

# BNSF Railway Electronic Train Management System PTC Implementation Plan (PTCIP)

Submitted in fulfillment of 49 CFR Part 236, Subpart I, § 236.1011



## Revision History

Version	Date	Changed By	Summary
1.0	04/14/2010	BNSF Railway	Document released to the FRA
1.1	04/20/2010	BNSF Railway	Moved SSI PHMSA Routing Exceptions to Appendix J.1
1.2	05/26/2010	BNSF Railway	Incorporated edits as a result of the FRA's review of PTCIP V1.1
1.3	06/10/2010	BNSF Railway	Incorporated edits as a result of the conditions set forth in the FRA's conditional approval of BNSF's PTCIP v1.2.
1.4	07/02/2010	BNSF Railway	Incorporated edits as a result of the FRA comments received on July 2, 2010.

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The PTCIP Appendices contain confidential information that constitutes trade secrets and other proprietary information that is exempt from the mandatory disclosure requirements of the Freedom of Information Act (5 U.S.C. § 552) (FOIA). The whole Appendix section as identified by “<Confidential>” below has been designated as confidential as required by 49 C.F.R. § 209.11(d) so as to exempt the entire section from all disclosure requirements under FOIA.

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- A.4 Appanoose County Community Railroad < SSI >
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- A.74 Puget Sound & Pacific Railroad Company < SSI >
- A.75 Red River Valley & Western Railroad < SSI >
- A.76 Richmond Pacific Railroad < SSI >
- A.77 Riverport Railroad LLC < SSI >
- A.78 RJ Corman Tennessee Terminal RR < SSI >
- A.79 Rock & Rail < SSI >
- A.80 San Joaquin Valley Railroad Co < SSI >
- A.81 Sand Springs Railway Company < SSI >
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- A.83 Sidney & Lowe Railroad Inc < SSI >

- A.84 Sierra Railroad < SSI >
- A.85 Sisseton Milbank Railroad < SSI >
- A.86 South Kansas & Oklahoma Railroad Inc < SSI >
- A.87 South Plains Lamesa Railroad LTD < SSI >
- A.88 Southwestern Railroad < SSI >
- A.89 Stillwater Central Railroad < SSI >
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- A.91 Tacoma Rail < SSI >
- A.92 Tazewell & Peoria Railroad Inc < SSI >
- A.93 Texas & Oklahoma Railroad < SSI >
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- A.98 Texas Rockcrusher Railway < SSI >
- A.99 Timber Rock Railroad < SSI >
- A.100 Toledo Peoria & Western Railway < SSI >
- A.101 Transit America LLC < SSI >
- A.102 Tulsa-Sapulpa Union Railway Company < SSI >
- A.103 Twin Cities & Western Railroad Company < SSI >
- A.104 V & S Railway < SSI >
- A.105 Washington and Idaho Railway < SSI >
- A.106 West Texas & Lubbock Railroad < SSI >
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# 1 Introduction

## 1.1 Overview

The BNSF Railway (BNSF) submits this Positive Train Control Implementation Plan (PTCIP) pursuant to 49 CFR 236 Subpart I (§ 236 Subpart I). In this PTCIP, BNSF sets forth:

1. The method, locations, and sequential order in which BNSF plans to deploy its Positive Train Control (PTC) system.
2. The method by which the PTC system meets the required functionality.
3. The definition of BNSF's PTC system's safety as a non-vital overlay per the § 236 Subpart I criteria.
4. For each BNSF subdivision where PTC will be equipped, all main line track segments, method of operation, and the maximum authorized speed(s).
5. The installation risk prioritization methodology used.
6. The plan for equipping BNSF and tenant railroad locomotives to utilize PTC.
7. BNSF's strategy for meeting the requirement set forth in 49 CFR Section 236.1011(b)(1).
8. Accompanying appendices as appropriate to clarify information.

### 1.1.1 History

BNSF submits this PTCIP pursuant to the mandates to install PTC on certain portions of its system set forth by Congress in section 104 of the Railway Safety Improvement Act of 2008 (RSIA08), Pub.L. 110-432, 122 Stat. 4854 (Oct. 16, 2008) (codified at 49 U.S.C. Sec. 20157, *et seq.*) and the implementation rule issued by the Federal Railroad Administration (FRA) set forth at 49 CFR Subpart 236.0 *et seq.* that cumulatively requires PTC deployment on a large portion of the BNSF system. Prior to these actions of Congress and the FRA, BNSF had been proactively developing and implementing a PTC system – the Electronic Train Management System (ETMS).

BNSF developed a form of PTC, the Electronic Train Management System (ETMS) on its own initiative and submitted the system for initial FRA approval in 2003. FRA first reviewed and granted a waiver for BNSF to test ETMS on a certain part of its system in 2004. BNSF received conditional approval to deploy ETMS on certain parts of its system in 2006. BNSF planned to deploy ETMS on its system as conditions warranted, but in any circumstance only planned to deploy ETMS where justified by financial, operational, and safety reasons. BNSF considered ETMS one of a menu of options for enhancing safety; deployment would be a tool with other technology, physical enhancements, capital projects, and general maintenance programs to enhance overall system safety. Even before the enactment of the RSIA08, with its statutory mandate for wide-scale deployment of PTC by the end of 2015, BNSF began working with other railroad stakeholders to deploy ETMS.

Importantly, ETMS was developed and designed as a safety overlay, meaning that where it was to be deployed, BNSF would install the ETMS system over, or in addition to, existing methods of operation. BNSF always intended that should ETMS fail or not be deployed on a segment, rail operations would continue and default to the current pre-ETMS operational practices (which FRA has for years found to provide an appropriate level of safety). The ETMS system was designed to include only one locomotive cab display and have no restrictions on the engineer's functions. In the form submitted to the FRA for approval, ETMS was not designed, by itself, to create operational benefits or capacity improvements for BNSF; rather, it was designed only to protect safety in existing operations.

The RSIA08 required that a fully-operational PTC system be deployed on thousands of miles of railroad lines with full interoperability and functionality, regardless of the operational or cost considerations that would have guided BNSF's voluntary deployment of ETMS. In implementing the RSIA08, FRA by rule has interpreted the RSIA08 PTC deployment provisions as requiring installation of PTC on a significantly larger amount of rail lines than would have been necessary by other interpretations of the RSIA08. As is discussed below, BNSF believes that the FRA's expansive interpretation will result in significant unintended consequences and may have the ultimate effect of reducing, rather than increasing, rail safety.

BNSF therefore believes that the FRA should implement the RSIA08 in a manner that requires PTC to be installed on lines that carry passenger trains and Toxic Inhalation Hazard (TIH) / Poison by Inhalation Hazard (PIH) freight traffic and use its reserved authority to relieve the requirements to install PTC on certain routes; for example, on lines that will no longer carry TIH/PIH traffic after BNSF applies the recently promulgated Pipeline and Hazardous Materials Safety Administration's (PHMSA) routing analysis to select the safest and most secure route (see 49 CFR 172.820).

### **1.1.2 Capital Resource Diversion and Operational Impacts**

BNSF is concerned that deploying PTC in the scale and scope mandated by the FRA would have unintended consequences on freight railroad capital spending, on system operations, and potentially on overall system safety. By the FRA's own calculations in the rule implementing the PTC provisions of the RSIA08, installation of PTC will require the expenditure of \$22 for every \$1 of benefit (safety or otherwise). Furthermore, using FRA's publicly-available numbers shows that the cost benefit ratio for BNSF rises to 34 to 1 for PTC installation on lines of road where TIH/PIH shipments are not expected to move after the Congressionally-mandated implementation date. BNSF believes that these cost-benefit ratios understate the true cost of PTC deployment. BNSF also believes that the FRA has not fully considered that the costs associated with unwarranted PTC deployment will be ultimately borne by freight shippers, which could have the effect of diverting traffic to the highways, a mode that is decidedly less safe and inconsistent with good public policy.

Each year BNSF makes significant investments to keep its physical plant in the best operating condition for safe and secure freight operations. In fact, the BNSF physical plant is in the best condition in its modern history as a result of BNSF's continued high level of capital investments even during this recent period of reduced volumes. BNSF is concerned that financing this unprecedented PTC expense may have the effect of forcing BNSF to divert scarce capital resources from the baseline maintenance of the railroad as well as potentially jeopardize other investments that could have significantly more benefit for society including capacity expansion projects that could attract more freight to move by rail, the purchase of cleaner-burning new locomotives, further development of hybrid technology, and numerous other capital, maintenance, and safety projects. Large capital reallocation on the scale of PTC should not be done without a full understanding of whether such capital reprogramming will inevitably lead to unintended consequences.

In addition to the substantial expenditure of capital resources required to support this mandate, BNSF is concerned about several significant and unintended negative operational impacts that flow from this regulation. First, if a locomotive fails to initialize at its initial terminal, BNSF will be required to identify an alternate locomotive that is appropriately equipped to place in the lead position. To ensure system performance, BNSF will need to maintain additional locomotives as a contingency for potential equipment failures. BNSF believes that the unprecedented step of keeping this safety net in place will require additional capital and reduced efficiency in our locomotive utilization.

Second, and perhaps of greater concern, is the possibility of operational impacts caused by the en route failure of locomotive equipment. Under the regulation, equipment failures will have impacts to system traffic beyond what BNSF anticipated in development of ETMS; for example, the restrictions placed on movement speed if a locomotive loses communications capability en route. In deployment prior to this regulation, BNSF has successfully managed these situations through current operating rules and practices to provide for the safe movement of ETMS-equipped trains with en route failures. The FRA regulation requires that these trains be held to restricted speed or to medium speed. As PTC is deployed on some of BNSF's more heavily-trafficked mainline, the impact from slowing one train to restricted speed has the potential of a ripple effect through our system which will impact our ability to meet customer expectations for transportation by rail and reduce our system capacity, impacting both freight and passenger traffic on the system. BNSF believes that these restrictions represent additional unexpected negative impacts on our system velocity and efficiency that must be recognized when calculating the true cost of this mandate and its impacts on our business model.

In order to mitigate these concerns, BNSF believes that FRA should use its discretionary authority to waive the requirements to install PTC on certain routes; for example, on lines that will no longer carry TIH/PIH traffic after BNSF applies the recently promulgated Pipeline and Hazardous Materials Safety Administration (PHMSA) routing analysis to select the safest and most secure route. BNSF understands that a separate waiver request will need to be submitted to address this issue. With respect to TIH/PIH traffic, BNSF believes that through a combination of re-routing this traffic to maximize loads on PTC equipped lines consistent with PHMSA routing requirements and using operational protocols over other lines carrying small amounts of



TIH/PIH traffic by the implementation date of December 31, 2015, the overall safety of the freight rail system would be improved, rather than compromised.

By BNSF's own internal estimates, were the FRA to adopt this paradigm, then BNSF's deployment of PTC would be reduced by almost one-third while freeing substantial capital for other types of safety and capacity improvements.

### **1.1.3 Approach to PTC Implementation in Southern California**

BNSF has made a commitment to certain public entities in the state of California to install the wayside infrastructure portion of a PTC system on certain rail lines that share passenger and freight service in the Los Angeles Basin region of Southern California by December 31, 2012. Although this means that BNSF will have the wayside physical infrastructure in place along the lines by that date, BNSF anticipates that its locomotive fleet will not be fully PTC-equipped until December 31, 2015, and therefore, that PTC will not be fully operational for freight operations on freight rail lines in the Los Angeles Basin earlier than such date.

### **1.1.4 Organizational Relationships**

#### **1.1.4.1 Program Office**

The Program Office (PO) provides operational oversight of the program and is the definitive resource for project management direction and guidance. The PO does not directly manage projects. A hierarchical view of the relationship between the PO and the Project Managers can be seen in *Figure 1 - Program Approach*. Specific responsibilities of the PO include:

- Providing oversight and monitoring of projects/activities within the program
- Enforcing priorities and approving scope for the program
- Providing an escalation point for issues, risks, and resources
- Fostering quick decision making and issue resolution
- Monitoring/tracking budget

#### **1.1.4.2 Project Managers**

Project Managers manage their teams' delivery of items and tasks as outlined in the project charter (see *Appendix E - PTC Project Charter Template* for an example). They report status to the Program Manager (PM) and facilitate communication, resolve intra-team issues, and report team progress.

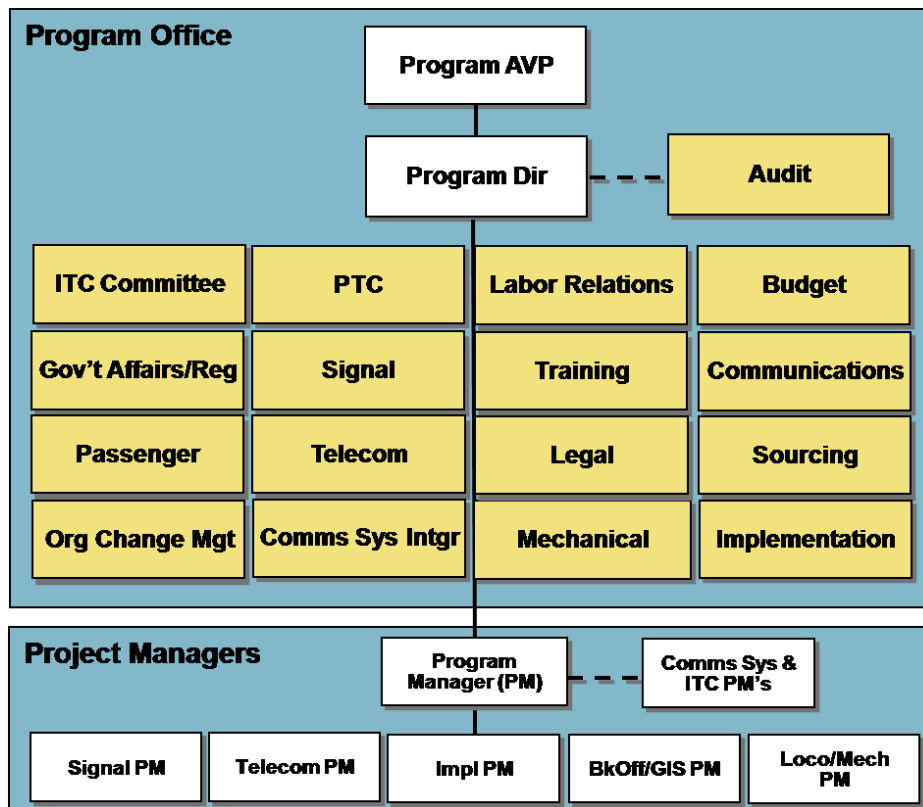


Figure 1 - Program Approach

#### 1.1.4.3 Program “Working” Steering Committee

The Program Steering Committee provides program oversight and serves as an escalation point to resolve issues not resolvable at the program level. *Figure 2 - Program Governance* shows the Program Escalation Path. The Steering Committee is comprised of stakeholders from internal organizations within BNSF that are required to make the implementation of PTC a successful program.

The responsibilities of the Program Steering Committee include, but are not limited to:

- Monitoring and reviewing the program at regular Program Steering Committee meetings
- Providing assistance/guidance to the program when required
- Controlling program scope as emergent issues force changes to be considered, ensuring that scope aligns with program objectives of implementing PTC
- Resolving program conflicts and disputes and reconciling differences of opinion and approach
- Providing formal acceptance of program deliverables

#### 1.1.4.4 Executive Steering Committee

At the highest level, the Executive Steering Committee oversees the program and acts as the decision-maker of last resort, and provides focus, oversight, and strategic guidance and vision to the program. The Executive Steering Committee is comprised of executive level stakeholders from internal organizations within BNSF that are required to make the implementation of PTC a successful program.

The responsibilities of the Executive Steering Committee include, but are not limited to:

- Ensuring that the PTC program is consistent with BNSF's goals and objectives
- Providing advice and evaluating mission critical issues
- Providing strategic input on program objectives

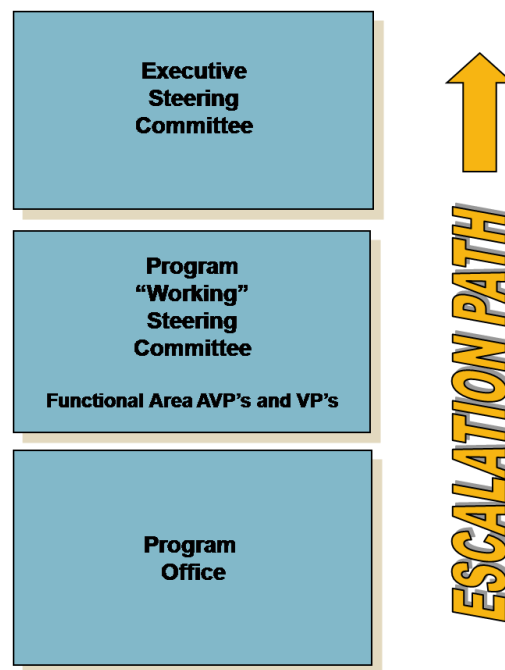


Figure 2 - Program Governance

#### 1.1.5 Request for Amendment of a PTCIP [§ 236.1009(a)(2)(ii)]

This subsection describes how the railroad will make and file a Request for Amendment (RFA) of its PTCIP in accordance with § 236.1021.

When a routing change affecting annual Million Gross Tons (MGT), TIH/PIH traffic levels, or other operational change as called out under § 236.1009(a)(2)(ii) prompts an RFA of the PTCIP to be drawn up as a part of its review and approval process, BNSF will take the following steps:

1. The RFA will be drawn up for internal review. Once an initial draft is published, the review/approval cycle will begin.
2. The Program Office and Program Steering Committee will be responsible for reviewing the RFA to ensure that all items described in § 236.1021(d) are present when applicable. All review comments of the draft will be documented in an internal review log.
3. After the reviewers have had at least one week to review the draft RFA, the process of addressing and displacing comments from the review log will begin.
4. Once all comments from the review log have been addressed and displaced, the review log and updated draft RFA will be re-distributed to the Program Office and Program Steering Committee for a final review.
5. If no new comments are added, the RFA and updated PTCIP will be finalized and submitted to FRA via two methods:
  - a. Three hard copies of each will be sent to the FRA (full version, redacted version, and a delta version that highlights any redacted sections)
  - b. Three soft copies of each will be placed on the FRA's SharePoint site

Document version control will be provided by using an internal BNSF SharePoint site.

## 1.2 Goals and Objectives

The primary goal of implementing BNSF's PTC solution on its network, as required by the RSIA08, is to prevent train-to-train collisions, overspeed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position. BNSF will have its PTC safety overlay system (ETMS) installed and interoperable by December 31, 2015. Further goals and objectives are discussed below.

### 1.2.1 Performance

The PTC system's deployment will adhere to the PTC System Certification requirements detailed in § 236.1015.

### 1.2.2 Quality

As defined in § 236.1001, an acceptable level of safety will be maintained in the development, functionality, architecture, installation, implementation, inspection, testing, operation, maintenance, repair, and modification of the PTC system.

To ensure that an acceptable level of safety is achieved, BNSF will follow the methodologies and activities outlined in its ETMS Product Safety Plan (PSP) V3.0 submittal of February 18, 2010 (approval pending). As outlined in § 236.1015(b)(2), BNSF will also ensure that all vendors from whom PTC technologies are to be acquired have an acceptable quality assurance program for both design and manufacturing processes.

### 1.2.3 Technical

The PTC system will provide for interoperability between BNSF and all of its tenant railroads. Technical, semantic, and organizational interoperability will be achieved to enhance the ability of BNSF and its tenants to operate together safely. Interoperability between BNSF and its tenants will be achieved through product testing, industry partnership, use of common technology, and standard implementation. BNSF will work closely with its tenants throughout the PTC deployment process to ensure that all aspects of interoperability are fully addressed. This partnership will be ongoing as the tenant railroads proceed to operate on the equipped portions of BNSF's network.

### 1.2.4 Coverage

Pending the outcome of BNSF's waiver request, as described in *Section 1.1.2 - Capital Resource Diversion and Operational Impacts*, and 220 MHz radio availability, BNSF will have the following coverage goals:

- BNSF will have ETMS installed, operational, and interoperable on 118 (60%) of its 198 subdivisions by December 31, 2015.
- BNSF will have ETMS installed, operational, and interoperable on 18,445 (82%) of its 22,386 owned route miles by December 31, 2015.
- Of the 18,445 route miles to be equipped, 5,972 miles (27%) contain passenger traffic.
- Of the 18,445 route miles to be equipped, 18,445 miles (100%) contain TIH/PIH traffic.

## 1.3 Success Criteria

This section of the PTCIP calls out the metrics that will be applied to gauge the success of long-term and intermediate implementation goals. Based on the request by BNSF for the FRA to use its discretion to waive the requirements to install PTC on certain routes, these metrics are given under pre-waiver conditions. For clarification, when referred to in this section, long-term goals refer to BNSF's implementation milestones from a *system* point of view. Intermediate goals refer to BNSF's implementation milestones from a *subdivision* point of view.

### 1.3.1 Long-term Goal Metrics

To gauge long-term goals, BNSF will use the following metrics for system PTC implementation and locomotive installation. A definition of long-term goals for PTC Safety Plan (PTCSP) submittal and PTC System Certification are also included. The remaining metrics will be on a subdivision-to-subdivision basis and are described in *Section 1.3.2 - Intermediate Goal Metrics*.

#### 1.3.1.1 System PTC Implementation

A subdivision will be considered complete when PTC System Certification is received by BNSF as detailed in § 236.1015(a). Pending the outcome of BNSF's waiver request, as described in *Section 1.1.2 - Capital Resource Diversion and Operational Impacts*, and 220 MHz radio availability, BNSF will have the following system implementation goals:

- 2011 - 1 of 118 subdivisions have completed PTC implementation - 0.8%
- 2012 - 31 of 118 subdivisions have completed PTC implementation - 26.3%
- 2013 - 55 of 118 subdivisions have completed PTC implementation - 46.6%
- 2014 - 80 of 118 subdivisions have completed PTC implementation - 67.8%
- 2015 - 118 of 118 subdivisions have completed PTC implementation - 100%

As called out in § 236.1009 (a)(2)(ii), BNSF will file an RFA if any subdivision is added, removed, or modified.

#### 1.3.1.2 Locomotive Installation

Since BNSF does not assign its locomotives per subdivision, it is appropriate to consider the equipping of rolling stock as a long-term goal. BNSF will equip 2,000 of its locomotives with PTC. Details of BNSF's plan for the progressive equipping of rolling stock, as required by §236.1006(b)(1),(2), on PTC territory, can be found in *Appendix K.1 – Controlling Locomotive Equipped Per Sub*. Pending the outcome of BNSF's waiver request, as described in *Section 1.1.2 - Capital Resource Diversion and Operational Impacts*, and 220 MHz radio availability, BNSF will have the following locomotive installation goals:

- 2011 - 319 of 2,000 locomotives have completed PTC implementation - 15.9%
  - 3 of 319 PTC equipped locomotives will be operating on PTC equipped territory – 0.9%
- 2012 - 619 of 2,000 locomotives have completed PTC implementation - 31%



- 256 of 619 PTC equipped locomotives will be operating on PTC equipped territory – 41.4%
- 2013 – 1,019 of 2,000 locomotives have completed PTC implementation - 51%
  - 640 of 1,019 PTC equipped locomotives will be operating on PTC equipped territory – 62.8%
- 2014 – 1,575 of 2,000 locomotives have completed PTC implementation - 78.8%
  - 1,180 of 1,575 PTC equipped locomotives will be operating on PTC equipped territory – 74.9%
- 2015 – 2,000 of 2,000 locomotives have completed PTC implementation - 100%
  - 2,000 of 2,000 PTC equipped locomotives will be operating on PTC equipped territory – 100%

BNSF's General Director of Locomotive Maintenance & Repair and appropriate Manager Mechanicals are responsible for achieving the progressive implementation and deployment of PTC-equipped rolling stock.

On an average day, BNSF runs 1300 trains system-wide. BNSF's proposed implementation plan of 118 subdivisions composes approximately 80% of those trains. This correlates to an average of 1040 trains on PTC territory. Given BNSF's locomotive installation goal of 2000 PTC equipped locomotives, this leaves BNSF 960 PTC equipped locomotive, per day, for staging, maintenance, and repairs.

The locomotive onboard installation is made more expensive and further complicated by FRA's inclusion of a requirement for a second screen in the locomotive cab. BNSF has operated, with FRA's approval and without a mishap, thousands of ETMS-equipped trains without such a screen thus establishing the lack of need for this requirement. FRA's belief that railroads may find some future business benefit, possibly to enhance operations or handle mandatory directives, should be handled when and if such applications become a reality. BNSF believes that the second screen requirement is yet another added expense to the PTC deployment costs with no corresponding safety benefit. BNSF is also concerned that this requirement may represent an attempt to unnecessarily affect labor management relations and collective bargaining agreements.

### 1.3.1.3 Amended PTCSP Submitted

As set forth in § 236.1015, BNSF will submit an amended PTCSP in order to address incremental changes required for interoperability as described in the Request for Expedited

Certification (REC) submitted on April 13, 2010. This long-term goal will be considered complete once the amended PTCSP has been submitted to the FRA.

#### **1.3.1.4 Request for Expedited Certification Submitted**

BNSF has, in accordance with § 236.1031(a), submitted a Request for Expedited Certification (REC) letter to the FRA on April 13, 2010. This letter referenced BNSF's ETMS PSP V3.0 submitted on February 18, 2010, and included the information required under §236.1031(a)(1).

#### **1.3.1.5 PTC System Certification Received**

§ 236.1015(a) states that the "receipt of a PTC System Certification affirms that the PTC system has been reviewed and approved by the FRA in accordance with, and meets the requirements of, this part." Once BNSF receives the PTC System Certification, the configuration will be considered operational.

### **1.3.2 Intermediate Goal Metrics**

Intermediate goals will refer to those milestones that can best be used on a subdivision-to-subdivision basis. When all of these intermediate goals have been completed, a subdivision will be considered cut over to PTC operations.

#### **1.3.2.1 Infrastructure Installation Completed**

Infrastructure installation for a subdivision will be completed when the following have been installed and tested for functionality:

- 100% of the communication system
- 100% of the track infrastructure
- 100% of the waysides

### 1.3.2.2 Geographic Information System (GIS) Validated

Each subdivision has two intermediate goals that are a result of Geographic Information System (GIS) data. GIS data will be considered validated for a subdivision when the following are completed:

- Track survey completed
- Track database validated and verified

### 1.3.2.3 Field Testing Completed

The completed field testing will conform with § 236.1015(d)(10). This testing will be made up of the following:

- Host railroad PTC operation
- Interoperable PTC functionality

### 1.3.2.4 Training Plan Implementation

As an intermediate goal, the training plan will be implemented to assure 100% of BNSF employees are trained prior to performing PTC service.

- Field and office maintenance personnel, as described in § 236.1041(a)(1), for this subdivision have completed training in accordance with §§ 236.1039 through 236.1045.
- Dispatchers, as described in § 236.1041(a)(2), for this subdivision have completed training in accordance with §§ 236.1039 through 236.1045.
- Persons who operate trains or serve as a train or engine crew, as described in § 236.1041(a)(3), for this subdivision have completed training in accordance with §§ 236.1039 through 236.1045.
- Roadway workers, as described in § 236.1041(a)(4), for this subdivision have completed training in accordance with §§ 236.1039 through 236.1045.
- Direct supervisors, as described in § 236.1041(a)(5), for this subdivision have completed training in accordance with §§ 236.1039 through 236.1045.

## 1.4 Applicability

This section provides the pertinent information for the railroad's rail network for the purpose of PTC implementation.

Designation of non-main line subdivisions can be found in detail in *Section 3.1 - Non-Mainline Subdivisions*. Non-main line subdivisions are defined as those subdivisions that do not meet the parameters described in § 236.1003 and § 236.1005(b)(1)(i and ii). All subdivisions that meet the parameters in § 236.1005(b)(1)(i and ii) are considered main line for PTC installation as defined in § 236.1003, and, along with associated traffic densities and risk analysis, can be found in *Appendix D - PTC Implementation Plan* and *Appendix F - Risk Analysis by Subdivision*.

For the purpose of risk analysis, baseline densities were set to calendar year 2008 numbers.

## 1.5 Document Overview

This section provides an overview of the organization of the PTCIP, which BNSF has developed as required by 49 U.S.C. § 20157 and § 236.1005.

- **Section 1** describes the general objectives, applicability, and scope of the document.
- **Section 2** lists applicable documents referenced in this PTCIP.
- **Section 3** identifies which track segments the railroad designates as main line and non-main line track, as required by § 236.1011(a)(8).
- **Section 4** describes the functional requirements that the PTC system meets as required by § 236.1011(a)(1).
- **Section 5** describes how BNSF will comply with § 236.1009(c) as required by § 236.1011(a)(2).
- **Section 6** defines how BNSF will provide for interoperability between itself and all tenant railroads as required by § 236.1011(a)(3).
- **Section 7** describes how the PTC system will be implemented to address areas of greater risk to the public and railroad employees before areas of lesser risk by evaluating multiple risk factors as required by § 236.1011(a)(4).
- **Section 8** defines the sequence, schedule, and decision basis for the line segments to be equipped, including the risk factors by line segment, as required by § 236.1011(a)(5).
- **Section 9** identifies the rolling stock that will be equipped with PTC technology, as required by § 236.1011(a)(6), and defines a schedule for same.

- **Section 10** identifies the number of wayside devices required for each subdivision and the schedule to complete the installations by December 31, 2015, as required by § 236.1011(a)(7).
- **Section 11** identifies and describes BNSF's basis for determining that the risk-based prioritization in Section 7 above is not practical as required by § 236.1011(a)(9).
- **Section 12** contains the strategy for full system-wide deployment of BNSF's PTC system beyond those line segments required to be equipped under § 236 Subpart I, including the criteria that will be applied in identifying those additional lines.
- **Section 13** identifies the three track segments for which BNSF is filing a Main Line Track Exclusion Addendum (MTEA) as required by §236.1019(c)(3).

## 1.6 Acronyms and Definitions

This section will include definitions of all terms, abbreviations, and acronyms required to properly interpret the PTCIP.

The following is a list of abbreviations and acronyms used in the PTCIP.

ACRONYM	DEFINITION
AAR	American Association of Railroads
ABS	Automatic Block Signal
ATS	Automatic Train Stop
BNSF	BNSF Railway Company
CFR	Code of Federal Regulations
CTC	Centralized Traffic Control
ETMS	Electronic Train Management System
FRA	Federal Railroad Administration
GIS	Geographic Information System
HMI	Human Machine Interface
ID	Identification
ITC	Interoperable Train Control
MGT	Million Gross Tons
MHz	Megahertz
MPH	Miles per Hour
MTEA	Main Line Track Exclusion Addendum

<b>ACRONYM</b>	<b>DEFINITION</b>
NCS	Network Control Systems
NPI	Notice of Product Intent
PMHSA	Pipeline and Hazardous Materials Safety Administration
PIH	Poison by Inhalation Hazard
PM	Program Manager
PO	Program Office
PSP	Product Safety Plan
PTC	Positive Train Control
PTCDP	PTC Development Plan
PTCIP	PTC Implementation Plan
PTCSP	PTC Safety Plan
REC	Request for Expedited Certification
RFA	Request for Amendment
RSIA08	Rail Safety Improvement Act of 2008
TBC	To Be Configured
TIH	Toxic Inhalation Hazard
Wabtec	Westinghouse Air Brake Technologies Corporation
WIU	Wayside Interface Unit
WRE	Wabtec Railway Electronics

The following is a list of terms and definitions used in the PTCIP.

### **ABS**

Automatic Block Signal system, a series of consecutive blocks governed by block signals, cab signals, or both, actuated by a train or engine or by certain conditions affecting the use of a block.

### **Class 1 Railroad**

A railroad which, in the last year for which revenues were reported, exceeded the threshold established under regulations of the Surface Transportation Board (49 CFR part 120.1-1 (2008)).

### **Crossing**

Point of intersection at grade between two tracks belonging to the same or different railroads.



## **CTC**

Centralized Traffic Control, a block system operated from a dispatching office using block signal indications to authorize train movements.

## **ETMS**

Electronic Train Management System, used to refer to the railroad safety-overlay system developed jointly by BNSF and Wabtec for a pilot implementation on the Beardstown subdivision in Illinois.

## **GIS**

Geographic Information System, a collection of computer hardware, software, and geographic data for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographically referenced information.

## **Host Railroad**

The railroad that has effective operating control over a segment of track.

## **Interoperability**

ETMS capability allowing trains equipped with the same or similar systems to operate on different railroads interchangeably and automatically without hindrance, delay, or additional on-board equipment, including uninterrupted movements over property boundaries.

## **Locomotive Engineer**

A qualified person who is currently certified pursuant to 49 CFR Part 240.

## **Main Line**

Except as excepted pursuant to § 236.1019 or where all trains are limited to restricted speed, a segment or route of railroad tracks, including controlled sidings:

- 1) Of a Class I railroad, as documented in current timetables filed by the Class I railroad with the FRA under § 217.7, over which 5,000,000 or more gross tons of railroad traffic is transported annually; or
- 2) Used for regularly scheduled intercity or commuter passenger service, as defined in 49 U.S.C. § 24012, or both.

## **Methods of Operation**

Track Warrant Control (TWC) with non-signal and Automatic Block Signal (ABS) applications, Centralized Traffic Control (CTC), or other operation types that generate mandatory directives.

## **MTEA**

Main Line Track Exclusion Addendum, the document further described in § 236.1019.

## **NCS**

BNSF's Network Control Systems, the group responsible for the operation and maintenance of BNSF's NOC networks.

## **Non-Signaled Territory**

Track without signals, over which train movements are governed by timetable, track warrants, or operating rules; aka *dark territory*.

## **NPI**

Notice of Product Intent as further described in § 236.1013.

## **Overlay**

A system that does not constitute any part of the method of operation, but maintains safe system operation should any one of the safety-critical functions be omitted or not performed correctly.

## **PTC**

Positive Train Control, as further described in § 236.1005.

## **PTCDP**

PTC Development Plan, as further described in § 236.1013.

## **PTCIP**

PTC Implementation Plan, as required under 49 U.S.C. § 20157 and further described in § 236.1011.

## **PTCSP**

PTC Safety Plan as further described in § 236.1015.

## **PTC Railroad**

Each Class I railroad and each entity providing regularly scheduled intercity or commuter rail passenger transportation required to implement and operate a PTC system.

## **PTC System Certification**

Certification as required under 49 U.S.C. § 20157 and further described in § 226.1009 and § 236.1015.

## **RFA**

Request for Amendment, a request for an amendment of a plan or system made by a PTC-equipped railroad in accordance with § 236.1021.

**Safety Critical**

Applies to any function or system, the correct performance of which is essential to the safety of personnel and/or equipment, or the incorrect performance of which could cause a hazardous condition or allow a hazardous condition that was intended to be prevented by the function or system to exist.

**Tenant Railroad**

A railroad, other than a Host Railroad, operating on track upon which a PTC system is required.

**Track Database**

Database containing locations and attributes of track over which trains are subject to location tracking and enforcement.

**TWC**

Track Warrant Control, a method of authorizing train movements or protecting track forces on a main track within specified limits in a territory so designated in the timetable.

**Validation**

The process of determining that a system is appropriate for its purpose.

**Verification**

The process of determining that a system or module meets its designed specification.

**Wayside Interface Unit**

An electronic component that interfaces ETMS to a field (wayside) device.

## 2 Applicable Documents

This section provides a complete list of all documents and other sources referenced in this PTCIP.

- 49 CFR Part 236 Subpart I - Final Rule, January 15, 2010
- 49 CFR Part 236 Subpart H, March 5, 2005
- BNSF's Electronic Train Management System Product Safety Plan 3.0, February 12, 2010
- BNSF's Request for Expedited Certification (REC), April 13, 2010
- BNSF Subdivision Timetables
- Railway Safety Improvement Act of 2008 (RSIA08), Pub.L. 110-432, 122 Stat. 4854 (Oct. 16, 2008) (codified at 49 U.S.C. Sec. 20157, *et seq.*)

### 3 Designating Track as Main Line or Non-Main Line [§ 236.1011(a)(8)]

This section provides the track segments the railroad identifies as main line and non-main line track.

BNSF's PTCIP includes Main Line Track Exclusion Addendums (MTEAs), as defined by § 236.1019 in *Section 3 - Designating Track as Main Line or Non-Main Line* [§ 236.1011(a)(8)].

BNSF's territory is subdivided into 198 subdivisions. Boundaries for each subdivision are defined in their appropriate timetable. The limits of PTC installation on a particular subdivision are called out in the Limits column in *Appendix D - Implementation Plan*.

The parameters described in § 236.1003 and § 236.1005(b)(1)(i and ii) were used to designate track as main line or non-main line. In § 236.1005(b)(1)(i and ii), the rail lines required to be equipped are defined as follows:

***“§ 236.1005 Requirements for Positive Train Control systems***

***(b) PTC system installation.***

***(1) Lines required to be equipped.*** *Except as otherwise provided in this subpart, each Class I railroad and each railroad providing or hosting intercity or commuter passenger service shall progressively equip its lines as provided in its approved PTCIP such that, on and after December 31, 2015, a PTC system certified under § 236.1015 is installed and operated by the host railroad on each:*

- (i) Main line over which is transported any quantity of material poisonous by inhalation (PIH), including anhydrous ammonia, as defined in §§ 171.8, 173.115 and 173.132 of this title;*
- (ii) Main line used for regularly provided intercity or commuter passenger service, except as provided in § 236.1019...”*

Based on the above rule, each track segment was evaluated according to the following four conditions:

1. BNSF is the host railroad defined in § 236.1003 as follows, “Host railroad means a railroad that has effective operating control over a segment of track.”, and
2. The subdivision meets the definition for main line track as provided in § 236.1003 such that:
  - A. No restriction exists requiring all trains to operate at restricted speed within the boundaries of the subdivision, and;
    - I. More than 5 million gross tons of railroad traffic were transported within the boundaries of the subdivision during calendar year 2008; or

- II. The subdivision was used for regularly scheduled intercity or commuter rail passenger service.

If the above conditions #1 and #2 were determined to exist for a subdivision, and if either one (or both) conditions #3 or #4 below were also determined to be true, the subdivision was categorized as main line, requiring the implementation of PTC.

3. Any quantity of TIH/PIH material was transported on the subdivision during calendar year 2008, and/or
4. The subdivision was used for regularly scheduled intercity or commuter passenger service during calendar year 2008.

After evaluating each subdivision according to these four conditions:

- 80 subdivisions were determined to be not main line
- 118 subdivisions were determined to be main line and require the implementation of PTC under the regulation
  - 93 subdivisions as required under the regulation to have PTC installed on applicable tracks over their entirety
  - 25 subdivisions as required under the regulation to have PTC installed over partial subdivision limits
    - 3 subdivisions as required under the regulation to have PTC installed on two non-consecutive track segments each

*Appendix D - PTC Implementation Plan* and *Appendix F - Risk Analysis by Subdivision* list the 118 subdivisions designated as main line. Traffic densities and risk analysis information are provided in detail in these sections.

### **3.1 Non-Mainline Subdivisions**

*Appendix H.1 – Non-Mainline Subdivisions* contains a detailed list of the 80 subdivisions designated as non-main line and specifies the conditions met by each track segment in making this designation.



## 4 Technology [§ 236.1011(a)(I)]

§ 236.1011(a)(1) requires that the PTCIP describe the functional requirements the proposed PTC system must meet.

In lieu of a PTC Development Plan (PTCDP), BNSF will submit an REC to address interoperable functionality of ETMS. This REC (along with BNSF's previously-submitted PSP of February 18, 2010) describes how ETMS satisfies the mandated requirements for PTC systems as outlined in § 236.1005. On April 13, 2010, the REC prepared by BNSF was submitted to the FRA for review and approval. This REC sought to gain approval of ETMS I and II configurations under Subpart I.

BNSF's REC describes development of the ETMS interoperable PTC system developed in compliance with requirements and standards defined through the Interoperable Train Control (ITC) industry effort. ETMS is a locomotive-centric train control system designed to be overlaid on existing methods of operation and provide a high level of railroad safety through enforcement of a train's authorized operating limits, including protection against train-to-train collisions, derailments due to overspeed, unauthorized incursions into work zones, and operation through main track switches in improper position. ETMS is designed to support different railroads and their individual methods of operations and is intended to be implemented across a broad spectrum of railroads without modification. This design approach supports interoperability across railroads as ETMS-equipped locomotives apply consistent warning and enforcement rules, regardless of track ownership.

An overview of ETMS, its primary functions, PTC system architecture, and a high-level description of the functionality of the PTC system, subsystems, and interfaces are found in BNSF's PSP submittal dated February 18, 2010. Specifically, these areas are addressed in the following sections:

**Part II - System Description & Architecture**, which provides a complete description of the ETMS system, including a list of all product components and their physical relationships in the subsystem or system as required by § 236.1013(a)(1) through (3).

- 12.1 Locomotive Segment
- 12.2 Office Segment
- 12.3 Communications Segment
- 12.4 Wayside Segment
- 13.0 Functional Overview
- 14.0 Concept of Operations
- 15.0 Railroad Operational Applicability
- 16.0 Back-up Modes

**Part III - System Safety Process and Analyses**, which describes how ETMS architecture satisfies safety requirements as required by § 236.1013(a)(4).

- 17.0 System Safety Process
- 18.0 Preliminary Hazard Assessment
- 19.0 Hazard Log
- 20.0 Fault Tree Analysis
- 21.0 Failure Mode and Effect Analysis
- 22.0 Supporting Analyses
- 23.0 Safety Requirements
- 24.0 Safety Assurance Concepts
- 25.0 Base Case

The Concept of Operations as required by § 236.1013(a)(3) is covered in **Section 14.0 - Concept of Operations** of BNSF's PSP submittal. The detailed Concept of Operations document is provided as **Appendix G.1 - Concept of Operations** of that PSP submittal. While the entire Concept of Operations provides a thorough understanding of the system's ability to meet the requirements, for the purpose of this document, each requirement will be addressed with a reference within the ETMS Concept of Operations as follows:

**§ 236.1005 Requirements for Positive Train Control systems.**

(a) *PTC system requirements.*

Each PTC system required to be installed under this subpart will:

- (1) Reliably and functionally prevent:
  - (i) Train-to-train collisions—including collisions between trains operating over rail-to-rail at-grade crossings ...
    - Section **3.3.2 Wayside Segment**
    - Section **3.4.2 Train Movements**
    - Section **3.4.3 Train-to-Train Proximity Alerts**
    - Section **3.4.4 Speed Restrictions**
    - Section **3.4.5 Speed Enforcements**
    - Section **3.4.6 Switch Enforcements**
    - Rail-to-rail crossings at grade that have one or more PTC routes intersecting with one or more routes without a PTC system must have an interlocking signal arrangement (developed in accordance with 49 CFR 236 Subparts A through G) in place and a PTC-enforced stop on all PTC routes. FRA has also determined that the level of risk varies based upon the speeds at which the trains operate through such crossings, as well as the presence, or lack, of PTC-equipped lines leading into the crossing. Accordingly, if the maximum speed on at least one of the intersecting tracks is more than 40 miles per hour, then the routes without a PTC system must also have either some type of positive stop enforcement or a split-point derail on each approach to the

crossing (incorporated into the signal system), and a permanent maximum speed limit of 20 miles per hour.

(ii) Overspeed derailments, including derailments related to railroad civil engineering speed restrictions, slow orders, and excessive speeds over switches and through turnouts;

- Section **3.3.2 Wayside Segment**
- Section **3.4.2 Train Movements**
- Section **3.4.4 Speed Restrictions**
- Section **3.4.5 Speed Enforcements**

(iii) Incursions into established work zone limits without first receiving appropriate authority and verification from the dispatcher or roadway worker in charge, as applicable and in accordance with 49 CFR part 214.

- Section **3.4.2 Train Movements**
- Section **3.4.4 Speed Restrictions**

(iv) The movement of a train through a main line switch in the improper position as further described in § 235.1005(e).

- Section **3.3.2 Wayside Segment**
- Section **3.4.2 Train Movements**
- Section **3.4.6 Switch Enforcement**

(2) Include safety-critical integration of all authorities and indications of a wayside... or other similar appliance, method, device, or system of equivalent safety, in a manner by which the PTC system will provide associated warning and enforcement to the extent and except as described and justified in the FRA-approved PTCDP or PTCSP, as applicable;

- Section **3.3.2 Wayside Segment**
- Section **3.4.2 Train Movements**
- Section **3.4.3 Train-to-Train Proximity Alerts**
- Section **3.4.4 Speed Restrictions**
- Section **3.4.5 Speed Enforcements**
- Section **3.4.6 Switch Enforcements**

(4) Provide an appropriate warning or enforcement when:

(i) A derail or switch protecting access to the main line required by § 236.1007 or otherwise provided for in the applicable PTCSP is not in its derailing or protecting position, respectively;

- Section **3.4.2.1.4 Entry to Signaled Territory between Signals**
- Section **3.4.6 Switch Enforcement**

(ii) A mandatory directive is issued associated with a highway-rail grade crossing warning system malfunction as required by § 234.105, § 234.106, or § 234.107;

- Section **3.4.4.4 Crossing and Speed Tags**

(iii) An after-arrival mandatory directive has been issued and the train or trains to be waited on has not yet passed the location of the receiving train;

- Section **3.4.2 Train Movements**

(iv) Any movable bridge within the route ahead is not in a position to allow permissive indication for a train movement pursuant to § 236.312; and

- Section **3.3.2 Wayside Segment**
- All movable bridges on BNSF's territory are protected by vital signals. These signals provide the necessary aspect to effectively protect a misaligned movable bridge for PTC-equipped locomotives. BNSF will provide more detail on this functionality in its amended PTCSP.

(v) A hazard detector integrated into the PTC system that is required by paragraph (c) of this section, or otherwise provided for in the applicable PTCSP, detects an unsafe condition or transmits an alarm; and

- Section **3.3.2 Wayside Segment**
- All hazard detectors as described in § 236.1005(c) on BNSF's territory are protected by vital signals. These signals provide the necessary aspect to effectively protect a hazard for PTC-equipped locomotives. BNSF will provide more detail on this functionality in its amended PTCSP.

(5) Limit the speed of passenger and freight trains to 59 miles per hour and 49 miles per hour, respectively, in areas without broken rail detection or equivalent safeguards.

- Section **3.4.4 Speed Restrictions**
- Section **3.4.5 Speed Enforcements**

## 5 Compliance [§ 236.1011(a)(2)]

This section describes how BNSF intends to comply with § 236.1009(d), which requires BNSF to apply for and receive PTC System Certification from the FRA. PTC System Certification must be received before deploying a PTC system in revenue service on a railroad.

This section describes any identified or potential risks or other items that could create or suggest increased difficulty in the successful completion and delivery of the PTC system installation on or prior to the required date. It also identifies any contingency plans that have been formulated to deal with the risks. Risks are created when assumptions are not met. As risks are identified, consequences associated with risks are also identified.

To achieve FRA certification, BNSF will:

- File an REC as described in § 236.1031(a)(1) along with the information required to consider it an approved PTCDP.
- Supply deliverables similar to what it has submitted in two previous PSPs to support a petition for certification of the PTC system.
- File an abbreviated PTCSP for interoperable ETMS. This PTCSP will reference BNSF's previous PSPs where appropriate.

### 5.1 Risks to Meeting Required PTC Installation Date

BNSF has implemented a risk management process to identify, mitigate, and monitor risks that could create or suggest increased difficulty in the successful completion and delivery of the PTC system installation on or prior to the required date. This risk management process:

- Identifies risks to meeting the goals and objectives of BNSF's PTC deployment
- Predicts consequences associated with risks
- Implements risk mitigation strategies
- Monitors risk status
- Establishes contingency plans

*Table 1 - Risks to BNSF's Completion and Delivery of PTC Installation by Dec 31, 2015* below lists each identified risk to BNSF's completion and delivery of PTC installation on or prior to December 31, 2015, its associated goal/objective category, the predicted consequences of the risk should it occur, BNSF's mitigation/containment strategy, and contingency plans.

Risk ID	Objective/Goal Category	Risk Description	Predicted Consequences	Risk Mitigation	Contingency Plan
1	<u>Performance:</u> Enhance system safety, with particular focus on the prevention of train-to-train collisions, overspeed derailments, incursions into established work zone limits, and movement of trains through improperly-positioned switches.	<p>PTC system does not enhance system safety:</p> <ul style="list-style-type: none"> <li>Does not prevent train-to-train collisions</li> <li>Does not prevent overspeed derailments</li> <li>Does not prevent incursions into established work zone limits</li> <li>Does not prevent movement of trains through improperly positioned switches</li> <li>Creates additional safety hazards that reduce system safety</li> <li>An acceptable level of safety is not maintained in the development, functionality, architecture, installation, implementation, inspection, testing, operation, maintenance, repair, and modification of the PTC technologies to be deployed.</li> </ul>	<ul style="list-style-type: none"> <li>PTC system cannot be deployed without modification of system behavior.</li> <li>PTC system cannot be deployed without re-assessment of achieved safety levels.</li> <li>Deployed PTC system can not obtain FRA Certification</li> <li>Schedule delay</li> </ul>	<ul style="list-style-type: none"> <li>Follow system development methodology that captures PTC system requirements and provides traceability of those requirements throughout the system life cycle.</li> <li>Rigorous safety program at all levels of system development. Methodologies and activities as required by § 236.1015 will be followed in the PTCSP.</li> </ul>	Existing method of operation can be maintained during/after PTC installation until acceptable safety levels have been achieved and FRA Certification has been granted.

<b>Risk ID</b>	<b>Objective/Goal Category</b>	<b>Risk Description</b>	<b>Predicted Consequences</b>	<b>Risk Mitigation</b>	<b>Contingency Plan</b>
<b>2</b>	<u>Coverage:</u> Enhancements to system safety will be achieved as a PTC safety overlay system is progressively deployed across all portions of the BNSF network for which PTC deployment is required by § 236.1005(b).	PTC system progressive installation is delayed because of <ul style="list-style-type: none"> <li>• PTC equipment availability</li> <li>• Availability of trained installers</li> <li>• Ineffective coordination of installation plans result in interference between installation crews where infrastructure is complex and/or working space is limited</li> <li>• Installation procedures become protracted</li> <li>• Acts of nature</li> </ul>	<ul style="list-style-type: none"> <li>• PTC system will not be installed across all portions of the BNSF network for which PTC deployment is required by § 236.1005(b)</li> <li>• Full benefit of safety enhancements will not be realized by required date</li> <li>• BNSF may incur civil penalties</li> </ul>	<ul style="list-style-type: none"> <li>• Develop detailed plans for equipping rolling stock, wayside, and office with required PTC equipment.</li> <li>• Develop detailed training and personnel plans.</li> <li>• Work closely with vendors and other railroads in close geographic proximity to minimize risk associated with installation procedures and scheduling.</li> <li>• Establish schedule performance metrics to measure PTC deployment progress. Monitor metrics to identify any potential schedule delays. Take action to avert potential schedule delays.</li> </ul>	Existing method of operation can be maintained during/after PTC installation until acceptable safety levels have been achieved and FRA Certification has been granted.

<b>Risk ID</b>	<b>Objective/Goal Category</b>	<b>Risk Description</b>	<b>Predicted Consequences</b>	<b>Risk Mitigation</b>	<b>Contingency Plan</b>
<b>3</b>	<i>Coverage:</i> All required portions of the network to be fully equipped, operational, and interoperable with all tenant railroads by December 31, 2015.	<p>All required portions of the network are not fully equipped, operational, and interoperable with all tenant roads by December 31, 2015.</p> <ul style="list-style-type: none"> <li>• Unable to maintain equipage schedule</li> <li>• Delay in initiating PTC operations</li> <li>• Difficulty and/or delay in establishing required interoperability agreements with tenant railroads.</li> <li>• Difficulty and/or delay in achieving required levels of technical interoperability</li> </ul>	<ul style="list-style-type: none"> <li>• PTC system will not be installed across all portions of the BNSF network for which PTC deployment is required by § 236.1005(b)</li> <li>• Full benefit of safety enhancements will not be realized by required date</li> <li>• BNSF may incur civil penalties</li> </ul>	<ul style="list-style-type: none"> <li>• See Risk Mitigation Strategy for risk #2 above.</li> <li>• Establish clear understanding of technical requirements and schedule for interoperability with each tenant road.</li> <li>• Establish performance metrics to measure tenant progress toward equipping rolling stock with interoperable PTC equipment.</li> </ul>	Existing method of operation can be maintained during/after PTC installation until acceptable safety levels have been achieved and FRA Certification has been granted.



<b>Risk ID</b>	<b>Objective/Goal Category</b>	<b>Risk Description</b>	<b>Predicted Consequences</b>	<b>Risk Mitigation</b>	<b>Contingency Plan</b>
<b>4</b>	<i>Performance &amp; Quality:</i> PTC deployment will meet the PTC System Certification performance requirements in § 236.1015.	<ul style="list-style-type: none"> <li>• The methodologies and activities required by § 236.1015 are not applied consistently for the PTCSP</li> <li>• Gaps in the V&amp;V process are uncovered that impact the validity of testing results; or, at worst, the design of the system</li> </ul>	<ul style="list-style-type: none"> <li>• PTC may not function as required to meet performance requirements</li> <li>• PTC system may not enhance safety levels</li> <li>• PTC system cannot be deployed without modification of system behavior</li> <li>• PTC system can not be deployed without re-assessment of achieved safety levels</li> <li>• Deployed PTC system can not obtain FRA Certification</li> <li>• Schedule delay</li> </ul>	<ul style="list-style-type: none"> <li>• The methodologies and activities as required by § 236.1015 will be followed for the PTCSP.</li> <li>• BNSF will ensure that all vendors from whom PTC technologies are to be acquired will have an acceptable quality assurance program for both design and manufacturing processes.</li> <li>• Testing and documentation process audits are conducted periodically with vendors.</li> </ul>	Existing method of operation can be maintained during/after PTC installation until acceptable safety levels have been achieved and FRA Certification has been granted.

<b>Risk ID</b>	<b>Objective/Goal Category</b>	<b>Risk Description</b>	<b>Predicted Consequences</b>	<b>Risk Mitigation</b>	<b>Contingency Plan</b>
<b>5</b>	<u>Technical:</u> Interoperability between BNSF and its tenants will be achieved.	Interoperability between BNSF and its tenants is not achieved. <ul style="list-style-type: none"> <li>• Unsuccessful in deploying interoperable radio and messaging technology</li> <li>• Semantic incompatibility between railroads</li> </ul>	<ul style="list-style-type: none"> <li>• PTC system will not be installed across all portions of the BNSF network for which PTC deployment is required by § 236.1005(b)</li> <li>• Full benefit of safety enhancements will not be realized by required date</li> <li>• BNSF may incur civil penalties</li> </ul>	<ul style="list-style-type: none"> <li>• Establish organizational structure to facilitate communication and coordination between host and tenant roads.</li> <li>• BNSF participates in industry organizations to establish PTC system standards to achieve interoperability by working collaboratively on requirements definition, system/ component design, and product testing to deploy interoperable, common technology.</li> <li>• Testing will ensure that implementations conform to industry standards.</li> <li>• Interoperability testing will be conducted.</li> </ul>	Existing method of operation can be maintained during/after PTC installation until acceptable safety levels have been achieved and FRA Certification has been granted.

Risk ID	Objective/Goal Category	Risk Description	Predicted Consequences	Risk Mitigation	Contingency Plan
6	<u>Performance, Coverage, Quality &amp; Technical:</u> BNSF will maintain acceptable levels of operation on subdivisions operating under PTC.	<p>BNSF incurs unacceptable train delays resulting from PTC operation.</p> <ul style="list-style-type: none"> <li>• PTC implementation and/or system design introduces inefficiencies: <ul style="list-style-type: none"> <li>○ Wireless communication related delays</li> <li>○ Inefficient train operation resulting from braking algorithm</li> </ul> </li> <li>• Reduction in efficiency resulting from running unequipped trains through PTC equipped territory because: <ul style="list-style-type: none"> <li>○ Locomotives operating with PTC equipment installed but with equipment outages</li> <li>○ Trains not PTC equipped.</li> </ul> </li> <li>• Reduction in efficiency of personnel <ul style="list-style-type: none"> <li>○ Ineffective human factors design for PTC equipment</li> <li>○ Ineffective and/or insufficient training of personnel</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Railroad incurs unacceptable train delays as a result of PTC</li> <li>• PTC deployment is delayed until productivity issues are resolved</li> </ul>	<ul style="list-style-type: none"> <li>• Reliability program initiated to monitor, report, and improve reliability of equipment.</li> <li>• Identify and reach agreement with additional potential tenants for equipping PTC equipment.</li> <li>• Monitor effectiveness of training – quality improvement program in place.</li> <li>• System development effort focusing on high technical risk areas to identify and mitigate potential system design and implementation related contributions to decreased productivity.</li> </ul>	Existing method of operation can be maintained during/after PTC installation until acceptable levels of operation have been achieved.

**Table 1 - Risks to BNSF's Completion and Delivery of PTC Installation by Dec 31, 2015**

## 6 Interoperability [§ 236.1011(a)(3)]

This section describes how the PTC system will provide for interoperability between BNSF and all tenant railroads on the lines required to be equipped with a PTC system per § 236 Subpart I.

### 6.1 Railroad Agreement Provisions Relevant to Interoperability [§ 236.1011(a)(3)(i)]

An Interoperable Train Control (ITC) collaboration agreement was executed by and amongst several railroads wishing to achieve PTC system interoperability. The development of an interoperable train control system would enable locomotives of one participant to transition at track speed to the control of another participant. The collaboration agreement includes a list of interoperability requirements mutually agreed-upon by the parties:

- Definition and adoption of uniform interface standards
- Definition, adoption, and implementation of American Association of Railroads (AAR) standard communication protocols
- Definition, adoption, and implementation of common office-locomotive communication protocols and message formats
- Definition, adoption, and implementation of a common Human Machine Interface (HMI), allowing an engineer from any of the participant's roads to utilize the system on any participant's locomotives on territory for which the engineer is qualified
- Adoption of a coordinated plan for configuration management of the interoperable PTC on-board executable software
- Agreement on use of radio spectrum in the 220MHz band for communications between the locomotive and wayside and the locomotive and back office
- Agreement to acquire, develop, and deploy all of the technical capabilities required to permit the use of shared communications infrastructure
- Definition and adoption of standards allowing each participant's locomotive engineer, at the start of a trip, to initialize the interoperable on-board system with the back offices of participants' PTC systems that may be traversed during the trip to support all interoperability scenarios that will be encountered on the line-of-road with respective locomotive fleets and run-through operations

The ITC collaboration agreement chartered the formation of various technical working committees, each dedicated to some technical aspect of PTC interoperability. Participation in the technical working committees was expanded beyond the chartering roads to include any railroad planning to implement an interoperable PTC system and wishing to participate.

BNSF has additionally exchanged a Letter of Understanding with each of its passenger and freight tenant carriers who will operate PTC on its track. The letter establishes agreement between BNSF and its tenants in the following areas:

- Implementation of PTC technical solutions which meet the requirements of interoperability as defined in § 236.1003(b)
- Participation in a PTC testing program to verify functionality and interoperability
- Exchange of technical information needed to implement PTC in accordance with applicable FRA requirements

BNSF has executed the Letter of Understanding and is coordinating implementation of an interoperable PTC system in accordance with the interoperability requirements stated in the ITC collaboration agreement with the tenant railroads shown in *Appendix A - Short Line Letters of Understanding*, *Appendix B - Passenger Letters of Understanding*, and *Appendix C - Class I Letters of Understanding*. BNSF will continue to communicate with its tenant roads to get a signed Letter of Understanding (LOU) and will amend its PTCIP with LOUs received after April 16, 2010.

Additionally, BNSF is currently working with the tenant railroads identified in *Appendix A - Short Line Letters of Understanding*, *Appendix B - Passenger Letters of Understanding*, and *Appendix C - Class I Letters of Understanding* to identify any potential impacts on existing service agreements.

BNSF will achieve interoperable PTC operations with its tenant and host railroads that operate PTC systems via one of three technical methods:

- **Native Interoperability**

BNSF and its interoperability partner install and operate either the Electronic Train Management System (ETMS) or V-ETMS on their respective locomotives, office, and wayside. ETMS provides full functionality for any equipped locomotive, regardless of ownership, with any correspondingly-equipped office or wayside. Interoperability is achieved through native operation of ETMS/V-ETMS without the need for data, function, or HMI translation. Interoperable communications are achieved through adoption of common communications and message protocols and application behavior specifications described in ITC interoperability requirements. ETMS/V-ETMS encompasses the methods of operation and rules of both BNSF and its interoperability partners and accommodates any differences in the data provided by back office systems. ETMS and its operations are fully described in the ETMS PSP, submitted to FRA on February 18, 2010. As BNSF works with its tenant roads, this section will be updated in future PTCIP amendments with all tenants that we identify to operate in this manner. Railroads with which BNSF will conduct interoperable PTC operations in this manner are as follows:

- Altamont Corridor Express
- Commuter Rail Division of the Regional Transportation Authority (Metra)

- Fort Worth & Western Railroad Co.
- Minnesota Commercial Railway Company
- National Railroad Passenger Corporation (Amtrak)
- Nebraska Northeastern Railroad
- North County Transit District
- Northstar Commuter Rail
- Red River Valley & Western Railroad
- Sound Transit
- Southern California Regional Rail Authority
- Texas North Western Railroad
- Texas Rockcrusher Railway
- Trinity Railway Express

- **Onboard Functional Interoperability**

BNSF and its interoperability partners install and operate different systems on their respective locomotives, office, and wayside. However, the locomotive on-board system of each is able to interoperate with the office and wayside infrastructure deployed on the other's property. BNSF will continue to evaluate its options as to whether or not it will conduct interoperable PTC operations in this manner.

- **Unequipped Operation**

BNSF will continue to evaluate its options as to whether or not it will allow any unequipped operation on its PTC equipped subdivisions.

## 6.2 Technology Applicable to Interoperability [§ 236.1011(a)(3)(ii)]

BNSF and its interoperability partners utilize methods in three areas to obtain and maintain interoperability of its PTC system(s):

- **Technical interoperability** is achieved through the common use of documented interface definitions. These definitions include one or more radio protocols (220MHz) and hardware interfaces to radio equipment, a common standard messaging protocol (ITC messaging), and standard data element and application message format and content definitions (ETMS/V-ETMS interface control documents). Use of, and compliance with, these common interface definitions ensures the ability to exchange data messages between interoperable system components.
- **Semantic interoperability** is achieved through the common use of documented system behavioral specifications. In the current ITC architecture, standard application-level specifications define the behavior of the interoperable office, locomotive, and wayside

segments. Use of, and compliance with, these common behavioral specifications ensure each interoperable system segment properly interprets and acts upon exchanged data messages.

- **Organizational interoperability** is achieved primarily through industry-wide forums, such as committees chartered by ITC and AAR. Technical teams operating under both the ITC and AAR charters are tasked with developing and maintaining the common technical standards in the areas of technical and semantic interoperability described above. These teams have worked to establish a baseline level of interoperability required for industry-wide PTC implementation. The teams will work in perpetuity to provide configuration management and ensure that interoperability is maintained as the interoperable PTC system(s) are enhanced. ITC and AAR teams also work to establish organizational interoperability in the areas of interchange and infrastructure sharing.

### 6.3 Obstacles to Interoperability [§ 236.1011(a)(3)(iii)]

As a hosting railroad, BNSF foresees no obstacles to achieving full interoperability with any tenant railroads that operate lead PTC-equipped locomotives certified as conforming to the specifications established by the ITC consortium, and that also exchange the requisite information for operating a train as established by the ITC consortium.

As a tenant railroad, BNSF also foresees no obstacles to achieving full interoperability with any and all hosting railroads that operate a PTC-equipped wayside certified as conforming to the specifications established by the ITC consortium, and that also exchange the requisite information for operating a train as established by the ITC consortium.

BNSF intends to subject its PTC back office, wayside infrastructure, and locomotive equipment for certification or install equipment already type-certified for interoperability as appropriate.

## 7 Installation Risk Analysis [§ 236.1011(a)(4)]

This section describes how the PTC system will be implemented to address areas of greater risk to the public and railroad employees before areas of lesser risk. Exceptions to the risk-based implementation methodology are included in *Section 11 Exceptions to Risk-Based Prioritization* [§ 236.1011(a)(9)].

A detailed risk analysis for each subdivision can be found in *Appendix F - Risk Analysis per Subdivision*. This appendix is intended to:

- Describe the rail network, its subdivisions, and the limits to be equipped
- Identify the significant risk factors on each subdivision, including:
  - Risk Factors
  - Measurement Values
  - Risk Assignments
  - Risk Values
  - Overall Risk Rating
- Prioritize the installation of PTC for each subdivision



## 8 Deployment Sequence & Schedule [§ 236.1011(a)(5)]

This section defines the sequence, planned schedule, and decision basis for subdivisions to be equipped.

*Appendix D - Implementation Plan* shows, in detail, the deployment sequence, segment traffic characteristics, segment operational characteristics, route attributes, and Total Risk Rating. Subdivisions that deviate from risk-based prioritization will be discussed in *Section 11 - Exceptions to Risk-Based Prioritization [§ 236.1011(a)(9)]*.

BNSF is not planning any modifications at this time due to PTC.

## 9 Rolling Stock [§ 236.1011(a)(6)]

In accordance with § 236.1011(a)(6), this section contains the following information related to BNSF's rolling stock that will be equipped with PTC:

- Type of rolling stock that will be equipped with PTC
- Schedule to equip the rolling stock by December 31, 2015

### 9.1 Rolling Stock to be Equipped [§ 236.1011(a)(6)(i)]

BNSF will be equipping 2,000 of its 6,480 locomotive fleet with PTC. This schedule will be continuously evaluated by BNSF during its implementation. Any changes to the rolling stock installation will be addressed in a formal RFA and updated PTCIP as outlined in *Section 1.1.5 Request for Amendment of a PTCIP [§ 236.1009(a)(2)(ii)]*. The rolling stock that BNSF plans to equip with PTC falls into four categories:

- New locomotives delivered with PTC installed
- Freight locomotives (Intermodal and Merchandise service)
- Coal locomotives
- Intermediate locomotives (Road Switch and Local service)

Each category of PTC locomotives is made up of several models of General Electric and Electric Motive Diesel engines.

### 9.2 Schedule [§ 236.1011(a)(6)(ii)]

*Appendix G.1 – Rolling Stock Installation* shows BNSF's installation schedule for its rolling stock.

It is currently planned that field installation of PTC on-board systems will be carried out at six locations, depending on service type and schedule:

- |                                     |                     |
|-------------------------------------|---------------------|
| • Alliance, Nebraska                | • Chicago, Illinois |
| • Argentine (Kansas City), Missouri | • Havre, Montana    |
| • Barstow, California               | • Topeka, Kansas    |

Two to six field retrofit installations will be scheduled per week at an estimated 40-60 man-hours per installation with a 24-48 hour cycle time.

### 9.3 Tenant Railroads [§ 236.1011(a)(6)(iv)(A) and (B)]

Along with the Letter of Understanding, as explained in *Section 6.1 Railroad Agreement Provisions Relevant to Interoperability* [§ 236.1011(a)(3)(i)], a PTCIP Notice and Intent to Coordinate Tenant Interoperability Letter was also sent to each tenant railroad that BNSF will require to equip PTC on the portion of their fleet that runs on PTC territory. This letter requests a list of all of the tenant railroad's rolling stock to be PTC-equipped and the schedule to equip that rolling stock in accordance with § 236.1011(a)(6)(iv)(A) and (B) of the PTC Final Rule. These letters are provided for reference in *Appendix A - Short Line Letters of Understanding*, *Appendix B - Passenger Letters of Understanding*, and *Appendix C - Class I Letters of Understanding* for each tenant railroad. BNSF continues to work with its tenant partners to receive the requested information. As new responses are received, BNSF will file RFA's that include the new letters.

## 10 Wayside Devices [§ 236.1011(a)(7)]

Wayside PTC devices consist of those signaling appliances located in the field whose status impacts PTC operations, along with any Wayside Interface Units (WIUs) used to monitor and report their status. Applicable appliances include:

- Interlockings
- Switch point monitors
- Track/route integrity detectors
- Other field devices
- Wayside signals
- Track circuits
- Hazard detectors

To see the number of wayside devices by subdivision, see *Table 2 - Number of Wayside Devices per Subdivision*. The installation schedule to complete wayside equipment installation by December 31, 2015 can be found in *Appendix D.1 – Implementation Limits*, under the *Year* column.

As called out in § 236.1009 (a)(2)(ii), BNSF will file an RFA if any subdivision is added, removed, or modified.

Wayside components exist in both signaled, and non-signaled territory. The PTC locomotive utilizes the status of wayside devices in the train route during calculation of its safe operating profile. Where installed, a WIU directly monitors the status of one or more wayside devices and relays the information via the communications network to the PTC locomotive and/or office.

A wayside device may also be integrated with a track circuit or signal control circuit. In such cases, the status of the device is combined with the status indicated for the track circuit or signal. The PTC locomotive may concurrently process device status provided in any of these configurations.

The industry ITC consortium has developed an open standard for WIU interfaces and functions, and several suppliers have developed products to meet that standard.

Wayside device status will be provided in the following manner:

**WIU-connected** - In this configuration, a WIU is connected to a wayside device that indicates its status to the PTC locomotive or Office via the Communications network. The WIU indicates device status at frequent intervals in order to satisfy the data freshness requirements of the PTC locomotive train control application. WIUs may also be configured to continuously indicate, or in order to conserve battery power at the WIU location and/or communications bandwidth, only begin to indicate upon receipt of a “wake-up” from the locomotive. Typical implementation of WIUs in the Wayside include monitoring of signals and power switches in Centralized Traffic Control (CTC) territory; monitoring signals and siding switches in Automatic Block Signal (ABS) territory; and monitoring hand-operated switches, approach and interlocking signals, and hazard detectors in non-signaled territory.

Where other signaling appliances or hazard detectors are integrated with a signal system, their status is implicitly reflected in the status of signals provided to PTC and may not be indicated separately.

For subdivisions where intermittent Automatic Train Stop (ATS) inductors (see *Section 10.3- Subdivisions with ATS Removal*) are located, these units will be removed when PTC is placed in service on the subdivision per § 235.7(a)(5).

BNSF is applying for approval of discontinuance of waived CAB signals (all freight trains are waived, CAB signals do not include passenger enforcement) covering 36 road miles in connection with a request for approval of the Request for Expedited Certification (REC) and/or Positive Train Control Safety Plan (PTCSP) per § 236.0(e). In subdivisions where CAB Signal devices (See *Section 10.4 - Subdivisions with CAB Signal Device Removal*) are in use, these units will be removed when PTC is placed in service on the subdivision. As per normal operation, BNSF will submit and receive approval for a Block Signal Application prior to the discontinuance of this CAB signal system.

## 10.1 WIU Technology

WIU technology, deployed as part of PTC, consists of signal-grade components and may be deployed in two configurations methods:

- In the first configuration, the WIU function is added to the chassis of an existing signaling processor. Hardware and/or software upgrades are deployed, often without requiring disarrangement of the signaling processor, its connected equipment, or pre-existing application software.
- In the second configuration, a complete WIU hardware and software component is collocated with an existing signaling processor and separately interfaced to the appliances it monitors or controls, such as lamp circuits, switch circuit controllers, or other outputs.

In either configuration, the WIU also provides an interface to the communications network, where it indicates the status of any monitored devices.

## 10.2 Number of Wayside Devices per Subdivision

Subdivision	Total
ABERDEEN	19
AFTON	37
AKRON	75
ANGORA	66
APPLETON	74
ARKANSAS CITY	88
AURORA	163
AVARD	77
BAKERSFIELD	65
BARSTOW	67
BEARDSTOWN	127
BELLINGHAM	59
BIG HORN	110
BIRMINGHAM	117
BLACK HILLS	68
BOISE CITY	77
BROOKFIELD	202
BRUSH	48
BUTTE	63
CAJON	59
CANYON	22
CASPER	119
CHEROKEE	94
CHICAGO	24
CHILLICOTHE	118
CLOVIS	113
COLUMBIA RIVER	97
CONROE	103
CREEK	76
CRESTON	72
CUBA	97
DALHART	61
DEVILS LAKE	121
DFW	47
DICKINSON	103

Subdivision	Total
DOUGLASS	13
EL PASO	173
EMPORIA	153
FALLBRIDGE	107
FORSYTH	112
FRONT RANGE	69
FT SCOTT	89
FT WORTH	134
GALLUP	160
GALVESTON	104
GATEWAY	54
GLASGOW	131
GRAND FORKS	62
GREAT FALLS	34
HANNIBAL	89
HASTINGS	119
HEREFORD	57
HETTINGER	33
HI LINE	114
HILLSBORO	89
HOUSTON	65
JAMESTOWN	92
K O	135
KOOTENAI RIVER	126
LA JUNTA	327
LAFAYETTE	103
LAKESIDE	70
LAMPASAS	240
LAUREL	60
MADILL	61
MARCELINE	93
MARSHALL	88
MENDOTA	114
MIDWAY	10
MILK RIVER	81

Subdivision	Total
MOBRIDGE	88
MOJAVE	44
MOORHEAD	30
MORRIS	82
MYKAWA	12
NAPIER	22
NEEDLES	71
NOYES	40
OMAHA	27
OREGON TRUNK	178
OTTUMWA	111
PANHANDLE	163
PEORIA	15
PHOENIX	70
PIKES PEAK	62
PLAINVIEW	70
PROSPER	45
PUEBLO	33
RAVENNA	80
RED RIVER VALLEY	83
RED ROCK	239
RIVER	107
SAN BERNARDINO	56
SAND HILLS	125
SCENIC	83
SEATTLE	127
SELIGMAN	164
SILSBEE	8
SIOUX CITY	60
SLATON	187
SPANISH PEAKS	36
SPOKANE	8
ST CROIX	86
ST JOSEPH	114
ST PAUL	21

Subdivision	Total
STAMPEDE	43
STAPLES	144
STOCKTON	179
STRONG CITY	17
SWEETGRASS	7

Subdivision	Total
THAYER NORTH	59
THAYER SOUTH	88
TWIN PEAKS	58
VALLEY	22
WAYZATA	42

Subdivision	Total
WICHITA FALLS	68
YAKIMA VALLEY	86
ZAP LINE	34

Table 2 - Number of Wayside Devices per Subdivision

### 10.3 Subdivisions with ATS Removal

The following lists all subdivisions that have ATS inductors:

- Boise City
- Cajon
- Emporia
- Gallup
- La Junta
- Marceline
- Needles
- Seligman

### 10.4 Subdivisions with CAB Signal Device Removal

The following lists all subdivisions that have CAB signal devices:

- Chicago

## 11 Exceptions to Risk-Based Prioritization [§ 236.1011(a)(9)]

This section identifies and describes the railroad's basis for determining that the risk-based prioritization in § 236.1011(a)(4) is not practical as it may be associated with any subdivision.

Prior to the ruling of Subpart I, BNSF conducted a voluntary risk rating analysis of its subdivisions to determine its implementation schedule. BNSF selected the first ten subdivisions, listed below, to implement due to the results of this risk rating and the amount of passenger traffic present. Material procurement and construction work is already under way for these areas.

- Bakersfield
- Bellingham
- Emporia
- Fallbridge
- Mendota
- San Bernardino
- Scenic
- Seattle
- Stockton

Currently five subdivisions, listed below, are already operational with the 44 MHz legacy ETMS system. Since these subdivisions are already operational with PTC, BNSF has tentatively planned to retrofit these locations with the 220 MHz interoperable solution in 2012 once they have assurance of radio availability.

- Beardstown
- Fort Worth
- Hettinger
- Red Rock
- Wichita Falls

BNSF, in this PTCIP, is filing for exclusion of track segments without TIH/PIH or passenger traffic. While FRA is considering such requests and developing the criteria for safety considerations, BNSF has placed the track segments with outstanding exclusion requests towards the back of its implementation plan. BNSF will continue to evaluate this plan as it moves forward. The following subdivisions fall under this consideration:

- Aberdeen
- Afton
- Big Horn
- Black Hills
- Boise City
- Canyon
- Creek
- Cuba
- DFW
- Jamestown
- Lampasas
- Laurel
- Napier
- Pueblo
- River
- Sand Hills
- Silsbee
- Slaton
- Spanish Peeks
- St. Croix
- Stampede
- Twin Peaks
- Yakima Valley



Pending the outcome of BNSF's filing for exclusion, BNSF has moved the subdivisions listed below that would have their PTC installation limits changed towards the back of its implementation plan. As with the subdivisions mentioned above, ongoing evaluations will continue for each subdivision in regards to their PTC installation limits.

- Aurora
- Brookfield
- Butte
- Casper
- Chillicothe
- Conroe
- Devils Lake
- Front Range
- Galveston
- Great Falls
- Houston
- La Junta
- Madill
- Mobridge
- Morris
- Phoenix
- Ravenna
- Red River

## 11.1 PHMSA Routing Exceptions

As required by the PHMSA Routing Rule covering bulk movements of TIH and certain explosive and radioactive shipments (49 CFR § 172.820), BNSF has completed an analysis of the historic and current routing of these commodities. In performing this analysis, BNSF took into account 27 factors identified by the Department of Transportation as affecting the safety and security of covered shipments and additional factors identified by BNSF. The results of this analysis are relevant to BNSF's PTC Implementation Plan as they change the territories across which toxic inhalant shipments are routed.

*Appendix J.1 - PHMSA Routing Exceptions* lists territories across which toxic inhalants will no longer be routed by BNSF as a result of BNSF's routing analysis.

## 12 Strategy for Full PTC System Deployment [§ 236.1011(b)]

BNSF will evaluate whether to add additional track segments pursuant to the risk reduction program contemplated by section 105 of the RSIA08 once regulations are adopted. Without a complete and final regulatory framework, it is impossible to know exactly what criteria to apply in making risk reduction prioritizations or in determining whether PTC is an appropriate method of risk reduction. BNSF will evaluate any safety enhancements that may be needed in combination with economic considerations. As FRA's economic analysis has shown, PTC is a very costly system, and the benefit of its installation is greatly outweighed by the costs. BNSF believes that PTC is not a "one size fits all" safety solution and anticipates that, given the breadth of FRA's PTC expectations under this section and the expense of PTC, there will be few or no other lines where PTC will be the appropriate risk reduction choice.

## 13 Main Line Track Exclusion Addendum [§ 236.1019]

### 13.1 MTEA General

The following sections provide a Mainline Track Exclusion Addendum (MTEA) for each segment of BNSF mainline track for which exclusion of PTC installation is requested due to extenuating circumstances as provided by the § 236 Subpart I.

BNSF's MTEAs are filed per the following MTEA rule citation:

- Rule § 236.1019(c)(3) – Limited Operations Exception; not more than four passenger trains per day are operated on a segment of track of a Class 1 freight railroad on which less than 15 million gross tons of freight traffic is transported annually.

Each MTEA request is detailed separately in the following sections. All have been reviewed in detail with the National Railroad Passenger Corporation (Amtrak) and all are submitted with their full concurrence and agreement. Each MTEA submission provides a summary track description and layout, a narrative description of normal train operations, and a reference to the applicable section of 49 CFR 236.1019 under which the MTEA is requested.

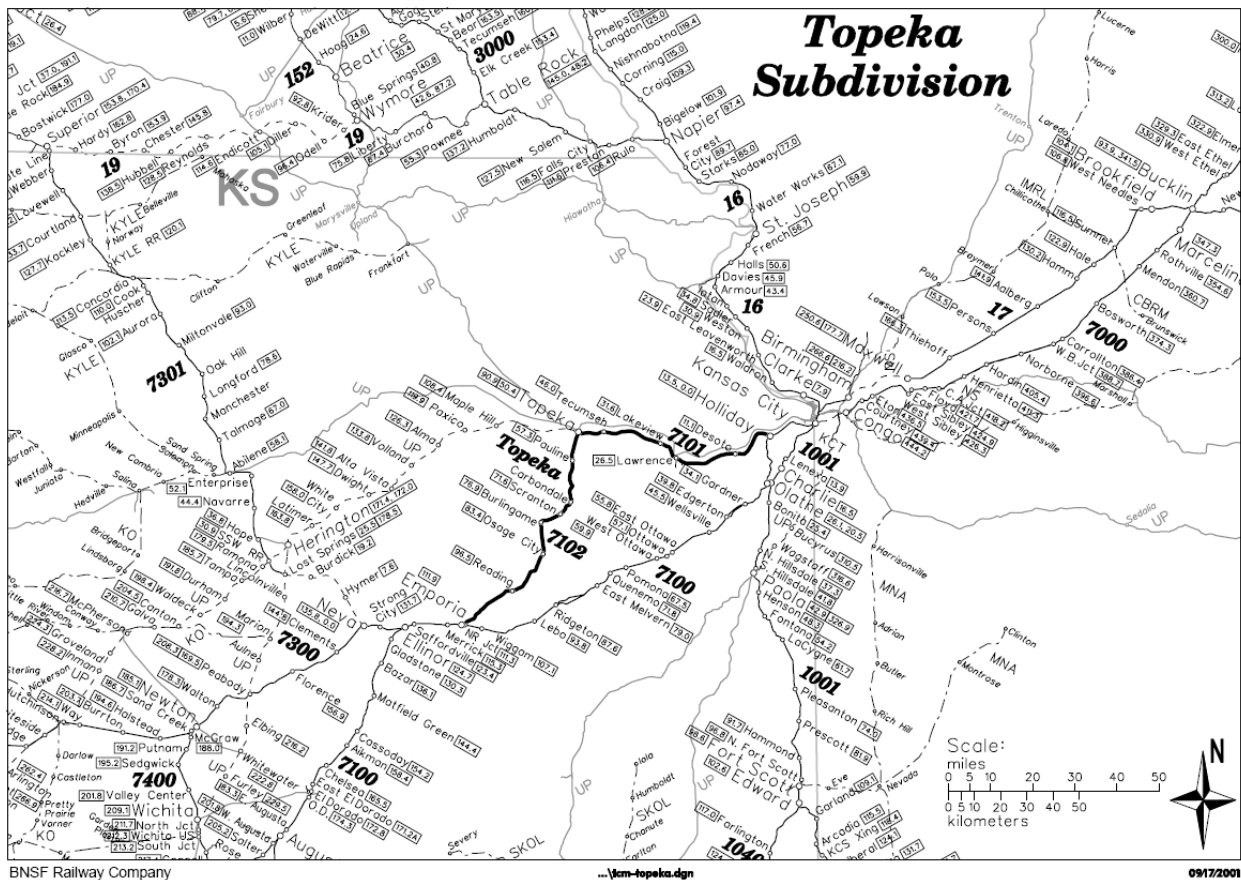
MTEA's are being requested by BNSF for each of the following track segments:

1. Topeka Subdivision – Holliday (MP 0.0) to N.R. Jct (MP 111.0)
2. Raton Subdivision – La Junta (MP 554.9) to Las Vegas (MP 770.1)
3. Glorieta Subdivision – Las Vegas (MP 770.1) to Lamy (MP 835.2) and Isleta (MP 12.6) to Dalies (MP 27.4)

## 13.2 MTEA Request – Topeka Subdivision

BNSF is seeking an MTEA for the Topeka subdivision under the Limited Operations Exception explained in §236.1019(c)(3) for the segments of track between Holliday (MP 0.0) and N.R. Jct (MP 111.0).

The Topeka subdivision contains no TIH/PIH traffic and runs two passenger trains each way per day between Holliday and Topeka (MP 50.5W).



### 13.3 MTEA Request – Raton Subdivision

BNSF is seeking an MTEA on the Raton subdivision under the Limited Operations Exception explained in § 236.1019(c)(3) for the segments of track between La Junta (MP 554.9) and Las Vegas (MP 770.1).

The Raton subdivision runs two passenger trains each way per day between La Junta and Las Vegas. There is no TIH/PIH traffic on the Raton subdivision.

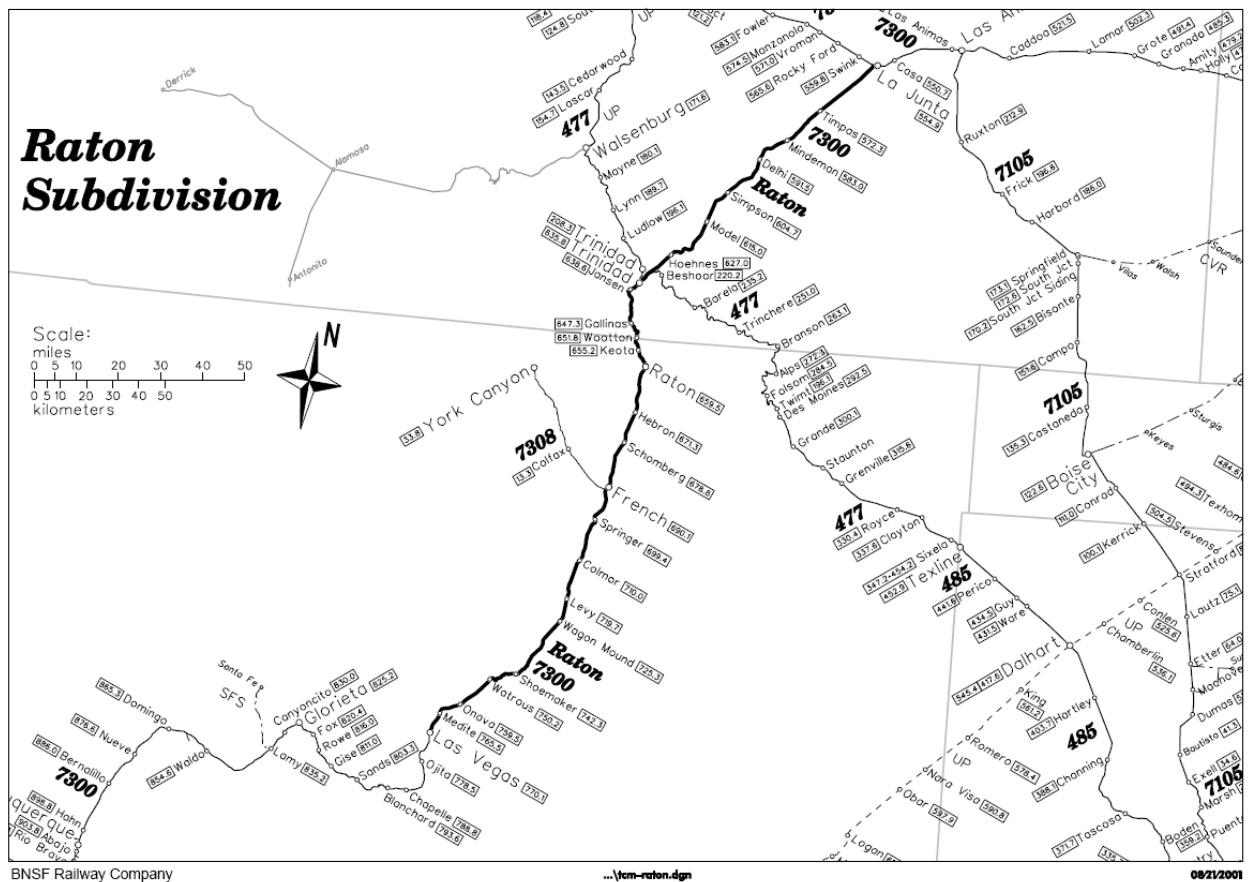


Figure 4 - Raton Subdivision

