

Federal Railroad Administration's Positive Train Control (PTC) Rule
ACC/CI/TFI Meeting with the Office of Management and Budget
July 12, 2010

Introduction

Industry Participants

Arthur Dungan – Chlorine Institute
Pamela Guffain – The Fertilizer Institute
Robyn Heald – Chlorine Institute
Robert Mulholland – Peabody & Associates
Thomas Schick – American Chemistry Council
Jeffrey Sloan – American Chemistry Council

Meeting objectives: Organizations representing chemical shippers will discuss:

- Concerns with FRA's regulatory impact analysis of the PTC Rule;
- The Chlorine Institute's petition to FRA, and findings from the report by Peabody & Associates on the total costs and benefits of the Rule;
- The need for FRA to publish corrected regulatory impact analysis.

FRA improperly excluded majority of PTC benefits in Final Rule

- "Business benefits" of PTC expected to accrue to railroads, to shippers and to society resulting from improved rail transit times and reliability
 - *Cost savings to railroads and shippers from improved supply-chain efficiency*
 - *Reduced fuel consumption*
 - *Lower inventory carrying costs*
 - *Benefits to society from modal diversion of freight from highways to rail (developed by FRA using FRA's ITIC model)*
 - *Reduced emissions*
 - *Reduced crashes*
 - *Reduced highway congestion*
- Previous FRA analyses have recognized and incorporated these benefits
 - *2004 report commissioned by FRA and developed by ZETA-TECH*
 - *2004 FRA Report to Congress based on ZETA-TECH analysis and industry feedback*
 - *In 2009, FRA updated its 2004 Report as part of its economic analysis supporting its NPRM including an update of its 2004 benefits calculations*
 - *NPRM RIA only includes railroad safety benefits and excludes updated societal benefits and other business benefits*
 - *In 2010, FRA again updated its full economic analysis including non-railroad-safety benefits but FRA Final Rule RIA continued to only include railroad safety benefits and exclude all other benefits.*

- FRA's decision is inconsistent with OMB guidance
 - *OMB Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," Section 6: Identifying and Measuring Benefits and Costs*
 - *"Analyses should include comprehensive estimates of the expected benefits and costs to society based on established definitions and practices for program and policy evaluation."*
 - *FRA's decision is also inconsistent with Executive Order 12866, "Regulatory Planning and Review"*
 - *FRA acknowledged but excluded societal and business benefits in the final rule for purposes of comparing only costs to benefits associated with the rule.*
 - *FRA cites uncertainty regarding "whether and when" benefits will accrue*
 - *Uncertainty is an inherent challenge in CBA so it has become customary to develop a range of costs and benefits*

Peabody analysis estimates full range of costs and benefits of PTC rule based on FRA economic analysis

- If all estimated costs and benefits were properly considered, the benefits of the PTC rule outweigh the costs over a 20-year time horizon
 - *Based on Peabody report, cost-benefit ratio is 0.86 based with 7% discount rate based on consideration of all direct and indirect costs and benefits*
 - *FRA's stated cost-benefit ratio associated with the rule ranges from 19.6 (3% discount rate) to 21.7 (7% discount rate) based on consideration of direct railroad costs and direct railroad safety benefits only*
 - *Presented as a ratio of 20 to 1 in Final Rule*
- Review of Peabody methodology
 - *Analysis includes a restatement of benefits using FRA's unit-cost estimates and methodologies previously used in FRA's analysis*
- Key corrections and additions to FRA analysis
 - *Developed updated business and societal benefits estimates using FRA's "business benefits" framework corrected to account for methodological and mathematical errors*
 - *Also restated estimates using 2009-real-dollar basis by indexing FRA's unit-cost components to account for inflation*
 - *Restatement showed that for the first time FRA incorrectly excluded large classes of benefits and that including these benefits as developed by FRA would have resulted in a far different CBA outcome and conclusion, which is also presented in the Peabody report.*

Revised RIA is needed to correct public record

- RIA may be used to support unfair rate policies on TIH shippers.
- Flawed analysis of PTC costs and benefits undermines the credibility of the Rail Safety Improvement Act.
- Accurate information from FRA is needed to inform future policy decisions



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March 16, 2010

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RE: Docket No. FRA-2008-0132—Petition for Reconsideration

Background

This Petition for Reconsideration is submitted by the Chlorine Institute, Inc. (the "Institute"), in response to the Final Rule published in the Federal Register on January 15, 2010 (75 Fed. Reg. 2598), under Docket FRA 2008-0132, with respect to Positive Train Control (PTC). Attached to this Petition and incorporated herein are three Partial Reports prepared for the Institute by L. E. Peabody & Associates, Inc. ("Peabody"). These Partial Reports are designated as: Potential Economic Harm To TIH Shippers Resulting From The Railroads Implementation Of Positive Train Control (Exhibit I); Summary of Key Literature Reviewed and Bibliography of Important PTC-Related Documents (Exhibit II); and Positive Train Control Benefits Analysis: Updated Statement of Total Benefits and Restatement of FRA Cost-Benefit Analysis Based on FRA Costs and Updated Benefits (Exhibit III).

The Institute filed comments on August 20, 2009, in response to the Notice of Proposed Rulemaking in this Docket. In those comments, the Institute expressed two primary concerns: First, that by limiting the implementation of PTC technology to passenger and TIH carrying mainline tracks, the full benefits of PTC might not be obtained; and second, that the recent and ongoing efforts of the Class I railroads to eliminate the transportation of vital TIH rail shipments, certainly including chlorine, would be aided by the narrow application of PTC technology and allow the railroads to impose a very large percentage of PTC costs on TIH shipments, thereby pricing TIH materials off the rails and onto the highways. This Petition for Reconsideration deals primarily with the latter concern.

Economic Harm to TIH Shippers

As noted in Exhibit I, the railroads have already announced that they will attempt to recover their investment in PTC from those shippers offering TIH materials for rail movement. These efforts will have a direct and substantial impact on prospective TIH rail shippers and a strong incentive to move TIH shipments from the safer rail mode to the less safe highway mode of transportation. Certainly, TIH shippers will also be negatively impacted by the railroads rolling their PTC investments on regulated

shipments into their regulatory rate base thereby leading to a double recovery of PTC costs well into the future as pointed out by Peabody in Exhibit I.

The Flawed Cost/Benefit Analysis

In its regulatory impact analysis presented in the PTC final rule, FRA made the following statements at 75 Fed. Reg. 2684:

Two types of benefits are expected to result from the implementation of this final rule – benefits from railroad accident reduction and business benefits from efficiency gains.

FRA also expects that once PTC systems are refined, there would likely be substantial additional business benefits resulting from more efficient transportation service; however, such benefits are not included because of significant uncertainties regarding whether and when individual elements will be achieved and given the complicating factor that some benefits might, absent deployment of PTC, be captured using alternative technologies at lower cost.

Stated differently, FRA knows its cost/benefit analysis understates the economic business benefits resulting from the implementation of PTC, but it cannot determine how to calculate those benefits so it will ignore them. These arbitrary conclusions are wholly remarkable. Exhibit III to this Petition clearly demonstrates how the cost/benefit calculations can be properly made, and how those calculations were made by ZETA-TECH, an FRA contractor, only six years ago. What possible justification can there be for ignoring the real and huge benefits accruing to the railroads and to all shippers resulting from the implementation of PTC? There can be no justification.

The final rule does not present a situation where there is a debate about whether the cost/benefit analysis is flawed and incorrect; it is a situation where the only question is how flawed and how incorrect is it?

In 2004, ZETA-TECH prepared a report for FRA seeking to quantify the business benefits of a hypothetical PTC system very much like the system contained in the final rule. ZETA-TECH noted six distinct direct and indirect business benefits that would follow the implementation of its hypothetical PTC system. These business benefits included: (1) line capacity enhancements; (2) dispatching efficiency gains; (3) work order issue flexibility; (4) loco diagnostics; (5) fuel savings; and (6) shipper benefits. ZETA-TECH estimated that annual business benefits resulting from PTC implementation would range between \$2.2 and \$3.8 billion dollars in 2001 dollars.

As is pointed out by Peabody in Exhibit III, there can be some legitimate debate regarding the precise costs and the precise benefits resulting from the implementation of PTC over the next two decades. However, there can be no legitimate debate as to the need to include all appropriate costs and benefits in such an analysis. To arbitrarily exclude vast sums on the benefit side of the cost/benefit analysis is to fatally prejudice the result in a manner that is wholly unacceptable, and inconsistent with the most basic cost/benefit models.

Conclusion

Given the undeniable flaws in the cost/benefit analysis relied upon by FRA, and given the substantial economic harm to TIII shippers, including chlorine shippers, that would result from the use of that flawed analysis, FRA should reconsider its final rule insofar as its cost/benefit analysis is concerned. The Institute submits that the Peabody analysis contained in Exhibit III reflects a proper analysis of all the costs and benefits that result from the implementation of PTC and should serve as the basis for the final rule.

Sincerely,



Arthur E. Dungan
President
The Chlorine Institute, Inc.



The Fertilizer Institute

Nourish, Replenish, Grow

Ford B. West
President

March 30, 2010

Docket Management Facility
U.S. Department of Transportation
1200 New Jersey Avenue, S.E., W12-140
Washington, D.C. 20590

RE: Docket No. FRA-2008-0132 – Chlorine Institute's Petition for Reconsideration

The Fertilizer Institute (TFI) hereby submits this letter in support of the Petition for Reconsideration submitted by the Chlorine Institute, Inc. (CI), on March 16, 2010, in response to the Final Rule regarding Positive Train Control (PTC), published in the *Federal Register* on Jan. 15, 2010 (75 Fed. Reg. 2598), under Docket FRA 2008-0132. CI supported its petition with three partial reports prepared by L. E. Peabody & Associates, Inc. (Peabody). Those reports illustrate fundamental flaws with the Final Rule's cost-benefit analysis that have profound implications for shippers of toxic-by-inhalation (TIH) materials.

TFI is especially troubled by the Peabody Report titled Positive Train Control Benefits Analysis: Updated Statement of Total Benefits and Restatement of FRA Cost-Benefit Analysis Based on FRA Costs and Updated Benefits (Benefits Report). As noted on pages 1-2 of the Benefits Report, the Federal Railroad Administration's (FRA) cost-benefit analysis of PTC in the Final Rule improperly excludes two large categories of PTC benefits that FRA itself had included in previous PTC analyses, and had discussed in the Final Rule Regulatory Impact Analysis, but inexplicably excluded from its final evaluation. The FRA's rationale for excluding these benefits was based upon the uncertainty as to "whether and when individual elements will be achieved" and the potential to achieve those benefits "using alternative technologies at lower cost." 75 Fed. Reg. at 2684. But, uncertainties are inherent to any cost-benefit analysis and most benefits are likely to be achievable by alternate means at a potentially lower cost. That does not mean it is proper to exclude those benefits from a cost-benefit analysis altogether.

The FRA's decision to exclude these large benefits is particularly surprising due to its inclusion in prior studies of these benefits. In 2004, ZETA-TECH prepared a report for FRA quantifying the business benefits of PTC.¹ FRA revised and restated the ZETA-TECH benefits estimates in a 2004 Report to Congress. In July 2009, the FRA included a 16-page appendix in the Notice of Proposed Rulemaking in this docket that updated the 2004 Report. Thus, the FRA already had estimates of these benefits that it could have incorporated into the Final Rule cost-benefit analysis, but inexplicably and inappropriately excluded.

¹ Zeta-Tech Associates, "Quantification of the Business Benefits of Positive Train Control," Prepared for the Federal Railroad Administration, March 15, 2004.

In the Benefits Report, Peabody has updated the Final Rule cost-benefit analysis with the excluded business benefits. First, Peabody identifies and corrects errors in the FRA's 2004 statement of benefits and 2009 restatement that overstate business costs by 85 percent and understate business benefits by 3 percent (Benefits Report at 15-26). Second, Peabody restates the cost-benefit analysis in the Final Rule by adding these updated and corrected calculations from the 2004 reports to the Final Rule analysis. The result is striking, because the cost-benefit ratio in the Final Rule would decline from 21.71 to 0.86. *Id.* at 27.

The importance of performing a complete and accurate PTC cost-benefit analysis is much more than an academic exercise. In the Final Rule, the FRA itself expresses concern that freight railroads will use the PTC mandate to drive TIH traffic from the rails by attempting to justify significantly higher rates for TIH traffic based on the cost of PTC implementation. 75 Fed. Reg. at 2618. The Final Rule cost-benefit analysis adds fuel to those efforts by portraying PTC as an unfunded mandate when in fact the benefits of PTC may well exceed its costs. Therefore, TFI supports CI's Petition for Reconsideration and asks the FRA to perform the complete cost-benefit analysis that it is required to prepare.

Please contact TFI Vice President of Member Services Pam Guffain by telephone at (202) 515-2704 or via e-mail at pguffain@tfi.org if you have any questions.

Sincerely yours,

A handwritten signature in cursive script that reads "Ford B. West".

Ford B. West



May 3, 2010

Docket Management Facility
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Washington, DC 20590

RE: Docket No. FRA-2008-0132—Petition for Reconsideration

The American Chemistry Council (ACC) and its self-funded groups representing TIIH shippers, including the Chlorine Chemistry Division, Ethylene Oxide Safety Task Group and Hydrogen Fluoride Panel, are writing to express support for reconsideration of the cost-benefit analysis in Docket No. FRA-2008-0132 related to Positive Train Control (PTC) technology. This reconsideration was requested in a March 16, 2010, petition submitted by the Chlorine Institute (CI). CI supported its petition with interim reports prepared by L.E. Peabody & Associates, which illustrate flaws in the final rule's cost-benefit analysis.

These reports point out that the Federal Railroad Administration (FRA) improperly excluded two large categories of PTC benefits that the FRA had included in previous reports on the benefits of PTC. FRA's rationale for excluding these benefits was based on uncertainties as to how such benefits would be achieved. Any projection of the future has uncertainties. However, a proper cost-benefit analysis should include and factor in such uncertainties based on the best available information.

We respectfully request the FRA reconsider and enhance the cost-benefit analysis for this rule to reflect the broad benefits of PTC for the overall rail system.

ACC strongly supports the FRA's role in enhancing railroad safety, and we are committed to working with the FRA, railroads and other stakeholders to ensure the safe transport of our products.

Thank you for your consideration of this matter. Please contact me at 703-741-5866 or robert_simon@americanchemistry.com if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "R. Simon", is written over a light blue horizontal line.

Robert J. Simon
Vice President
American Chemistry Council
Chemical Products & Technology Division

The American Chemistry Council (ACC) represents the leading companies engaged in the business of chemistry. ACC members apply the science of chemistry to make innovative products and services that make people's lives better, healthier and safer. ACC is committed to improved environmental, health and safety performance through Responsible Care[®], common sense advocacy designed to address major public policy issues, and health and environmental research and product testing.



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May 25, 2010

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RE: Docket No. FRA-2008-0132-Petition for Reconsideration

Transmitted herewith is the Final Report of L.E. Peabody & Associates, Inc. (Peabody), submitted by the Chlorine Institute, Inc. (the Institute) in support of its Petition for Reconsideration, which was filed on March 16, 2010. The Final Peabody Report (Exhibit 1) further documents the Initial Peabody Report's findings on the substance and extent of the FRA's understatement of the benefits to both the railroad industry and the society as a whole, and quantifies the real value of Positive Train Control (PTC).

The Final Peabody Report also points out the radical transformation of the railroad position regarding the benefits of PTC to the rail industry. In December 2008, one of the major railroads made a public webinar presentation which stated that the benefits of implementing PTC are to "improve safety, velocity, and fuel conservation," to "reduce fuel consumption and carbon emissions," and to "improve train handling and rule compliance." However, by April 2010, in a report prepared by Oliver Wyman, Inc., for the Association of American Railroads (AAR), the railroad position had shifted to the opinion that the before-mentioned benefits are "likely to be only marginally influenced by the roll-out of PTC." This latter conclusion is based on interviews with unnamed Union Pacific and Norfolk Southern representatives.¹ A matter that is so central to the issues before FRA cannot rely solely upon such interviews without the possibility of assessing the accuracy of those statements.

The Final Peabody Final Report concludes that "[a]ccepting FRA's estimate of the total PTC implementation costs and railroad safety benefits included in the Final Rule's Regulatory Impact Analysis (RIA), and including corrected societal and other business benefits lowers the cost-benefit ratio from the 21.71 included in the FRA's RIA to a 0.86 cost-benefit ratio." The Peabody Report also notes that the Oliver Wyman Report prepared for the AAR also disagrees with the FRA cost-benefit analysis and places the ratio at 11 to 1 rather than the FRA ratio of 21.71 to 1.

¹ Assessment of the Commercial Benefits of Positive Train Control prepared by Oliver Wyman, Inc., dated April 23, 2010 at page 15.

Docket Management Facility
May 25, 2010
Page 2

Upon review it is apparent that the FRA analysis contained in the RIA is seriously flawed, even the Oliver Wyman Report seems to acknowledge that. Only a reevaluation of the assumptions used and the methods employed in conducting the FRA cost-benefit analysis that includes all elements of benefits flowing from Positive Train Control can correct the deficiencies. The Chlorine Institute is willing to assist the FRA reexamine this vital issue to achieve a statistically appropriate and legally sound conclusion.

Sincerely,

A handwritten signature in cursive script that reads "Frank Reiner".

Francis X. Reiner
VP Transportation and Emergency Preparedness
The Chlorine Institute, Inc.

Report

to



**Positive Train Control:
Statement of Updated Total Benefits and Costs, Restatement of FRA
Cost-Benefit Analysis Based on Updated FRA Benefits and Costs,
and Statement of Economic Harm to TIH Shippers**

by

L. E. PEABODY & ASSOCIATES, INC.
ECONOMIC CONSULTANTS

1501 Duke Street, Suite 200
Alexandria, Virginia 22314

Date: May 24, 2010

TABLE OF CONTENTS

	Page
I. INTRODUCTION.....	1
II. SUMMARY AND FINDINGS	8
A. RESTATED PTC BENEFITS ANALYSIS.....	8
B. RESTATED PTC COST ANALYSIS.....	9
C. POTENTIAL ECONOMIC HARM TO TIH SHIPPERS FROM THE RAILROADS IMPLEMENTATION OF PTC	10
III. POSITIVE TRAIN CONTROL BENEFITS ANALYSIS: UPDATED STATEMENT OF TOTAL BENEFITS AND RESTATEMENT OF FRA COST-BENEFIT ANALYSIS BASED ON FRA COSTS AND UPDATED FRA BENEFITS	11
A. THEORETICAL PROBLEMS WITH THE FRA FINAL RULE RIA	13
B. CALCULATION OF TOTAL BENEFITS, HISTORICAL OVERVIEW	15
C. ERRORS CONTAINED IN THE 2004 FRA REPORT	23
D. MECHANICAL AND THEORETICAL ERRORS CONTAINED IN THE 2009 FRA RESTATEMENT	25
1. Mixing Of Costs And Benefits	27
2. Shipper Direct Benefits	27
3. Other Railroad Direct Benefits	28
4. Modal Diversion Factor	30
5. Inconsistent Application Of Modal Diversion Benefits And Costs	31
6. Retstatement	33
E. INTERMEDIATE RESTATEMENT OF FRA FINAL RULE RIA.....	35
IV. POSITIVE TRAIN CONTROL COST ANALYSIS: UPDATED STATEMENT OF TOTAL COSTS AND RESTATEMENT OF FRA COST-BENEFIT ANALYSIS BASED ON UPDATED FRA COSTS AND BENEFITS.....	37
A. CALCULATION OF TOTAL COSTS, HISTORICAL OVERVIEW	38
1. 2004 Report to FRA (ZETA-TECH).....	41
2. 2004 Report to Congress (FRA).....	44
3. July 2009 Notice of Proposed Rule Making (FRA)	46
4. January 2010 Final Rule (FRA).....	49

TABLE OF CONTENTS

	Page
B. PROBLEMS WITH THE 2010 FRA COST ESTIMATE	50
1. Overstated Locomotive Adaptation Costs	51
2. Overstated Maintenance Costs	52
3. Overstated Wayside Equipment Installation Costs	54
4. Retstatement	54
C. RESTATEMENT OF FRA FINAL RULE RIA	55
V. POTENTIAL ECONOMIC HARM TO THH SHIPPERS RESULTING FROM THE RAILROADS IMPLEMENTATION OF POSITIVE TRAIN CONTROL	57
A. RAILROADS' POSITION ON COST RECOVERY	57
B. QUANTIFICATION OF COSTS ALLOCATED TO THH SHIPPERS	58
<hr/>	
C. PTC INVESTMENTS WILL IMPACT REGULATED THH SHIPPER RATES	64
VI. SUMMARY OF KEY LITERATURE REVIEWED	66
A. A BRIEF SUMMARY OF SELECTED KEY DOCUMENTS (IN CHRONOLOGICAL ORDER)	66
1. Federal Railroad Administration, June 1995 - <i>Differential GPS: An Aide To Positive Train Control</i>	66
2. Railroad Safety Advisory Committee, August 1999 - <i>Implementation Of Positive Train Control Systems</i>	66
3. Zeta-Tech Associates, March 15, 2004 - <i>Quantification Of The Business Benefits Of Positive Train Control</i>	67
4. Federal Railroad Administration, August 2004 - <i>Benefits And Costs Of Positive Train Control</i>	68
5. Federal Railroad Administration, July 21, 2009 - <i>Positive Train Control Systems; Proposed Rule</i>	70
6. Federal Railroad Administration, July 10, 2009 - <i>Positive Train Control Systems; Economic Analysis</i>	71
7. Federal Railroad Administration, January 15, 2010 - <i>Positive Train Control Systems; Final Rule</i>	72
VII. BIBLIOGRAPHY OF IMPORTANT PTC-RELATED DOCUMENTS.....	74

LIST OF ATTACHMENTS

<u>Attachment No.</u> (1)	<u>Title</u> (2)
B-1	Intermediate Restatement of PTC Cost-Benefit Analysis (Twenty-year Costs and Benefits on a Present-Value Basis Assuming a 7% Discount Rate)
B-2	Intermediate Restatement of PTC Cost-Benefit Analysis (Twenty-year Costs and Benefits on a Present-Value Basis Assuming a 3% Discount Rate)
B-3	Restatement of Indirect Benefits Factor (Based on Corrections to FRA 7/10/2009 Economic Analysis)
B-4	Summary of Errors In and Corrections To the 2004 and 2009 FRA Economic Analysis Benefits Calculations
C-1	Restatement of PTC Cost-Benefit Analysis (Twenty-year Costs and Benefits on a Present-Value Basis Assuming a 7% Discount Rate)
C-2	Restated PTC Costs Based on Changes to FRA's Maintenance and Onboard Cost Estimates
H-1	Estimated PTC Installation Capital Costs By Year
H-2	Estimated Percentage Of PTC Costs To Be Recovered From TIH Shippers
H-3	Estimated Annual Capital Carrying Charges Railroads Will Allocate To TIH Shippers For PTC Installation

LIST OF ACRONYMS

AAR	Association of American Railroads
ABS	Automatic Block Signal System
ARES	Advanced Railroad Electronics System
ARR	Alaska Railroad
ATCS	Automatic Train Control System
BNSF	BNSF Railway Company
CBA	Cost-Benefit Analysis
CBTC	Communication Based Train Control
CFR	Code of Federal Regulations
CONRAIL	Consolidated Rail Corporation
<hr/>	
CPU	Central Processing Unit
CSXT	CSX Transportation
CTC	Centralized Traffic Control
DCF	Discounted Cash Flow
DTC	Direct Traffic Control
FRA	Federal Railroad Administration
GDP	Gross Domestic Product
GPS	Global Positioning System
ITIC	Intermodal Transportation and Inventory Cost Model
MOW	Maintenance of Way
NPRM	Notice of Proposed Rulemaking
NPV	Net Present Value
NS	Norfolk Southern Railway Company
OMB	Office of Management and Budget
PTC	Positive Train Control

LIST OF ACRONYMS

(continued)

PV	Present Value
RIA	Regulatory Impact Analysis
RSAC	Railroad Safety Advisory Committee
RSIA	Rail Safety Improvement Act of 2008
R/VC	Revenue/Variable Cost
SEC	Securities and Exchange Commission
SPMS	Switch Point Monitoring System
STB	Surface Transportation Board
TFT	Track Force Terminal
TIH	Toxic Inhalation Hazard
TIWS	Track Integrity Warning System
UP	Union Pacific Railroad Company
UHF	Ultra High Frequency
URCS	Uniform Railroad Costing System
VRE	Virginia Railway Express
V-TMS	Vital Train Management System

I. INTRODUCTION

Positive Train Control ("PTC") is a generic term for technology systems that monitor train movements and that can automatically stop trains to avoid imminent collisions or other incidents. The Rail Safety Improvement Act of 2008 ("RSIA") directed the Federal Railroad Administration ("FRA") to develop regulations requiring PTC installation on rail lines traversed by passenger traffic and certain hazardous materials shipments. On January 15, 2010, FRA issued its final rule on PTC implementation, which requires PTC systems to be up and running on affected rail segments by the end of 2015.

As part of its rulemaking process, FRA conducted several Regulatory Impact Analyses ("RIA") in which it developed estimated costs and benefits (over a 20-year time horizon) associated with the impending PTC implementation. Curiously, FRA's statement of benefits in the final rule RIA included only the railroad safety benefits expected to result from PTC installation. As such, FRA's stated cost-benefit analysis ("CBA")¹ and resulting cost-benefit ratio associated with the rule ranges from 19.6 (based on a 3% discount rate) to 21.7 (based on a 7% discount rate).

The FRA acknowledged in its discussion of costs and benefits that two other large pools of benefits would also accrue as a result of PTC implementation,² but it chose not to include them in its total statement of benefits for purposes of comparing costs to benefits (and developing a cost-benefit ratio) associated with the rule. As discussed in more detail below, FRA's reasoning

¹ A cost-benefit analysis framework is used to evaluate the desirability of a posited action. The aim is to gauge the efficiency of the action relative to the status quo. It monetizes all gains (benefits) and losses (costs) and weighs them against one-another. A project's desirability is ranked by the weight of its costs relative to its benefits, stated on a present value basis.

² **Federal Register** / Vol. 75, No. 10 / Friday, January 15, 2010 / Rules and Regulations, page 2684. The FRA uses the term "business benefits" to describe its assessment of what are actually benefits to both industry (e.g., direct benefits from efficiency gains) and society (e.g., indirect benefits from reduced highway crashes and reduced emissions.)

supporting its exclusion of the other benefits is flawed and is contradictory to RIA guidelines³.

Many preceding studies of PTC -- some of which were prepared by FRA -- did properly include these other benefits categories. In fact, in the July 10, 2009 Economic Analysis which FRA prepared in support of its July 21, 2009 Notice of Proposed Rulemaking ("NPRM"), FRA included an updated calculation of the *total* benefits resulting from PTC implementation. The FRA even discussed this analysis in the final rule RIA, despite its decision to exclude these other benefits categories from its final evaluation.

In March 2010, at the request of The Chlorine Institute Inc., we restated the benefits anticipated to result from PTC implementation. Our benefits restatement was developed using unit-cost estimates and methodologies included in FRA's 2009 and 2010 economic analyses supporting its July 2009 PTC NPRM and January 2010 PTC final rule, respectively. Specifically, we developed updated business and societal benefits estimates using FRA's business benefits framework corrected to account for methodological and mathematical errors. We also restated FRA's benefits estimates on a 2009-real-dollar basis by indexing the FRA's unit-cost components to account for inflation. Our restatement showed that FRA incorrectly excluded large classes of benefits from its RIA CBA's, and that including these benefits as developed by FRA (corrected and updated as discussed above) resulted in a far different CBA outcome and conclusion regarding the desirability and net economic impact of the final rule. Whereas FRA's final rule, based on consideration of all costs and a narrow selection of benefits classes (specifically railroad-related safety benefits), presented a cost-benefit ratio over 20 to 1 (anticipated costs were twenty times greater than anticipated benefits), a complete unbiased presentation of all costs and all benefits anticipated by FRA results in a cost-benefit ratio under 1.0 (anticipated costs are less than anticipated benefits.)

³ See: OMB Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," Section 6: Identifying and Measuring Benefits and Costs.

The railroads' Washington, D.C. based lobby group, the Association of American Railroads ("AAR"), took exception to our findings and hired Oliver Wyman, Inc. ("Wyman") to "provide an independent evaluation of the potential commercial benefits of PTC"⁴ which AAR claims "clearly dispels assertions that there will be substantial business benefits to railroads that implement positive train control ("PTC") technology under federal regulations."⁵ In its report, Wyman addressed certain of the specific business benefits incorporated in FRA's business benefits estimates (and updated in this Report). For each of the items discussed in the Wyman report, Wyman broke down the underlying assumptions and cost components, opined as to the validity of the assumptions and unit costs, and restated the benefits based on its own assessment. The Wyman report concluded that the cost-benefit ratio is in the neighborhood of 11 to 1, when considering railroad safety and business benefits.

Cost-benefit analyses require the employment of several imprecise analytical techniques, such as forecasting the effect of a proposed action or actions on industry, government, and society (e.g., changes in efficiency, productivity, or safety), and assigning monetary values to non-monetary items (e.g., the value of time or of human life). As such, this Report focuses primarily on the framework, methodologies, and calculations underlying FRA's regulatory impact analyses and underlying economic analyses. When we use the proper framework, methodologies, and calculations, *and used FRA's own assumptions regarding the quantity and value specific benefits arising from PTC implementation*, we demonstrate that the cost-benefit analysis presented in the final rule regulatory impact analysis was erroneous and incomplete, and the results were misleading.

⁴ "Assessment of the Commercial Benefits of Positive Train Control," Oliver Wyman, Inc. April 23, 2010, page 1.

⁵ AAR press release dated April 27, 2010, accessed on the web at <http://www.aar.org/NewsAndEvents/PressReleases/2010/04/042710-PTCClaimsOverblown.aspx> on April 28, 2010.

We focus this Report on FRA's cost-benefit model, not its inputs or assumptions.⁶ By using FRA's forecasts and unit-cost estimates (developed over several years through research, evaluation, and discussion with rail carriers), we present a fair and impartial assessment of the process and tools used by FRA in its required analysis of the rule.

The Wyman report most specifically attacks our reliance on benefits estimates developed by FRA, which we updated in our restatement of PTC "business benefits." Our reliance on those estimates was done to ensure impartiality and credibility. Our use of the term "business benefits" to describe non-railroad-safety benefits was taken directly from FRA's nomenclature. The "business benefits" included in FRA's economic analyses and in this Report include benefits accruing to the railroads, to shippers, and to society. These benefits include cost savings to railroads and shippers resulting from improved supply-chain efficiencies (e.g., reduced fuel consumption, lower inventory carrying costs) ~~and they include other benefits accruing to society from modal diversion of freight from highways to rail (e.g., reduced emissions, reduced crashes, reduced highway congestion) in response to improved rail service resulting from PTC and precision dispatching.~~ The Wyman analysis concludes that, "the net benefit to shippers from the planned implementation of PTC will be zero."⁷ The Wyman report excludes societal benefits from its analyses. The Wyman statement of "business benefits" comprises only business benefits accruing to the railroads. This narrow view of benefits ignores benefits accruing to other parties, including general societal benefits, and as such it violates Federal cost-benefit analysis policy.⁸

As support for its dismissal of all shipper benefits, the Wyman report states:

"Substantial benefits can be realized through improvements in railroad on-time performance.... [which] would divert some traffic from truck to rail, yielding benefits to shippers in the form of lower transportation

⁶ It is impossible to completely separate the model from the assumptions, and judgment must be exercised in conducting or restating CBAs. Our primary focus, however, was on the methodologies used by FRA.

⁷ "Assessment of the Commercial Benefits of Positive Train Control," Oliver Wyman, Inc. April 23, 2020, page 6.

⁸ Office of Management and Budget ("OMB") Circular A-94: "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." Section 6.

rates. Improved railroad reliability would also enable shippers to reduce safety stock levels and thus lessen inventory carrying costs.

However, improvements in railroad on-time performance, and subsequent shipper benefits, would be attributable to precision dispatching, which as mentioned is currently not in production use, is being developed independently from the PTC initiative, is not part of the FRA mandated PTC implementation, and is likely to be only marginally influenced by the roll-out of PTC."⁹

A PTC webinar presentation on December 17, 2008, entitled "Train Control Systems and Vital Train Management System (VTMS)" by the Union Pacific Railroad Company ("UP")¹⁰ contradicts Wyman's findings.

The presentation explicitly lists objectives and benefits of UP's Vital Train Management System (the version of PTC that the UP is implementing) as being, in part, to "improve safety, velocity, and fuel conservation", to "reduce fuel consumption and carbon emissions" and to "improve train handling and rule compliance."¹¹ Obviously, UP considered PTC and precision dispatching as integral parts of its business plan. If PTC and precision dispatching were independent from one another, as Wyman and AAR have said, the UP would not have been able to list improved velocity, improved fuel consumption, reduced carbon emissions, and improved train handling as being expected benefits of the implementation of VTMS PTC.

FRA's statement of costs in the final rule RIA included four categories of railroad costs: (1) central office and development costs; (2) wayside equipment installation costs; (3) onboard equipment installation costs; and (4) annual maintenance costs. In developing its cost estimates for the four included cost categories, FRA departed from its positions and assumptions included in preceding reports regarding certain cost estimates.

⁹ "Assessment of the Commercial Benefits of Positive Train Control," Oliver Wyman, Inc. April 23, 2010, page 6.

¹⁰ www.uprr.com/newsinfo/attachments/media_kit/ptc/ptc_webinar.pdf.

¹¹ Union Pacific Railroad, PTC webinar, "Train Control Systems and Vital Train Management System (VTMS)". December 17, 2008, slide 4.

In this Report, we examine FRA's cost estimates and underlying assumptions, inputs, and algorithms, identify errors in the assumptions and inputs used, update the calculations as necessary, and restate the FRA's cost estimates. Cost estimates are fairly straightforward inasmuch as unit costs for specific items are known and required quantities may be estimated with greater precision than can benefits resulting from their installation.

In developing our cost restatement, we have reviewed the PTC implementation plans filed with FRA on April 16, 2010 by the railroads as required by the final rule. We intended to use data from those reports to update FRA's cost estimates, but we were unable to review and incorporate the results of the implementation plans because the pertinent information was redacted. We reserve the right to augment our findings if and when we are allowed to review the individual implementation plans. We have thus relied on public data and preceding reports to make our restatement.

As shown in both this Report and in the Wyman report, there is no doubt that the Class I railroads will receive numerous benefits from their installation of PTC beyond the primary benefits of risk mitigation. FRA also believes that the railroads will pass through some of these benefits to shippers in the form of rate reductions and other direct operating benefits.¹² These benefits do not obviate the fact that the Congressional mandate to implement PTC will require the railroads to expend billions of dollars in capital expenditures over the next six years.

Economic theory holds that the railroads will attempt to recover mandated PTC investments as quickly and as efficiently as possible given the limitations placed on them by the market and industry regulators. There is little doubt that the railroads will attempt to exploit their most vulnerable customers to recover their PTC investment. From a general sense, this would include all captive railroad shippers, since those shippers have little recourse against a railroad's

¹² FRA bases this assumption on the railroads' pass through of historic productivity improvements as exemplified by the decline in real rates per ton-mile over the last 25 years. However, much of what FRA assessed as passing through of benefits was in fact due to cost shifting from railroads to shippers. The shifting of costs from railroads to shippers would be perceived as productivity improvement from the railroads perspective, but was perceived as a cost increase to affected shippers.

monopoly power on a captive movement.¹³ From a more focused position however, the railroads have stated that they will attempt to recover their investment directly from the shippers the railroads view as being responsible for the requirement to install PTC, namely Toxic Inhalation Hazard (“TIH”) shippers.

The railroads’ focus of recovering their investment costs from TIH shippers will have a direct, quantifiable impact on TIH shippers. Additionally, TIH shippers will be impacted by PTC installation through higher regulated rail rates due to the railroads rolling their PTC investment into their regulatory investment bases. This could lead to an effective “double recovery” of PTC costs well into the future.

The remainder of this report discusses our study approach, summarizes our findings and is organized under the following topical headings:

-
- II. Summary and Findings
 - III. Positive Train Control Benefits Analysis: Updated Statement of Total Benefits and Restatement of FRA Cost-Benefit Analysis Based on FRA Costs and Updated FRA Benefits
 - IV. Positive Train Control Cost Analysis: Updated Statement of Total Costs and Restatement of FRA Cost-Benefit Analysis Based on Updated FRA Costs and Benefits
 - V. Potential Economic Harm To TIH Shippers Resulting From The Railroads Implementation Of Positive Train Control
 - VI. Summary of Key Literature Reviewed
 - VII. Bibliography of Important PTC-Related Documents

¹³ The Surface Transportation Board (“STB”), the U.S. agency responsible for the economic regulation of the railroad industry, defines captive locations as those rail served locations without effective intramodal or intermodal competition. In other words, those locations that are not served by two or more railroads (intramodal competition) or can be economically served by another mode of transportation such as truck, barge or pipeline (intermodal competition).

II. SUMMARY AND FINDINGS

This Report summarizes the prior cost-benefit analyses performed by FRA and other public and private organizations related to the design and implementation of PTC systems by freight and passenger railroads. This Report also updates and restates the business and societal benefits anticipated to result from PTC implementation. The primary basis of this restatement was FRA's 2009 and 2010 economic analyses supporting FRA's July 2009 PTC NPRM and their January 2010 PTC Final Rule. In addition to restating the benefits expected to accrue due to the installation of PTC, this Report restates the FRA's final costs estimates for design, installation and maintenance of PTC systems on a national basis and updates the cost-benefit ratios calculated by FRA in its 2010 Final Rule. This Report also estimates the potential economic harm that may flow to TIH shippers, as the railroads attempt to pass through their PTC design, investment and maintenance costs to shippers of TIH materials.

A summary of our findings include:

A. RESTATED PTC BENEFITS ANALYSIS

1. FRA made several theoretical errors in developing its Final Rule RIA. Specifically, FRA excluded the potential impacts of future benefits on the theory that uncertainty surrounds whether and when benefits may accrue. FRA also excluded some PTC benefits because the benefits may be achievable through the development of alternative systems.
2. A 2004 report commissioned by FRA and performed by ZETA-TECH identified numerous business benefits associated with the implementation of PTC. FRA supplemented the ZETA-TECH report with the results of a peer review workshop, which included representatives of freight and passenger railroads, shippers, labor organizations and suppliers, and through the inclusion of societal benefits developed using a FRA developed model. The total PTC benefits calculated by the FRA in its supplemented report ranged from \$2.4 to \$3.9 billion, annually.
3. In 2009, FRA finalized its NPRM on PTC implementation including an update of its 2004 benefits calculations. However, in developing its NPRM RIA, FRA excluded its updated societal and other business benefits, and included only railroad safety benefits in its economic analyses. With the

exclusion of these additional benefits, FRA's NPRM estimated that the cost-benefit ratio associated with PTC implementation would equal 16.47. When all FRA calculated benefits are included in the cost-benefit analysis, the cost-benefit ratio drops to 1.19.

4. In January 2010, FRA published its Final Rule on PTC implementation. FRA continued to only include railroad safety benefits and exclude all other benefits from its analysis. By including only railroad safety benefits, FRA's cost-benefit ratio in its 2010 Final Rule increased to 21.71. Had FRA included all of the benefits it calculated, the cost-benefit ratio would have declined to 1.15.
5. A review of FRA's 2004 and 2009 benefits calculations identified several mathematical errors and omissions that collectively understated the total benefits associated with PTC implementation. These errors included FRA's failure to index different cost and benefit figures to the same year price levels, improper commingling of costs and benefits to develop net benefits (which is a fundamental violation of CBA principles), incorrect calculations of direct benefits and modal diversion factors, and misapplication of FRA's ITIC model. These issues led to an overstatement by FRA of indirect societal and add-on system costs by 85% and an understatement of positive benefits by 3%.
6. Accepting FRA's estimate of the total PTC implementation costs and railroad safety benefits included in the Final Rule RIA, and including the corrected societal and other business benefits lowers the cost-benefit ratio from the 21.71 included in the FRA's Final Rule RIA to a 0.86 cost-benefit ratio.

B. RESTATED PTC COST ANALYSIS

7. FRA undertook, supervised or commissioned several studies investigating the costs to install and maintain PTC systems. A 1999 Railroad Safety Advisory Committee Report estimated that the cost to implement a PTC system similar to the one mandated in the FRA's Final Rule would equal \$7.8 billion over 20-years on a discounted cost basis.
8. By 2009, FRA had updated its PTC cost estimates. While updating and restating the cost categories from its 2004 Report to Congress, FRA added additional cost categories to account for the initial design of the PTC system and the cost to develop the stand-alone system for the Alaska Railroad. By 2009, FRA estimated the total costs to design, install and maintain PTC systems would equal \$10.0 billion on a discounted cost basis.

9. In developing its Final Rules on PTC implementation, FRA in 2010 revised its cost estimates to reflect policy changes and other modifications to its 2009 cost estimates. The end result was to decrease the estimated PTC design, implementation and maintenance costs to \$9.5 billion on a discounted cost basis from the prior \$10.0 billion estimate in 2009.
10. FRA's 2009 and 2010 estimates of PTC implementation costs contain three primary issues that lead to overstated costs. These issues include overstated locomotive adaptation costs, overstated maintenance costs, and overstated wayside equipment installation costs. Adjusting for these overstatements reduces FRA's PTC implementation costs to \$8.4 billion.
11. Combining the restated total benefits, including benefits improperly excluded by FRA, with the restated costs produces a cost-benefit ratio of 0.80 versus the 21.71 cost-benefit calculated by FRA and included in their Final Report RIA.

**C. POTENTIAL ECONOMIC
HARM TO TIH SHIPPERS
FROM THE RAILROADS
IMPLEMENTATION OF PTC**

12. The Class I railroads view PTC installation as an unfunded mandate and have called on Congress to consider various funding mechanisms to offset PTC investment, including a 25 percent infrastructure tax incentive and a fully funded Rail Safety Technology Grant Program.
13. Without support from Congress, the railroads have indicated that they will attempt to recoup PTC costs from TIH shippers through higher rail rates because of their view that TIH shipments are the primary reason railroads must install PTC systems.
14. Based on railroad cost estimates and using standard STB capital cost recovery procedures, we estimated that the Class I railroads will attempt to recoup from TIH shippers PTC capital carrying charges that equal \$451 million per year by 2019.
15. In addition to incurring higher shipping costs through higher transportation rates, TIH shippers whose rates are set under the STB's regulatory procedures, will be impacted as the railroads' PTC investment is rolled into the railroads' investment bases. The impact of higher rates charged by railroads and the increase in regulatory costs from inclusion of PTC investment in railroad investment bases could lead to a double-recovery of PTC costs for certain TIH shippers.

III. POSITIVE TRAIN CONTROL BENEFITS ANALYSIS: UPDATED STATEMENT OF TOTAL BENEFITS AND RESTATEMENT OF FRA COST-BENEFIT ANALYSIS BASED ON FRA COSTS AND UPDATED FRA BENEFITS

In this section of our Report, we examine FRA's decision to exclude certain benefits from its RIA, identify the total benefits that will accrue as a result of PTC implementation, update the underlying methodologies and calculations as necessary, and restate the FRA's CBA to include total benefits.

Our updated benefits analysis shows that when full costs and benefits are properly included and assessed, the cost-benefit ratio associated with the PTC rule ranges from 0.70¹⁴ (based on a 3% discount rate) to 0.86¹⁵ (based on a 7% discount rate).

Table 1 below compares FRA's flawed CBA results and our corrected CBA results, based on a 7% discount rate.

¹⁴ See Attachment No. B-2, Column (5), Line 28.

¹⁵ See Attachment No. B-1, Column (5), Line 28.

Table 1
Comparison of FRA CBA to Corrected and Restated CBA
(\$ in millions)

<u>Item</u> (1)	<u>FRA Final Rule RIA</u> (2)	<u>Restated</u> (3)
1. Railroad Direct Costs ¹	\$9,547.5	\$9,547.5
2. Other Direct, Indirect, and Societal Costs ²	Improperly Excluded by FRA	\$5,707.6
3. Railroad Safety Benefits ³	\$439.7	\$439.7
4. Other Railroad, Shipper, and Societal Benefits ⁴	Improperly Excluded by FRA	\$17,266.7
5. Total Costs (L1 + L2)	\$9,547.5	\$15,255.1
6. Total Benefits (L3 + L4)	\$439.7	\$17,706.4
7. Cost-Benefit Ratio (L5 ÷ L6)	21.71	0.86

1/ Attachment No. B-1, Column (2), Line 5.
2/ Attachment No. B-1, Column (5) sum of lines 18,19,20,21.
3/ Attachment No. B-1, Column (2), Line 16.
4/ Attachment No. B-1, Column (5), sum of lines 22,23,24,25.

As shown in Table 1 above, when the CBA is properly expanded to encompass all costs and all benefits, the benefits outweigh the costs over a 20-year time horizon on a present value basis.

The remainder of this section of our Report is organized under the following topical headings:

- A. Theoretical Problems With FRA Final Rule RIA
- B. Calculation of Total Benefits, Historical Overview
- C. Errors Contained in the 2004 FRA Report
- D. Mechanical and Theoretical Errors Contained in the 2009 FRA Restatement
- E. Intermediate Restatement of FRA Final Rule RIA

A. **THEORETICAL PROBLEMS
WITH THE FRA FINAL RULE RIA**

In its regulatory impact analysis presented in the PTC final rule, FRA made the following statements:

"Two types of benefits are expected to result from the implementation of this final rule -- benefits from railroad accident reduction and business benefits from efficiency gains."¹⁶

"FRA also expects that once PTC systems are refined, there would likely be substantial additional business resulting from more efficient transportation service; however, such benefits are not included because of significant uncertainties regarding whether and when individual elements will be achieved and given the complicating factor that some benefits might, absent deployment of PTC, be captured using alternative technologies at lower cost."¹⁷

The RIA presents a 20-year analysis of the total costs and "railroad safety (railroad accident reduction)" benefits resulting from implementation of PTC systems under the final rule. FRA's stated logic for limiting its benefits quantification is based on two flawed lines of reason.

First, FRA cites uncertainty regarding "whether and when" the benefits will accrue. There is always uncertainty in developing cost-benefit analyses, and particularly in deriving benefits estimates. As the future is uncertain, this is the nature of the analysis. However, this uncertainty does not excuse FRA from its obligation to make an effort to develop a good-faith estimate of the benefits. In fact, the Office of Management and Budget ("OMB") Circular A-94 is titled "*Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*" and

¹⁶ **Federal Register** / Vol. 75, No. 10 / Friday, January 15, 2010 / Rules and Regulations, page 2684.

¹⁷ *Id.*

provides general guidance for conducting cost-benefit analyses. Section 6 of OMB Circular A-94 reads, in part:

"Analyses should include comprehensive estimates of the expected benefits and costs to *society* based on established definitions and practices for program and policy evaluation. Social net benefits, and not the benefits and costs to the Federal Government, should be the basis for evaluating government programs or policies that have effects on private citizens or other levels of government. Social benefits and costs can differ from private benefits and costs as measured in the marketplace because of imperfections arising from: (i) *external economies or diseconomies* where actions by one party impose benefits or costs on other groups that are not compensated in the market place; (ii) monopoly power that distorts the relationship between marginal costs and market prices, and (iii) taxes or subsidies." (emphasis in original)

Uncertainty regarding whether and when benefits will accrue is an inherent challenge with cost-benefit analyses, hence it has become customary to develop a range of costs and benefits, or high and low values for all components in a cost-benefit analysis.

Second, FRA attempts to justify its exclusion of "business benefits" from its cost-benefit comparison because some of the benefits may be achievable through the deployment of alternative systems. This logic is fundamentally flawed. Exclusion of a benefit resulting from one action because the same benefit would result from some other action defeats the purpose of the cost-benefit analysis. The correct action is to include the benefit in both analyses, not to exclude it from both. Furthermore, if this logic was reasonable, and it is not, then one would never include any benefits in a cost-benefit analysis, as all benefits are attainable through more than one means.

Interestingly, in a 2004 FRA Report to Congress containing an assessment of total benefits attributable to PTC implementation, FRA stated that:

"Railroad safety benefits are a very small proportion, less than 1% of total benefits.... The bulk of the benefits go to highway users (and the general public) who avoid accident costs, and to shippers, who as a result of competition in their own markets will have to pass the benefits on to society at large."⁷

Even FRA's estimate of railroad safety benefits is understated, as it acknowledges in the final rule RIA. In describing its calculation of safety benefits, FRA identifies the nine categories of benefits it did include in its railroad safety estimate, and then makes the following statement:

"Benefits more difficult to monetize -- such as the avoidance of hazmat accident related costs incurred by federal, state, and local governments and impacts to local businesses -- will also result."¹⁹

Surely, FRA could have developed an estimate for these benefits.

B. CALCULATION OF TOTAL BENEFITS, HISTORICAL OVERVIEW

In 2004, ZETA-TECH prepared a report for FRA which quantified the business benefits of PTC.²⁰ At the time the ZETA-TECH report was prepared, there were several schools of thought on exactly what a PTC system would comprise and how an integrated system would work. In the study, ZETA-TECH evaluated a system it called "PTC A" and another system it called "PTC B." PTC A was defined as "an 'overlay' system that provides enforcement of movement authorities, but does not incorporate a 'vital' central safety system," and PTC B was

¹⁸ "Benefits and Costs of Positive Train Control: Report in Response to Request of Appropriations Committees," USDOT, FRA, August 2004, page 5.

¹⁹ *Federal Register* / Vol. 75, No. 10 / Friday, January 15, 2010 / Rules and Regulations, page 2684.

²⁰ Zeta-Tech Associates. "Quantification of the Business Benefits of Positive Train Control." Prepared for the Federal Railroad Administration, March 15, 2004.

defined as "a stand-alone vital system."²¹ The elements of the PTC B system evaluated by ZETA-TECH in the 2004 report are very comparable to the PTC system being mandated by the FRA's final rule. We, therefore, will focus on ZETA-TECH's PTC B system evaluation in this section of our Report.

ZETA-TECH identified and quantified direct and indirect business benefits in the following six (6) distinct categories in its PTC B system:

1. Line capacity enhancements;
2. Dispatching efficiency gains;
3. Work order issue flexibility;
4. Loco diagnostics;
5. Fuel savings; and
6. Shipper benefits.

ZETA-TECH estimated that annual business benefits resulting from PTC implementation would be in the range of \$2.2 to \$3.8 billion (in 2001 dollars).²² The first five categories of business benefits are direct benefits to the railroads (e.g., reduced track investment, better equipment utilization, reduced fuel consumption), although they also would provide indirect benefits to shippers (e.g., better equipment utilization which could lead to reduced equipment capital, lease and maintenance costs).

Line capacity enhancements result from closer train spacing and more precisely-planned train meets. Dispatching efficiency gains result from dispatcher improved (real-time) train location information. ZETA-TECH posited that this location information also would allow dispatchers to pace trains between meets to optimize fuel consumption. ZETA-TECH also believed that the ability to issue work orders to train crews in real time and to automatically receive diagnostic data from linked-up locomotives would provide efficiencies.²³

²¹ 2004 ZETA-TECH Report, page 6.

²² As noted in the report, the business benefits calculated by ZETA-TECH were exclusive of and additive to the railroad safety benefits of PTC. See: 2004 ZETA-TECH Report at page 108.

²³ FRA later removed this class of benefits from its restatement of the ZETA-TECH study results.

The sixth category of business benefits -- "shipper benefits" -- refers to total logistics cost reductions assuming improved service and static rates. This very specifically represents the value of improved transit times and transit time reliability to logistics networks. When shippers realize better transit times and reliability, they are able to reduce inventory carrying costs, reduce or consolidate warehouse and distribution facilities and operations, and free up capital for other investment. Importantly, this benefit is *not* a result of cost or rate changes, rather it is strictly a result of service level changes.

Table 2 below shows the PTC B benefits calculated by ZETA-TECH in 2004.

<u>Item</u> (1)	<u>Low Case</u> (2)	<u>High Case</u> (3)
1. Line Capacity (Avoided Investment)	\$299.5	\$422.0
2. Line Capacity (Avoided Maintenance)	\$508.0	\$762.0
3. Precision Dispatch (Car Ownership)	\$322.1	\$868.2
4. Precision Dispatch (Locomotive Ownership)	\$85.9	\$171.9
5. Work Order Report	\$10.1	\$10.1
6. Loco Diagnostics (Locomotive Maintenance)	\$28.6	\$28.6
7. Loco Diagnostics (Locomotive Road Failure)	\$34.6	\$34.6
8. Fuel	\$55.9	\$130.5
9. Shipper Benefits	<u>\$900.0</u>	<u>\$1,400.0</u>
10. Total Estimated Annual Business Benefits	\$2,244.7	\$3,827.8

Source: ZETA-TECH 2004 Report, Table 32, Page 110.

Later in 2004, FRA developed a Report to Congress which addressed the costs and benefits associated with PTC implementation in response to the Conference Report on the Consolidated Appropriations Resolution, 2003 (P.L. 108-7).²⁴ In the 2004 report introduction, FRA described the report development as follows:

"FRA had a contractor, Zeta-Tech Associates (Zeta-Tech), examine the business benefits and costs [of PTC]. FRA combined that analysis with FRA estimates of modal diversion and societal consequences, and with a joint effort between FRA and the Volpe National Transportation Systems Center (Volpe) to analyze potential accident cost reductions due to PTC,"²⁵ and,

"FRA then conducted a peer review workshop to which representatives of railroads (freight and passenger), labor organizations, suppliers, and shippers were invited. Draft reports were presented, and post-workshop written filings were received."²⁶

FRA considered significant industry input (largely provided by the railroads) and revised and restated the ZETA-TECH direct business benefits estimates based on that input in its 2004 Report to Congress. In addition, FRA introduced another class of benefits attributable to PTC implementation in its 2004 report, i.e., indirect benefits to society resulting from the direct shipper benefits calculated by ZETA-TECH and revised by FRA. These indirect benefits consisted largely of reductions in highway crashes and highway-vehicle emissions as a result of shippers taking advantage of improved rail service (reduced transit times and improved

²⁴ In its 2004 report, FRA opined that PTC, by itself, would not result in business benefits. However, it followed that if add-on components of relatively modest cost were implemented subsequent to PTC implementation then business benefits would accrue. Thus, FRA's 2004 report evaluated costs and benefits associated with PTC implementation and a few add-on technology components. *See*: 2004 FRA Report to Congress at page 3.

²⁵ 2004 FRA Report to Congress, page 4.

²⁶ *Id.*

reliability) and shifting truck shipments to rail (modal diversion). In FRA's discussion on its indirect benefits calculation, FRA stated that:

"FRA remains convinced that an integrated communications, command and control system such as PTC and allied elements should be able to contribute to improvements in service quality," and, "Modal diversion is highly sensitive to service quality."²⁷

The unadjusted PTC B benefits calculated by FRA in 2004 ranged from \$2.4 to \$3.9 billion annually and are shown in Columns (4) and (5) on Attachment No. B-4.

In July 2009, as FRA finalized its NPRM on PTC implementation, it conducted an economic analysis of the impact of the proposed rule. Included in that report was a 16-page appendix which updated each element of the 2004 FRA statement of business benefits associated with PTC implementation. ~~These updated benefits were not included in the NPRM RIA (or the~~ final rule RIA), which considered only railroad safety benefits (along with total direct implementation costs) in the cost-benefit comparison. In the NPRM, FRA estimated 20-year discounted costs to equal \$10,008 million, and safety benefits to equal \$608 million using a 7% discount rate or a cost-benefit ratio of 16.47.²⁸

Table 3 below shows FRA's updated benefits calculation as included in the July 2009 NPRM.

²⁷ 2004 FRA Report to Congress, page 4.

²⁸ **Federal Register** / Vol. 74, No. 138 / Tuesday, July 21, 2009 / Proposed Rules, page 36002.

Table 3
FRA July 2009 NPRM Cost-Benefit Analysis 1/
(2009 Dollars in Millions)

<u>Item</u> (1)	<u>Amount</u> (2)
1. PTC Implementation Costs	\$10,007.6
2. Railroad Safety Benefits	\$607.7
3. Cost-Benefit Ratio (L1 ÷ L2)	16.47

Source: Attachment No. B-1, Column (3), Lines 1 through 17.
1/ Net Present Value assuming 7% Discount Rate.

Had the business benefits developed by FRA in its 2009 economic analysis been properly included in the NPRM RIA, the total costs would have been restated as \$20,580 million (~~\$10,572 million plus \$10,008 million~~), total benefits would have been restated as ~~\$17,310~~ million (\$16,702 million plus \$608 million), and the cost-benefit ratio would have been restated as 1.19 (\$20,508 divided by \$17,310.)

Table 4 below shows FRA's updated benefits calculation as included in FRA's July 2009 economic analysis.

Table 4
FRA July 2009 Economic Analysis Cost-Benefit Analysis 1/
(2009 Dollars in Millions)

<u>Item</u> (1)	<u>Amount</u> (2)
1. PTC Implementation Costs	\$10,007.6
2. Railroad Safety Benefits	\$607.7
3. Additional "Business" Costs	\$10,572.5
4. Additional "Business" Benefits	\$16,702.3
5. Total Costs (L1 + L3)	\$20,580.1
6. Total Benefits (L2 + L4)	\$17,310.0
7. Cost-Benefit Ratio (L5 ÷ L6)	1.19

Source: Attachment No. B-1, Column (3), Lines 1 through 28.
1/ Net Present Value assuming 7% Discount Rate.

In January 2010, FRA published its Final Rule on PTC implementation. As in July 2009, FRA's RIA considered only railroad safety benefits and total direct implementation costs in the cost-benefit comparison. FRA's revised estimate of 20-year discounted costs equaled \$9,548 million, and its revised safety benefits estimate equaled \$440 million using a 7% discount rate or a cost-benefit ratio of 21.71.²⁹ Table 5 below reproduces FRA's updated costs and benefits as included in FRA's January 2010 Final Rule.

²⁹ **Federal Register** / Vol. 75, No. 10 / Friday, January 15, 2010 / Rules and Regulations, page 2685.

Table 5
FRA January 2010 Final Rule Cost-Benefit Analysis 1/
(2009 Dollars in Millions)

<u>Item</u> (1)	<u>Amount</u> (2)
1. PTC Implementation Costs	\$9,547.5
2. Railroad Safety Benefits	\$439.7
3. Cost-Benefit Ratio (L1 ÷ L2)	21.71

Source: Attachment No. B-1, Column (2), Lines 1 through 17.
1/ Net Present Value assuming 7% Discount Rate.

Had business benefits calculated in July 2009 been properly updated and included in the final rule RIA, the total costs would have been restated as \$19,642 million (\$10,094 million plus \$9,548 million), total benefits would have been restated as \$17,142 million (\$16,702 million plus \$440 million), and the cost-benefit ratio would have been restated as 1.15 (\$19,642 divided by \$17,142.), as shown in Table 6 below.

Table 6
FRA January 2009 Final Rule Cost-Benefit Analysis
Restated to Include FRA July 2009 Economic Analysis "Business" Benefits 1/
(2009 Dollars in Millions)

Item (1)	Amount (2)
1. PTC Implementation Costs	\$9,547.5
2. Railroad Safety Benefits	\$439.7
3. Additional "Business" Costs	\$10,094.2
4. Additional "Business" Costs	\$16,702.3
5. Total Costs (1.1 + 1.3)	\$19,641.7
6. Total Benefits (1.2 + 1.4)	\$17,142.0
7. Cost-Benefit Ratio (1.5 ÷ 1.6)	1.15

Source: Attachment No. B-1, Column (4), Lines 1 through 28.
1/ Net Present Value assuming 7% Discount Rate.

These simple restatements using FRA's own economic analysis would have greatly changed the tone of the cost-benefit analysis presentation in the NPRM and in the Final Rule, as the demonstration would not have been that this rule equates to an unfunded mandate, but rather that the costs are largely recovered over a 20-year time horizon. However, as discussed below, there are several mechanical and theoretical errors in FRA's 2004 report and 2009 economic analysis that, when corrected, demonstrate that over 20-years, the benefits of PTC outweigh the costs.

**C. ERRORS CONTAINED
IN THE 2004 FRA REPORT**

The 2004 FRA Report to Congress included a restatement of the six benefits categories included in the ZETA-TECH report, new calculations for direct safety benefits co-developed with

VOLPE, as well as indirect societal benefits.³⁰ There are three (3) main problems with the FRA's 2004 statement of benefits:

1. FRA included ZETA-TECH costs and benefits at 2001 real dollar levels and introduced new cost and benefit estimates based on 2003 real dollar levels;³¹
2. FRA erred in its calculation of indirect shipper benefits (based on an assumed 80% pass-through of railroad direct benefits to shippers in the form of reduced rates); and
3. FRA improperly included annual maintenance costs in its benefits calculation.³²

The 2004 FRA Benefits calculation is reproduced in Attachment No. B-4 to this Report, along with notes describing the issues and errors contained therein. Attachment No. B-4 also shows the 2004 FRA report values corrected and updated to reflect 2003 constant dollars for all categories.³³ As shown, the error in the calculation of indirect shipper benefits (overstatement) and the improper inclusion of costs in the benefits estimate (understatement) carry forward to the statement of total benefits. Also, the inclusion of 2001-level costs for certain elements leads to an understatement of those elements. Although the overstatement caused by the erroneous indirect shipper benefit calculation and the understatement caused by the improper inclusion of costs in the benefits calculation are both significant in scale, they roughly cancel each-other and the compound result of these and other errors is a 2% understatement of

³⁰ Indirect societal benefits are based on FRA's Intermodal Transportation and Inventory Cost ("ITIC") modal diversion model and encompass crash reduction and environmental benefits associated with modal diversion resulting from shippers shifting volumes to rail from truck transport because of improved rail transit times and service reliability.

³¹ With one exception, FRA-developed costs and benefits reflect 2003 dollar values. The terminal track force cost reductions are expressed in 2002 dollars.

³² These costs were improperly included in the benefits side of the ledger and should be removed. Furthermore, these maintenance costs are already included in FRA's RIA cost statement.

³³ See: Attachment No. B-4, Columns (7) to (9).

benefits.³⁴ However, the errors contained in FRA's 2004 statement of benefits carry forward to FRA's 2009 update of "business" benefits where their impacts are larger.

D. MECHANICAL AND THEORETICAL ERRORS CONTAINED IN THE 2009 FRA RESTATEMENT

The July 2009 FRA economic analysis contained a restatement of the benefits categories included in the FRA 2004 Report to Congress and a new calculation for indirect societal costs.³⁵ There are five main problems with FRA's 2009 restatement of benefits:

1. Rather than including separate cost and benefits estimates, costs are subtracted from benefits to develop a statement of net benefits (which is a fundamental violation of CBA principles);
2. To update the dollar amounts to 2009 real dollars, FRA applied a GDP inflation index based on the change in GDP from 2003 to 2009 to the restated ZETA-TECH costs and benefits which are included at 2001 real dollar levels in the 2004 FRA report. This affects several calculations including the calculation of shipper direct benefits;
3. FRA's calculation of other direct benefits (railroad direct benefits) is erroneous;
4. FRA's calculated modal diversion factor (indirect benefits factor) is erroneous; and
5. FRA's application of its calculated modal diversion factor to assumed passed-through shipper costs (manifested in increased rates) is a fundamental misapplication of the ITIC model results included in the 2004 report. Even if inclusion of this additional cost is warranted, FRA was inconsistent in its application of the benefit.

³⁴ Attachment No. B-4, Column (6), Line 20 ÷ Column (9), Line 20.

³⁵ The indirect societal costs are purported to be based on a factor developed from FRA's Intermodal Transportation and Inventory Cost ("ITIC") model and used as a proxy for crash reduction and environmental benefits associated with modal diversion resulting from shippers shifting volumes to truck from rail transport *because of increased rates resulting from passed-through railroad direct costs*.

The 2009 FRA "business benefits" calculation is reproduced below in Table 7, along with notes describing the issues and errors contained therein.

<u>Item</u> (1)	<u>Amount</u> (2)	<u>Notes</u> (3)
1. Indirect Societal Cost, Modal Diversion Resulting from Increased Rail Rates	(\$10,403.8)	Calculated Using Incorrect Indirect Benefits Factor, Overstated by 92%
2. Add On Productivity System Costs	(\$82.0)	Calculation is Correct
3. Add On Productivity System Maintenance Costs	(\$86.8)	Calculation is Correct
4. Indirect Societal Cost, Modal Diversion Resulting from Further Increased Rail Rates	2/	Improperly Excluded from Analysis
5. Shipper Direct Productivity Benefit	\$4,336.3	Calculated Using Incorrect Inflation, Understated by 3%
6. Indirect Societal Benefit, Modal Diversion Resulting from Increased Rail Efficiency	\$7,292.5	Calculated Using Incorrect Indirect Benefits Factor, Overstated by 77%
7. Railroad Direct Productivity Benefit	\$5,073.5	Erroneous Calculation, Overstated by 1%
8. Indirect Societal Benefit, Modal Diversion Resulting from Reduced Rail Rates	2/	Improperly Excluded from Analysis
9. Total Costs (Sum of Lines 1-4)	(\$10,572.5)	xxx
10. Total Benefits (Sum of Lines 5-8)	\$16,702.3	xxx

Source: Attachment No. B-1, Column (3).
1/ Net Present Value Assuming a 7% Discount Rate.
2/ Not included by FRA.

Each of the errors summarized in Table 7 is discussed below.