require PTC installation. Under the accompanying final rule the two tests would no longer apply, so all of the segments would be excludable from the PTC network. For those segments that could not be excluded under the prior PTC rule, but that could be excluded under the final rule, the reduced initial cost would be the full cost of PTC wayside installation, or \$50,000 per mile. Therefore, in the expected case of 10,000 miles, 5,000 would have been excludable under the PTC rule (but would have required some mitigation), and the remaining 5,000 miles will now become excludable, with a reduction in initial costs of \$50,000 per mile. The initial cost savings

from not installing PTC systems on these segments will be 5,000 miles multiplied by \$50,000 per mile, for a total of \$250 million.

In this analysis, FRA assumes that the segments removed from the PTC network are relatively lower priority segments for purposes of PTC installation, so costs are assumed to be avoided in the last 2 years of PTC system implementation, with half in 2014 and half in 2015.

In discussions with FRA at the RSAC working group that developed the PTC rule, Class I railroads indicated that they would equip all of their over-the-road locomotives with PTC onboard apparatuses in order to avoid difficulties in managing power units. FRA believes this still holds true under the accompanying final rule. Further, FRA is not aware of any way to decrease any expenditures on central systems or development. FRA believes there will be little or no change on Class I systems in costs to equip locomotives or to develop or install central systems. There is a possibility that some Class I railroads may find a way to equip fewer locomotives in some situations where a captive locomotive fleet makes sense.

A more likely, but relatively small impact is that some Class II or III railroads may be able to avoid equipping locomotives under the final rule because the portion of the Class I railroad system on which they have trackage rights will no longer be PTC-equipped. (This is analyzed in the following section.) Further, although the costs of equipping rail-to-rail at-grade crossings (diamond crossings) is included in wayside costs, there may be some cases in which the Class II or III railroads are required to pay for wayside upgrades at the crossing. To the extent that the Class I railroad's track is removed from the PTC network under the final rule, the portion of the burdens falling on at-grade railroad crossings will also diminish. In data submitted to FRA, it appears that 19 of these crossings involving Class II or III railroads will be affected in the high case. FRA uses that data to estimate that 13 crossings involving Class II or III railroads will be affected in the expected case, and to estimate that 3 crossings involving Class III railroads will be affected in the expected case, based on data submitted by AAR.

3.4 Locomotive cost savings (benefit of the final rule)

In analyzing the economic impacts of the 2010 PTC rule, FRA did not develop a separate estimate of the number of locomotives affected that belong to Class II and III railroads. They were included in the industry total. However, in analyzing the impact on small entities for purposes of compliance with the Regulatory Flexibility Act, FRA estimated that 240 locomotives belonging to small entities (Class III railroads) will be affected. For the purposes of this analysis, FRA estimates that three times as many locomotives (720) belonging to Class II railroads will be affected, for a total of 960 Class II and Class III locomotives affected. This includes locomotives operating over either Class I railroads or passenger railroads. FRA requested comments regarding this assumption. AAR's aforementioned congressional testimony indicated that, without exclusions, approximately 73,000 of their miles would be affected. Therefore, if 14,000 miles were excluded as a result of this final rule (the high case), the total mileage impacted would decrease to 56,000 miles, declining by 20 percent. FRA assumes that if PTC system mileage were to decline by 20 percent, then Class II and Class III railroads could decrease the number of locomotives to be equipped by 16 percent (80 percent of 20 percent), or

154 locomotives, 39 of which belong to Class III railroads. Applying similar logic⁹ will yield a reduction of 110 locomotives equipped under the expected case, of which 28 belong to Class III railroads. Also using similar logic¹⁰ will yield a reduction of 77 locomotives under the low case, of which 19 belong to Class III railroads. In analyzing the 2010 PTC rule, FRA estimated the cost to equip a locomotive at \$55,000. Therefore, the initial cost savings related to equipping locomotives will be \$6,050,000 for the expected case, \$8,470,000 for the high case, and \$4,235,000 for the low case. This estimate was challenged in the comments from the Trade Associations, as discussed above in section 2.3.4, and as discussed above, FRA does not agree with those comments and retains the original estimate. Even if FRA accepted the estimate offered in comments FRA's estimate of locomotive cost savings would still yield net benefits for Class II and Class III railroads, and would only diminish net societal benefit estimates by approximately 0.6 percent, which would likely have little effect on the decision to adopt the final rule.

3.5 Maintenance cost savings (benefit of the final rule)

As in the 2010 PTC final rule analysis, FRA assumes that annual maintenance costs are 15 percent of the costs of the installed system as of the end of the previous year. Maintenance costs include training personnel to use and maintain the system, software management plans and implementation, inspection, repair, and testing, replacement parts cost and labor, and requalification of systems after original equipment parts are no longer manufactured, so new hardware must be introduced. The absolute costs of maintenance can be much larger than the original costs of procuring a system. The discounted costs are also larger, but not by as much as the undiscounted costs, because maintenance costs can only occur after a system is procured. The lower the discount rate, the greater the proportion of total costs attributable to maintenance. In this analysis, the initial procurements are evenly divided between 2014 and 2015, and maintenance costs are 15 percent of the installed base. Thus it does not matter which case is examined. Maintenance costs avoided are 59.04 percent of the total costs avoided using a 7 percent discount rate, and 65.87 percent of the total costs avoided using a 3 percent discount rate.

The Trade Associations' comments took issue with the assumption of maintenance costs being 15 percent of the value of the installed base, suggesting that the maintenance costs should be estimated at 12.5 percent of the value of the installed base. For reasons described above in response to comments, FRA retains its original estimate. Maintenance cost savings were 59 percent of the total benefit using a 7 percent discount factor and 65 percent of the total benefit using a 3 percent discount factor. Reducing maintenance costs by one-sixth (12.5 percent instead of 15 percent) would reduce the total benefit estimate by 10-11 percent. Even assuming the lower number of locomotives estimated by Peabody and the lower maintenance savings estimated by Peabody would not have any impact on the conclusions of the analysis, that benefits far exceed costs.

3.6 Timing of savings

FRA assumes that the segments withdrawn from the PTC network under the final rule will have

⁹ (10,000 miles/14,000 miles) x 154 locomotives.

¹⁰ (7,000 miles/14,000 miles) x 154 locomotives.

been lower priority segments for purposes of installation; therefore, the savings are toward the end of the 5-year installation period. FRA assumes that half of the initial system savings is in the last year of installation (2015) and the other half in the prior year (2014).

3.7 Rail-to-rail at-grade crossings

The cost savings associated with rail-to-rail at-grade crossing wayside improvements is included in the wayside cost discussion above, although in some instances the Class I railroad might not have been the party responsible for the costs of equipping the crossing with a PTC system, so the costs might have fallen on a Class II or III railroad. In analyzing the impacts on small entities for the 2010 PTC rule, FRA estimated operational costs at rail-to-rail crossings to be \$219,000 per year for Class III railroads. Finally, Class III railroads will avoid operational costs associated with having to reduce operating speeds to cross over two rail-to-rail crossings at an annual cost of \$43,800. These benefits to small railroads are a subset of the total benefits of reduced wayside costs described above. The cost impacts are discussed in the analysis of impacts on small entities contained in the preamble of the NPRM. FRA estimates that five small railroads will be affected by the reduced requirement to equip locomotives, and another two will be affected by the reduced requirements to take actions at rail-to-rail crossings, for a total of seven affected railroads. The total of seven affected Class III railroads is not a substantial number of small entities, given that there are 674 small railroads.

3.8 Total initial cost saving benefits

The total initial cost savings is the sum of the mitigation costs avoided: \$44.5 million for the expected case, \$59 million for the high case, or \$35 million for the low case; plus the initial wayside costs avoided: \$250 million for the expected case, \$350 million for the high case, or \$175 million for the low case; plus locomotive costs avoided: \$6.05 million for the expected case, \$8.47 million for the high case, or \$4.235 million for the low case. These add up to \$300,550,000 for the expected case, \$402,970,000 for the high case, or \$223,735,000, for the low case.

Table 1. Summary of Initial Costs Avoided

PTC system miles affected	
<i>Expected case</i>	<i>10,000</i>
High case	14,000
Low case	7,000
PTC rule mitigation cost/mile	\$10,000
Percent of miles avoidable under 2010 PTC rule	50%
Miles of mitigation installation avoided	
<i>Expected case</i>	<i>5,000</i>
High case	7,000
Low case	3,500
<i>Added mitigation, expected case</i>	<i>550</i>
Added mitigation, high case	1,100
Total mitigation installation costs avoided	
<i>Expected case</i>	<i>\$44,500,000</i>
High case	\$59,000,000
Low case	\$35,000,000
PTC wayside installation costs per mile	\$50,000
<i>PTC system miles avoided, expected case</i>	<i>5,000</i>
PTC system miles avoided, high case	7,000
PTC system miles avoided, low case	3,500
PTC wayside installation costs avoided	
<i>Expected case</i>	<i>\$250,000,000</i>
High case	\$350,000,000
Low case	\$175,000,000
PTC system analysis -- locomotive installation cost	\$55,000
<i>Locomotives affected, expected case</i>	<i>110</i>
Locomotives affected, high case	154
Locomotives affected, low case	77
<i>Initial locomotive savings, expected case</i>	<i>\$6,050,000</i>
Initial locomotive savings, high case	\$8,470,000
Initial locomotive savings, low case	\$4,235,000
Total initial costs avoided	
<i>Expected case</i>	<i>\$300,550,000</i>
High case	\$402,970,000
Low case	\$223,735,000

As in the analysis of the 2010 PTC rule, FRA also assumed that annual maintenance costs will total 15 percent of the initial installation costs for wayside components as well as locomotive components.

FRA then used these values as input to estimate discounted and annualized costs for expected, high, and low cases for the first 20 years at both 7 percent and 3 percent discount rates.

Table 2a. Expected Case Benefits– Total Costs Avoided, 7% Discount Factor

Year	Discount Factor	Initial Costs Avoided (wayside & locomotive)	Maintenance Avoided	Annual Costs Avoided	Discounted Costs Avoided
2012	1	\$0	\$0	\$0	\$0
2013	0.9345794	\$0	\$0	\$0	\$0
2014	0.8734387	\$150,275,000	\$0	\$150,275,000	\$131,256,005
2015	0.8162979	\$150,275,000	\$22,541,250	\$172,816,250	\$141,069,538
2016	0.7628952	\$0	\$45,082,500	\$45,082,500	\$34,393,223
2017	0.7129862	\$0	\$45,082,500	\$45,082,500	\$32,143,199
2018	0.6663422	\$0	\$45,082,500	\$45,082,500	\$30,040,373
2019	0.6227497	\$0	\$45,082,500	\$45,082,500	\$28,075,115
2020	0.5820091	\$0	\$45,082,500	\$45,082,500	\$26,238,425
2021	0.5439337	\$0	\$45,082,500	\$45,082,500	\$24,521,893
2022	0.5083493	\$0	\$45,082,500	\$45,082,500	\$22,917,657
2023	0.4750928	\$0	\$45,082,500	\$45,082,500	\$21,418,371
2024	0.444012	\$0	\$45,082,500	\$45,082,500	\$20,017,169
2025	0.4149644	\$0	\$45,082,500	\$45,082,500	\$18,707,635
2026	0.3878172	\$0	\$45,082,500	\$45,082,500	\$17,483,771
2027	0.362446	\$0	\$45,082,500	\$45,082,500	\$16,339,973
2028	0.3387346	\$0	\$45,082,500	\$45,082,500	\$15,271,003
2029	0.3165744	\$0	\$45,082,500	\$45,082,500	\$14,271,965
2030	0.2958639	\$0	\$45,082,500	\$45,082,500	\$13,338,285
2031	0.2765083	\$0	\$45,082,500	\$45,082,500	\$12,465,687
				Total	\$619,969,287
			Annualized Costs Avoided		\$58,520,715

Table 2b. Expected Case Benefits–Costs Avoided, 3% Discount Factor

Year	Discount Factor	Initial Costs Avoided (wayside & locomotive)	Maintenance Avoided	Annual Costs Avoided	Discounted Costs Avoided
2012	1	\$0	\$0	\$0	\$0
2013	0.970873786	\$0	\$0	\$0	\$0
2014	0.942595909	\$150,275,000	\$0	\$150,275,000	\$141,648,600
2015	0.915141659	\$150,275,000	\$22,541,250	\$172,816,250	\$158,151,350
2016	0.888487048	\$0	\$45,082,500	\$45,082,500	\$40,055,217
2017	0.862608784	\$0	\$45,082,500	\$45,082,500	\$38,888,561
2018	0.837484257	\$0	\$45,082,500	\$45,082,500	\$37,755,884
2019	0.813091511	\$0	\$45,082,500	\$45,082,500	\$36,656,198
2020	0.789409234	\$0	\$45,082,500	\$45,082,500	\$35,588,542
2021	0.766416732	\$0	\$45,082,500	\$45,082,500	\$34,551,982
2022	0.744093915	\$0	\$45,082,500	\$45,082,500	\$33,545,614
2023	0.722421277	\$0	\$45,082,500	\$45,082,500	\$32,568,557
2024	0.70137988	\$0	\$45,082,500	\$45,082,500	\$31,619,958
2025	0.68095134	\$0	\$45,082,500	\$45,082,500	\$30,698,989
2026	0.661117806	\$0	\$45,082,500	\$45,082,500	\$29,804,843
2027	0.641861947	\$0	\$45,082,500	\$45,082,500	\$28,936,741
2028	0.623166939	\$0	\$45,082,500	\$45,082,500	\$28,093,924
2029	0.605016446	\$0	\$45,082,500	\$45,082,500	\$27,275,654
2030	0.587394608	\$0	\$45,082,500	\$45,082,500	\$26,481,217
2031	0.570286027	\$0	\$45,082,500	\$45,082,500	\$25,709,920
				Total	\$818,031,752
			Annualized Costs Avoided		\$54,984,583

Table 2c. High Case Benefits–Costs Avoided, 7% Discount Factor

Year	Discount Factor	Initial Costs Avoided (wayside & locomotive)	Maintenance Avoided	Annual Costs Avoided	Discounted Costs Avoided
2012	1	\$0	\$0	\$0	\$0
2013	0.934579	\$0	\$0	\$0	\$0
2014	0.873439	\$201,485,000	\$0	\$201,485,000	\$175,984,802
2015	0.816298	\$201,485,000	\$30,222,750	\$231,707,750	\$189,142,544
2016	0.762895	\$0	\$60,445,500	\$60,445,500	\$46,113,583
2017	0.712986	\$0	\$60,445,500	\$60,445,500	\$43,096,806
2018	0.666342	\$0	\$60,445,500	\$60,445,500	\$40,277,389
2019	0.62275	\$0	\$60,445,500	\$60,445,500	\$37,642,420
2020	0.582009	\$0	\$60,445,500	\$60,445,500	\$35,179,831
2021	0.543934	\$0	\$60,445,500	\$60,445,500	\$32,878,347
2022	0.508349	\$0	\$60,445,500	\$60,445,500	\$30,727,427
2023	0.475093	\$0	\$60,445,500	\$60,445,500	\$28,717,222
2024	0.444012	\$0	\$60,445,500	\$60,445,500	\$26,838,525
2025	0.414964	\$0	\$60,445,500	\$60,445,500	\$25,082,734
2026	0.387817	\$0	\$60,445,500	\$60,445,500	\$23,441,807
2027	0.362446	\$0	\$60,445,500	\$60,445,500	\$21,908,231
2028	0.338735	\$0	\$60,445,500	\$60,445,500	\$20,474,982
2029	0.316574	\$0	\$60,445,500	\$60,445,500	\$19,135,497
2030	0.295864	\$0	\$60,445,500	\$60,445,500	\$17,883,642
2031	0.276508	\$0	\$60,445,500	\$60,445,500	\$16,713,684
				Total	\$831,239,473
			Annualized Costs Avoided		\$78,463,126

Table 2d. High Case Benefits–Costs Avoided, 3% Discount Factor

Year	Discount Factor	Initial Costs Avoided (wayside & locomotive)	Maintenance Avoided	Annual Costs Avoided	Discounted Costs Avoided
2012	1	\$0	\$0	\$0	\$0
2013	0.970874	\$0	\$0	\$0	\$0
2014	0.942596	\$201,485,000	\$0	\$201,485,000	\$189,918,937
2015	0.915142	\$201,485,000	\$30,222,750	\$231,707,750	\$212,045,415
2016	0.888487	\$0	\$60,445,500	\$60,445,500	\$53,705,044
2017	0.862609	\$0	\$60,445,500	\$60,445,500	\$52,140,819
2018	0.837484	\$0	\$60,445,500	\$60,445,500	\$50,622,155
2019	0.813092	\$0	\$60,445,500	\$60,445,500	\$49,147,723
2020	0.789409	\$0	\$60,445,500	\$60,445,500	\$47,716,236
2021	0.766417	\$0	\$60,445,500	\$60,445,500	\$46,326,443
2022	0.744094	\$0	\$60,445,500	\$60,445,500	\$44,977,129
2023	0.722421	\$0	\$60,445,500	\$60,445,500	\$43,667,115
2024	0.70138	\$0	\$60,445,500	\$60,445,500	\$42,395,258
2025	0.680951	\$0	\$60,445,500	\$60,445,500	\$41,160,444
2026	0.661118	\$0	\$60,445,500	\$60,445,500	\$39,961,596
2027	0.641862	\$0	\$60,445,500	\$60,445,500	\$38,797,666
2028	0.623167	\$0	\$60,445,500	\$60,445,500	\$37,667,637
2029	0.605016	\$0	\$60,445,500	\$60,445,500	\$36,570,522
2030	0.587395	\$0	\$60,445,500	\$60,445,500	\$35,505,361
2031	0.570286	\$0	\$60,445,500	\$60,445,500	\$34,471,224
				Total	\$1,096,796,723
			Annualized Costs Avoided		\$73,721,968

Table 2e. Low Case Benefits–Costs Avoided, 7% Discount Factor

Year	Discount Factor	Initial Costs Avoided (wayside & locomotive)	Maintenance Avoided	Annual Costs Avoided	Discounted Costs Avoided
2012	1	\$0	\$0	\$0	\$0
2013	0.934579	\$0	\$0	\$0	\$0
2014	0.873439	\$111,867,500	\$0	\$111,867,500	\$97,709,407
2015	0.816298	\$111,867,500	\$16,780,125	\$128,647,625	\$105,014,783
2016	0.762895	\$0	\$33,560,250	\$33,560,250	\$25,602,954
2017	0.712986	\$0	\$33,560,250	\$33,560,250	\$23,927,994
2018	0.666342	\$0	\$33,560,250	\$33,560,250	\$22,362,612
2019	0.62275	\$0	\$33,560,250	\$33,560,250	\$20,899,637
2020	0.582009	\$0	\$33,560,250	\$33,560,250	\$19,532,371
2021	0.543934	\$0	\$33,560,250	\$33,560,250	\$18,254,552
2022	0.508349	\$0	\$33,560,250	\$33,560,250	\$17,060,329
2023	0.475093	\$0	\$33,560,250	\$33,560,250	\$15,944,233
2024	0.444012	\$0	\$33,560,250	\$33,560,250	\$14,901,152
2025	0.414964	\$0	\$33,560,250	\$33,560,250	\$13,926,311
2026	0.387817	\$0	\$33,560,250	\$33,560,250	\$13,015,244
2027	0.362446	\$0	\$33,560,250	\$33,560,250	\$12,163,779
2028	0.338735	\$0	\$33,560,250	\$33,560,250	\$11,368,018
2029	0.316574	\$0	\$33,560,250	\$33,560,250	\$10,624,316
2030	0.295864	\$0	\$33,560,250	\$33,560,250	\$9,929,267
2031	0.276508	\$0	\$33,560,250	\$33,560,250	\$9,279,689
				Total	\$461,516,648
			Annualized Costs Avoided		\$43,563,907

Table 2f. Low Case Benefits–Costs Avoided, 3% Discount Factor

Year	Discount Factor	Initial Costs Avoided (wayside & locomotive)	Maintenance Avoided	Annual Costs Avoided	Discounted Costs Avoided
2012	1	\$0	\$0	\$0	\$0
2013	0.970874	\$0	\$0	\$0	\$0
2014	0.942596	\$111,867,500	\$0	\$111,867,500	\$105,445,848
2015	0.915142	\$111,867,500	\$16,780,125	\$128,647,625	\$117,730,801
2016	0.888487	\$0	\$33,560,250	\$33,560,250	\$29,817,847
2017	0.862609	\$0	\$33,560,250	\$33,560,250	\$28,949,366
2018	0.837484	\$0	\$33,560,250	\$33,560,250	\$28,106,181
2019	0.813092	\$0	\$33,560,250	\$33,560,250	\$27,287,554
2020	0.789409	\$0	\$33,560,250	\$33,560,250	\$26,492,771
2021	0.766417	\$0	\$33,560,250	\$33,560,250	\$25,721,137
2022	0.744094	\$0	\$33,560,250	\$33,560,250	\$24,971,978
2023	0.722421	\$0	\$33,560,250	\$33,560,250	\$24,244,639
2024	0.70138	\$0	\$33,560,250	\$33,560,250	\$23,538,484
2025	0.680951	\$0	\$33,560,250	\$33,560,250	\$22,852,897
2026	0.661118	\$0	\$33,560,250	\$33,560,250	\$22,187,279
2027	0.641862	\$0	\$33,560,250	\$33,560,250	\$21,541,047
2028	0.623167	\$0	\$33,560,250	\$33,560,250	\$20,913,638
2029	0.605016	\$0	\$33,560,250	\$33,560,250	\$20,304,503
2030	0.587395	\$0	\$33,560,250	\$33,560,250	\$19,713,110
2031	0.570286	\$0	\$33,560,250	\$33,560,250	\$19,138,942
				Total	\$608,958,024
			Annualized Costs Avoided		\$40,931,544

The costs that will be avoided under the final rule are presented in Tables 3, 4, and 5. FRA analyzed the maintenance costs and found that under the expected case as well as the two additional scenarios analyzed to determine sensitivity, both for wayside and locomotive components, the maintenance costs were 59.04 percent of the total cost savings when discounted at 7 percent, and 65.87 percent of that total when discounted at 3 percent.

Table 3. Summary of Benefits (Costs Avoided) Over 20 years

Total of all Benefits				
	Total Discounted Benefits		Annualized Benefits	
Discount Factor	7%	3%	7%	3%
<i>Expected Case</i>	\$619,969,287	\$818,031,752	\$58,520,715	\$54,984,583
High Case	\$831,239,473	\$1,096,796,723	\$78,463,126	\$73,721,968
Low Case	\$461,516,648	\$608,958,024	\$43,563,907	\$40,931,544

Table 4. Benefits (Costs Avoided) By Category Over 20 Years

1. Reduced Mitigation Costs, Including Maintenance				
	Total Discounted Benefits		Annualized Benefits	
Discount Factor	7%	3%	7%	3%
<i>Expected Case</i>	\$91,793,822	\$121,119,324	\$8,664,687	\$8,141,121
High Case	\$121,704,169	\$160,585,172	\$11,488,013	\$10,793,846
Low Case	\$72,197,388	\$95,262,390	\$6,814,923	\$6,403,129
2. Reduced Wayside Costs, Including Maintenance				
	Total Discounted Benefits		Annualized Benefits	
Discount Factor	7%	3%	7%	3%
<i>Expected Case</i>	\$515,695,631	\$680,445,643	\$48,678,019	\$45,736,635
High Case	\$721,973,883	\$952,623,900	\$68,149,227	\$64,031,290
Low Case	\$360,986,942	\$476,311,950	\$34,074,614	\$32,015,645
3. Reduced Locomotive Costs, Including Maintenance				
	Total Discounted Benefits		Annualized Benefits	
Discount Factor	7%	3%	7%	3%
<i>Expected Case</i>	\$12,479,834	\$16,466,785	\$1,178,008	\$1,106,827
High Case	\$17,471,768	\$23,053,498	\$1,649,211	\$1,549,557
Low Case	\$8,735,884	\$11,526,749	\$824,606	\$774,779

Given the large portion of total benefits comprised of maintenance costs avoided, these are separated out. The table below presents total maintenance cost savings for wayside and locomotive components.

Table 5. Reduced Total Maintenance Costs

Discount Factor	7%	3%	7%	3%
<i>Expected Case</i>	\$366,044,119	\$538,860,239	\$34,551,975	\$36,219,872
High Case	\$490,782,893	\$722,490,469	\$46,326,433	\$48,562,708
Low Case	\$272,490,038	\$401,137,566	\$25,721,132	\$26,962,745

4. Costs – Diminished Benefit of Accident Reduction

The costs associated with the accompanying final rule come from a reduction of the benefits that would have resulted from implementation of PTC components along certain lines beginning in 2015 and are comprised of foregone accident prevention benefits. In the analysis of the 2010 PTC rule, FRA estimated that the benefit in 2015 would have been \$55,351,026 and in subsequent years it would have been \$65,118,854. In order to estimate the cost impact of eliminating the two tests in this analysis, the reduced benefit of the 2010 PTC rule in the year 2015 is estimated to be half of the reduced benefit of each of the subsequent years beginning in 2016. Since half of the implementation costs avoided would have been incurred in 2014, and half in 2015, the safety impacts should be considered until 2015 and 2016, respectively. The track removal from the PTC network will not affect the accident reduction that would have taken place in absence of this final rule until after it would have been placed in PTC service.

The elimination of both tests for exclusion of PTC lines will not come close to eliminating the benefits of the PTC rule to the same extent as the costs for several reasons. For example, the “headline accidents” in the analysis of the PTC rule either involve a passenger train or a substantial release of PIH material, neither of which is likely to occur on the segments that will be withdrawn from the PTC network under this final rule. Headline accidents were 41.08 percent of the total accident reduction benefits in the analysis of the 2010 PTC rule, and other accidents comprised the remaining 58.92 percent—only the latter types of accidents are likely to be affected by the final rule. FRA sought and received comment on the exclusion of headline accidents from foregone benefits of the proposed rule. The Trade Associations commented that the risk on segments removed from the PTC network was better represented by the entire risk of non-headline accidents, and that removing the estimated risk of headline accidents and then taking a reduction to 60 percent of the remaining accident risk resulted in understating the costs of increased accident risk, a sort of double counting. FRA disagrees. There were no headline accidents that did not include passenger service or PIH materials. None of those will be on excluded segments. The railroads submitted data showing that the affected segments had an average of 3 PTC preventable accidents per year on 16.8 percent of the PTC network, while the nationwide basis for the original accident reduction benefit was 52 accidents per year. The PTC preventable accident risk on the excluded segments was 36 percent of the risk of non-headline PTC preventable accidents used in analyzing the 2010 PTC final rule. As a conservative estimate, FRA used a value of 60% to estimate the accident benefits that would no longer occur on segments removed from the PTC network, a value that leads to a higher estimate of costs than a value of 36% would have.

The rerouted traffic will not add to the risk on the lines they are rerouted to, as they will be rerouted either to PTC-equipped lines or to relatively low volume lines subject to the *de minimis* exception, hence to lines with equal or less risk. In other words the risk will be “transferred” from one line to another. However, the remaining traffic on lines no longer equipped with PTC systems will no longer benefit from the reduced risk.

In the 2010 PTC rule analysis, FRA estimated that PTC wayside components would be installed on roughly 70,000 miles, and AAR congressional testimony also refers to a PTC network of 70,000 miles. Thus, this analysis also uses a 70,000 mile network as the basis for analysis. As

with the cost savings analysis, the benefit reduction analysis presents the expected impacts of 10,000 miles excluded as well as the impacts associated with the cases in which 7,000 and 14,000 miles are excluded. In the high case, the railroads would reduce their PTC network mileage by 14,000 miles, which is 20 percent of the 70,000 mile network. (20 percent x 70,000 = 14,000) FRA, based on its review of the AAR submitted data, also assumed for this analysis that the segments from which PIH materials traffic is rerouted or eliminated have relatively less dense traffic, which reduces accident exposure, than the average segment along which PTC systems must be implemented due to the presence of PIH or passenger traffic. Thus, FRA used an estimate of 60 percent of average risk for those segments. FRA requests comments on this assumption. As noted above, FRA received comment on this assumption from the Trade Associations. FRA believes the 60 percent assumption is more conservative than the actual experienced rate of 36 percent. Thus, FRA retains the original assumption.

Therefore, in the high case, the risk increase will be 7.07 percent determined as follows:

$$\begin{array}{l}
 58.92 \text{ percent (the non-headline accident percentage)} \\
 \times 20 \text{ percent, (14,000 miles excluded divided by the total system of 70,000 miles)} \\
 \underline{\times 60 \text{ percent (the relative accident exposure on those segments)}} \\
 7.07 \text{ percent}
 \end{array}$$

This means that excluding the segments in the high case will increase risk by 7.07 percent of the total risk avoided as estimated in the analysis of the 2010 PTC rule. The value of the total risk avoided was \$65,118,854 per year, beginning in 2016. Therefore, in the years when the full impact of the final rule eventuates, the increased accident risk will be \$4,604,163 per year (7.07 percent of \$65,116,854). This impact will occur in years 2016 and beyond. In 2015, only half the impact will occur, so the accident risk increase will be half that, or \$2,302,082. Similar calculations were applied to the expected and low cases, but because the high case was a relatively even percentage (20 percent of the total system), FRA used the high case in this instance to illustrate the mechanics of the calculations. All the calculations are shown in the following table.

Table 6. Diminished Accident Benefit Reduction (Costs of the Final Rule) Accident Benefit Reduction

From the 2010 PTC Rule			
Annual accident reduction	\$65,118,854		
Total PTC system miles		70,000	
Proportion of system			
	<i>Expected Case</i>	High Case	Low Case
	14.29%	20.00%	10.00%
Proportion of non-headline accidents			
	58.92%		
Relative traffic risk		60%	
Proportion of risk from PTC study			
	<i>Expected Case</i>	High Case	Low Case
	5.05%	7.07%	3.54%
Percent of benefit reduction in 2015		50%	
Annual PTC Benefit Reduction			
	<i>Expected Case</i>	High Case	Low Case
2015	\$1,644,344	\$2,302,082	\$1,151,041
2016 and beyond	\$3,288,688	\$4,604,163	\$2,302,082

These annual benefit reduction estimates were then used to calculate 20-year discounted and annualized costs at 7 percent and 3 percent, in Tables 7a and 7b.

Table 7a. Costs–Discounted Diminution of Accident Reduction, 7% Discount Factor (20 years)

Year	Discount Factor	Current Annual Benefit			Discounted Annual Benefit		
		Expected	High	Low	Expected	High	Low
		Case	Case	Case	Case	Case	Case
2012	1	\$0	\$0	\$0	\$0	\$0	\$0
2013	0.934579	\$0	\$0	\$0	\$0	\$0	\$0
2014	0.873439	\$0	\$0	\$0	\$0	\$0	\$0
2015	0.816298	\$1,644,344	\$2,302,082	\$1,151,041	\$1,342,275	\$1,879,184	\$939,592
2016	0.762895	\$3,288,688	\$4,604,163	\$2,302,082	\$2,508,924	\$3,512,494	\$1,756,247
2017	0.712986	\$3,288,688	\$4,604,163	\$2,302,082	\$2,344,789	\$3,282,705	\$1,641,352
2018	0.666342	\$3,288,688	\$4,604,163	\$2,302,082	\$2,191,392	\$3,067,949	\$1,533,974
2019	0.62275	\$3,288,688	\$4,604,163	\$2,302,082	\$2,048,030	\$2,867,242	\$1,433,621
2020	0.582009	\$3,288,688	\$4,604,163	\$2,302,082	\$1,914,046	\$2,679,665	\$1,339,833
2021	0.543934	\$3,288,688	\$4,604,163	\$2,302,082	\$1,788,828	\$2,504,360	\$1,252,180
2022	0.508349	\$3,288,688	\$4,604,163	\$2,302,082	\$1,671,802	\$2,340,523	\$1,170,262
2023	0.475093	\$3,288,688	\$4,604,163	\$2,302,082	\$1,562,432	\$2,187,405	\$1,093,702
2024	0.444012	\$3,288,688	\$4,604,163	\$2,302,082	\$1,460,217	\$2,044,304	\$1,022,152
2025	0.414964	\$3,288,688	\$4,604,163	\$2,302,082	\$1,364,689	\$1,910,564	\$955,282
2026	0.387817	\$3,288,688	\$4,604,163	\$2,302,082	\$1,275,410	\$1,785,574	\$892,787
2027	0.362446	\$3,288,688	\$4,604,163	\$2,302,082	\$1,191,972	\$1,668,761	\$834,380
2028	0.338735	\$3,288,688	\$4,604,163	\$2,302,082	\$1,113,992	\$1,559,589	\$779,795
2029	0.316574	\$3,288,688	\$4,604,163	\$2,302,082	\$1,041,114	\$1,457,560	\$728,780
2030	0.295864	\$3,288,688	\$4,604,163	\$2,302,082	\$973,004	\$1,362,206	\$681,103
2031	0.276508	\$3,288,688	\$4,604,163	\$2,302,082	\$909,350	\$1,273,090	\$636,545
				Total	\$26,702,267	\$37,383,174	\$18,691,587
				Annualized	\$2,520,505	\$3,528,707	\$1,764,354

Table 7b. Costs–Discounted Diminution of Accident Reduction, 3% Discount Factor (20 years)

Year	Discount Factor	Current Annual Benefit			Discounted Annual Benefit		
		Expected	High	Low	Expected	High	Low
		Case	Case	Case	Case	Case	Case
2012	1	\$0	\$0	\$0	\$0	\$0	\$0
2013	0.970874	\$0	\$0	\$0	\$0	\$0	\$0
2014	0.942596	\$0	\$0	\$0	\$0	\$0	\$0
2015	0.915142	\$1,644,344	\$2,302,082	\$1,151,041	\$1,504,808	\$2,106,731	\$1,053,365
2016	0.888487	\$3,288,688	\$4,604,163	\$2,302,082	\$2,921,957	\$4,090,740	\$2,045,370
2017	0.862609	\$3,288,688	\$4,604,163	\$2,302,082	\$2,836,851	\$3,971,592	\$1,985,796
2018	0.837484	\$3,288,688	\$4,604,163	\$2,302,082	\$2,754,225	\$3,855,914	\$1,927,957
2019	0.813092	\$3,288,688	\$4,604,163	\$2,302,082	\$2,674,004	\$3,743,606	\$1,871,803
2020	0.789409	\$3,288,688	\$4,604,163	\$2,302,082	\$2,596,121	\$3,634,569	\$1,817,285
2021	0.766417	\$3,288,688	\$4,604,163	\$2,302,082	\$2,520,506	\$3,528,708	\$1,764,354
2022	0.744094	\$3,288,688	\$4,604,163	\$2,302,082	\$2,447,093	\$3,425,930	\$1,712,965
2023	0.722421	\$3,288,688	\$4,604,163	\$2,302,082	\$2,375,818	\$3,326,146	\$1,663,073
2024	0.70138	\$3,288,688	\$4,604,163	\$2,302,082	\$2,306,620	\$3,229,268	\$1,614,634
2025	0.680951	\$3,288,688	\$4,604,163	\$2,302,082	\$2,239,437	\$3,135,211	\$1,567,606
2026	0.661118	\$3,288,688	\$4,604,163	\$2,302,082	\$2,174,210	\$3,043,894	\$1,521,947
2027	0.641862	\$3,288,688	\$4,604,163	\$2,302,082	\$2,110,884	\$2,955,237	\$1,477,619
2028	0.623167	\$3,288,688	\$4,604,163	\$2,302,082	\$2,049,402	\$2,869,162	\$1,434,581
2029	0.605016	\$3,288,688	\$4,604,163	\$2,302,082	\$1,989,710	\$2,785,595	\$1,392,797
2030	0.587395	\$3,288,688	\$4,604,163	\$2,302,082	\$1,931,758	\$2,704,461	\$1,352,230
2031	0.570286	\$3,288,688	\$4,604,163	\$2,302,082	\$1,875,493	\$2,625,690	\$1,312,845
				Total	\$39,308,896	\$55,032,454	\$27,516,227
				Annualized	\$2,642,175	\$3,699,045	\$1,849,523

For purposes of this analysis, FRA assumed that the proportion of costs attributable to each accident cost element will be the same as in the analysis of the 2010 PTC rule. For example, fatality costs (\$16,457,143 per year in PTC-preventable accidents (PPA) costs avoided) were 42.89 percent of the annual accident reduction benefit (\$38,368,895) in the analysis of the 2010 PTC rule. Likewise, they represent 42.89 percent of the foregone accident reduction in this analysis. For a more thorough discussion of PPAs please see FRA’s analysis of the PTC Rule.¹¹ The proportion of costs (by element) is shown in Table 8.

¹¹ U.S. DOT/FRA–Positive Train Control Systems, Final Rule, Regulatory Impact Analysis, Document ID: FRA-2008-0132-0060.1, Docket ID: FRA-2008-0132.

Table 8. Proportions of Accident Costs used in the 2010 PTC Rule Analysis¹²

PTC Rule Benefits by Category	Total Annual PPA (Volpe Center Analysis)	Percentage
Fatalities	\$16,457,143	42.89%
Injuries	\$6,113,333	15.93%
Train Delay	\$169,259	0.44%
Property Damage	\$14,604,570	38.06%
Equipment Clean Up	\$205,872	0.54%
Environmental Cleanup	\$619,303	1.61%
Evacuations	\$199,416	0.52%
Total	\$38,368,895	100.00%

The costs of the rule through diminished accident reduction are summarized in Table 9. These were derived applying the proportions in the Table 8 to the totals in Table 7a (for 7 percent discount rate) and Table 7b (for 3 percent discount rate).

¹² U.S. DOT/FRA–Positive Train Control Systems, Final Rule, Regulatory Impact Analysis, Document ID: FRA-2008-0132-0060.1, Docket ID: FRA-2008-0132.

Table 9. Summary of Costs of the Final Rule (20 years)

Costs of the final rule by category (20-year, 7% discount)			
Foregone Reductions in:	<i>Expected Case</i>	High Case	Low Case
Fatality Prevention	\$11,453,106	\$16,034,349	\$8,017,174
Injury Prevention	\$4,254,484	\$5,956,278	\$2,978,139
Train Delay	\$117,793	\$164,911	\$82,455
Property Damage	\$10,163,835	\$14,229,369	\$7,114,685
Equipment Clean Up	\$143,273	\$200,583	\$100,291
Environmental Cleanup	\$430,995	\$603,393	\$301,696
Evacuations	\$138,780	\$194,292	\$97,146
Total	\$26,702,267	\$37,383,174	\$18,691,587
Costs of the final rule by category (20-year, 3% discount)			
Foregone Reductions in:	<i>Expected Case</i>	High Case	Low Case
Fatality Prevention	\$16,860,327	\$23,604,458	\$11,802,229
Injury Prevention	\$6,263,104	\$8,768,346	\$4,384,173
Train Delay	\$173,406	\$242,768	\$121,384
Property Damage	\$14,962,367	\$20,947,314	\$10,473,657
Equipment Clean Up	\$210,915	\$295,282	\$147,641
Environmental Cleanup	\$634,475	\$888,265	\$444,133
Evacuations	\$204,301	\$286,021	\$143,011
Total	\$39,308,896	\$55,032,454	\$27,516,227
Annualized costs of the final rule by category (20-year, 7% discount)			
Foregone Reductions in:	<i>Expected Case</i>	High Case	Low Case
Fatality Prevention	\$1,081,092	\$1,513,529	\$756,765
Injury Prevention	\$401,593	\$562,231	\$281,115
Train Delay	\$11,119	\$15,566	\$7,783
Property Damage	\$959,394	\$1,343,152	\$671,576
Equipment Clean Up	\$13,524	\$18,934	\$9,467
Environmental Cleanup	\$40,683	\$56,956	\$28,478
Evacuations	\$13,100	\$18,340	\$9,170
Total	\$2,520,505	\$3,528,707	\$1,764,354
Annualized costs of the final rule by category (20-year, 3% discount)			
Foregone Reductions in:	<i>Expected Case</i>	High Case	Low Case
Fatality Prevention	\$1,133,279	\$1,586,590	\$793,295
Injury Prevention	\$420,979	\$589,371	\$294,685
Train Delay	\$11,656	\$16,318	\$8,159
Property Damage	\$1,005,706	\$1,407,989	\$703,994
Equipment Clean Up	\$14,177	\$19,848	\$9,924
Environmental Cleanup	\$42,647	\$59,705	\$29,853
Evacuations	\$13,732	\$19,225	\$9,613
Total	\$2,642,175	\$3,699,045	\$1,849,523

5. Relationship Between Benefits and Costs

Under the expected case, as well as the two other cases analyzed for sensitivity purposes, the cost-saving benefits are far greater than the foregone accident reduction costs. The net benefits are summarized in Table 10.

Table 10. Summary of Net Benefits of the Final Rule Over 20 Years

Discount Factor	Total Discounted Net Benefits		Annualized Net Benefits	
	7%	3%	7%	3%
<i>Expected Case</i>	\$593,267,020	\$778,722,856	\$56,000,210	\$52,342,408
High Case	\$793,856,299	\$1,041,764,269	\$74,934,419	\$70,022,922
Low Case	\$442,825,061	\$581,441,797	\$41,799,553	\$39,082,022

In all of the scenarios analyzed the benefit/cost ratio was between 20 and 25.

Table 11. Benefit/Cost Ratios

Discount Factor	7%	3%
<i>Expected Case</i>	23.22	20.81
High Case	22.24	19.93
Low Case	24.69	22.13

In conclusion, FRA believes that the benefits of this final rule provide regulatory relief far in excess of the costs. The \$593 million (discounted at 7 percent over 20 years) or \$779 million (discounted at 3 percent over 20 years) that will not be spent on PTC system implementation along lower-risk routes will be freed for use in capacity enhancements and other initiatives with potentially higher economic and safety return. This rulemaking is consistent with the expressed goals of Executive Order 13563 to design regulations so that they are cost effective, evidence-based, and compatible with economic growth, job creation, and competitiveness.