MILLENNIUM BULK TERMINALS—LONGVIEW NEPA ENVIRONMENTAL IMPACT STATEMENT

NEPA RAIL SAFETY TECHNICAL REPORT

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September 2016

ICF International. 2016. *Millennium Bulk Terminals—Longview, NEPA Environmental Impact Statement, NEPA Rail Safety Technical Report*. September. (ICF 00264.13.) Seattle, WA. Prepared for U.S. Army Corps of Engineers, Seattle District.

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Acronyms and Abbreviations

Applicant	Millennium Bulk Terminals—Longview, LLC
BNSF	BNSF Railway Company
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
LVSW	Longview Switching Company
mph	miles per hour
Port	Port of Longview
RCW	Revised Code of Washington
SEPA	Washington State Environmental Policy Act
UP	Union Pacific Railroad
USDOT	U.S. Department of Transportation
WAC	Washington Administrative Code
WUTC	Washington Utilities and Transportation Commission

Chapter 1
Introduction

This technical report assesses the potential rail safety impacts of the proposed Millennium Bulk Terminals—Longview project (On-Site Alternative), Off-Site Alternative, and No-Action Alternative. This technical report describes the regulatory setting, establishes the method for assessing potential rail safety impacts, presents the historical and current rail safety conditions in the study area, and assesses potential impacts. The NEPA Vehicle Transportation Technical Report (ICF International and DKS Associates 2016) addresses at-grade crossing safety.

1.1 Project Description

Millennium Bulk Terminals—Longview, LLC (Applicant) proposes to construct and operate an export terminal in Cowlitz County, Washington, along the Columbia River (Figure 1). The export terminal would receive coal from the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado via rail shipment, then load and transport the coal by ocean-going ships via the Columbia River and Pacific Ocean to overseas markets in Asia. The export terminal would be capable of receiving, stockpiling, blending, and loading coal by conveyor onto ships for export. Construction of the export terminal would begin in 2018. For the purpose of this analysis, it is assumed the export terminal would operate at full capacity by 2028. The following subsections present a summary of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative.

1.1.1 On-Site Alternative

Under the On-Site Alternative, the Applicant would develop an export terminal on 190 acres (project area). The project area is located within an existing 540-acre area currently leased by the Applicant at the former Reynolds Metals Company facility (Reynolds facility), and land currently owned by Bonneville Power Administration. The project area is adjacent to the Columbia River in unincorporated Cowlitz County, Washington near Longview city limits (Figure 2).

The Applicant currently and separately operates at the Reynolds facility, and would continue to separately operate a bulk product terminal on land leased by the Applicant. Industrial Way (State Route 432) provides vehicular access to the Applicant's leased land. The Reynolds Lead and the BNSF Spur rail lines, both operated by Longview Switching Company (LVSW),[1] provide rail access to the Applicant's leased area from the BNSF Railway Company (BNSF) main line (Longview Junction) located to the east in Kelso, Washington. Ships access the Applicant's leased area including the bulk product terminal via the Columbia River and berth at an existing dock (Dock 1) operated by the Applicant in the Columbia River.

[1] LVSW is jointly owned by BNSF Railway Company (BNSF) and Union Pacific Railroad (UP).

Figure 1. Project Vicinity

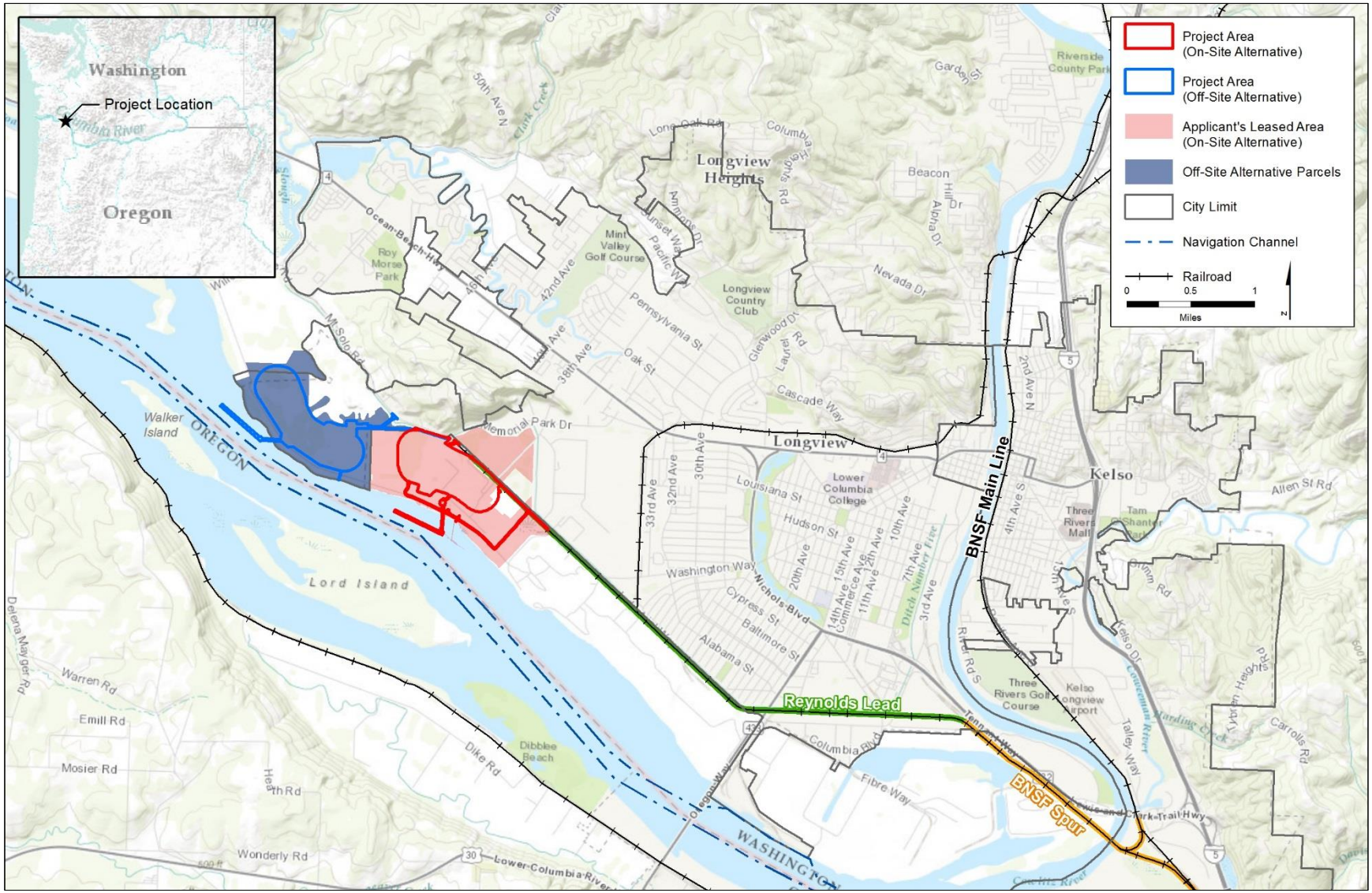
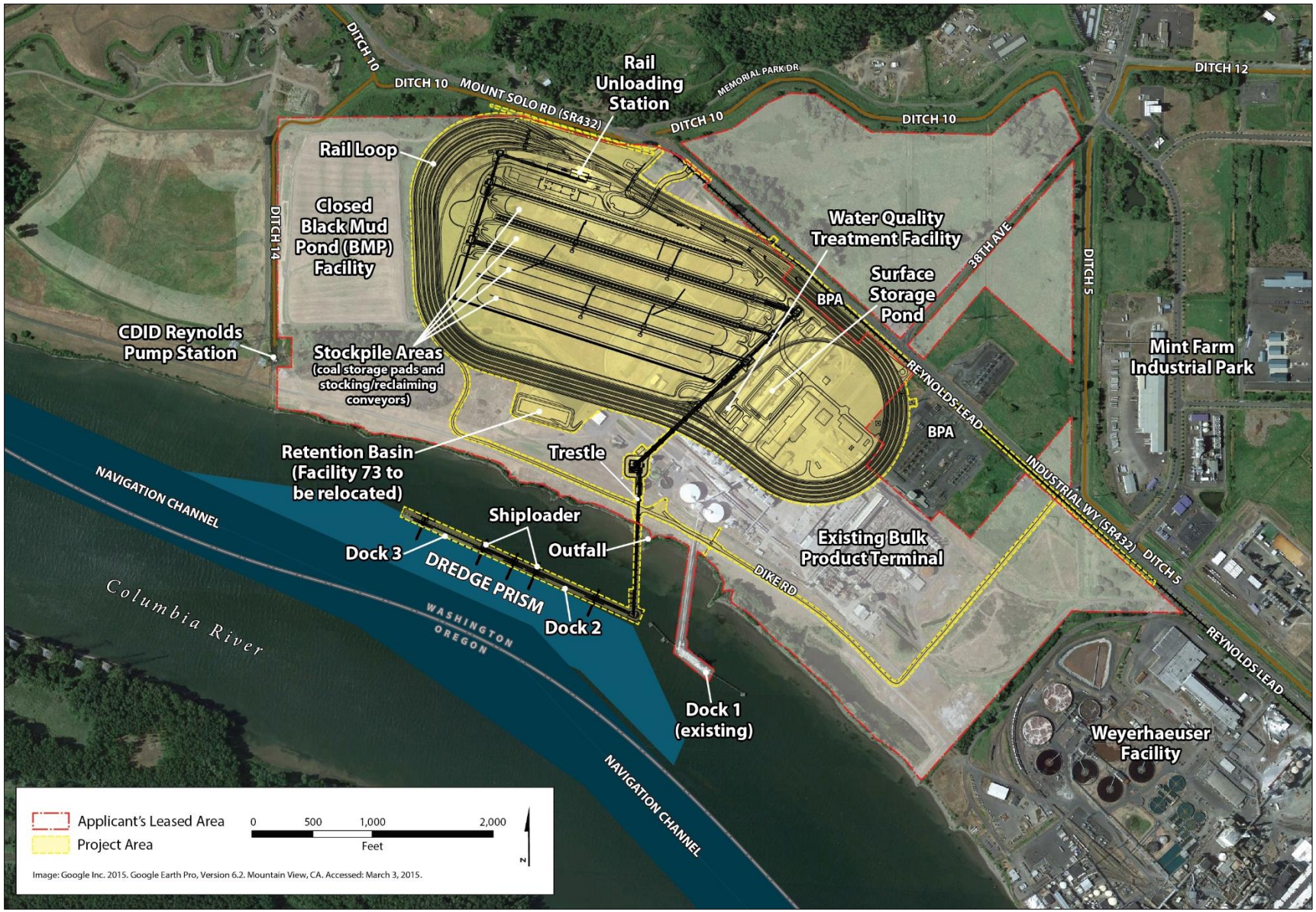


Figure 2. On-Site Alternative



Under the On-Site Alternative, BNSF or Union Pacific Railroad (UP) trains would transport coal in rail cars from the BNSF main line at Longview Junction to the project area via the BNSF Spur and Reynolds Lead. Coal would be unloaded from rail cars, stockpiled and blended, and loaded by conveyor onto ocean-going ships at two new docks (Docks 2 and 3) on the Columbia River for export to Asia.

Once construction is complete, the export terminal would have an annual throughput capacity of up to 44 million metric tons of coal.[2] The export terminal would consist of one operating rail track, eight rail tracks for the storage of rail cars, rail car unloading facilities, stockpile areas for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and ship-loading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

Vehicles would access the project area from Industrial Way (State Route 432). Ships would access the project area via the Columbia River and berth at one of the two new docks. Trains would access the export terminal via the BNSF Spur and the Reynolds Lead. Terminal operations would occur 24 hours per day, 7 days per week. The export terminal would be designed for a minimum 30-year period of operation.

1.1.2 Off-Site Alternative

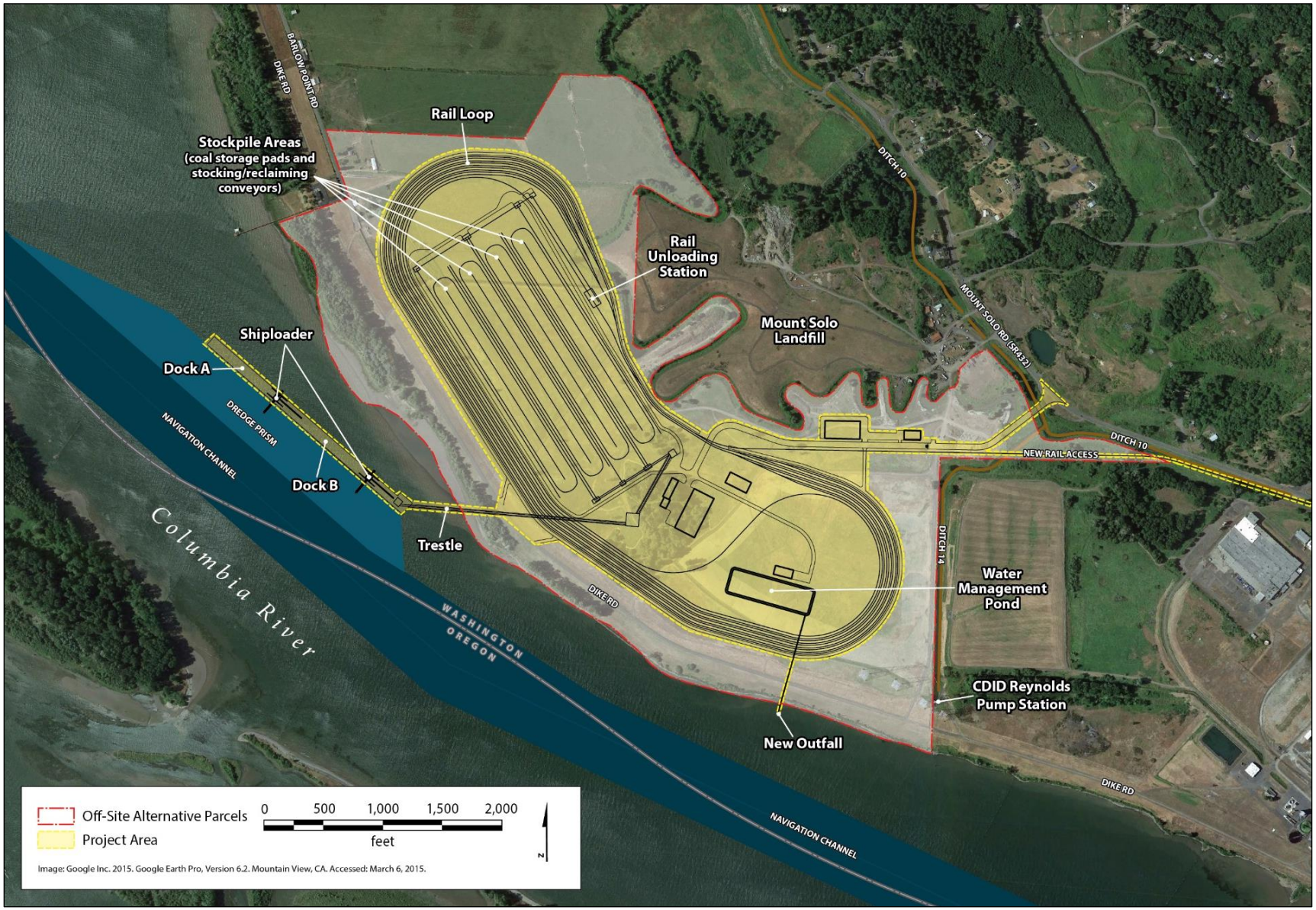
Under the Off-Site Alternative, the export terminal would be developed on an approximately 220-acre site adjacent to the Columbia River, located in both Longview, Washington, and unincorporated Cowlitz County, Washington, in an area commonly referred to as Barlow Point (Figure 3). The project area for the Off-Site Alternative is west and downstream of the project area for the On-Site Alternative. Most of the project area for the Off-Site Alternative is located within Longview city limits and owned by the Port of Longview. The remainder of the project area is within unincorporated Cowlitz County and privately owned.

Under the Off-Site Alternative, BNSF or UP trains would transport coal from the BNSF main line at Longview Junction over the BNSF Spur and the Reynolds Lead, which would be extended approximately 2,500 feet to the west. Coal would be unloaded from rail cars, stockpiled and blended, and loaded by conveyor onto ocean-going ships at two new docks (Docks A and B) on the Columbia River. The Off-Site Alternative would serve the same purpose as the On-Site Alternative.

Once construction is complete, the Off-Site Alternative would have an annual throughput capacity of up to 44 million metric tons of coal. The export terminal would consist of the same elements as the On-Site Alternative: one operating rail track, eight rail tracks for the storage of rail cars, rail car unloading facilities, stockpile areas for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks A and B), and ship-loading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

[2] A metric ton is the U.S. equivalent to a tonne per the International System of Units, or 1,000 kilograms or approximately 2,204.6 pounds.

Figure 3. Off-Site Alternative



Vehicles would access the project area via a new access road extending from Mount Solo Road (State Route 432) to the project area. Trains would access the terminal via the BNSF Spur and the extended Reynolds Lead. Ships would access the project area via the Columbia River and berth at one of the two new docks. Terminal operations would occur 24 hours per day, 7 days per week. The export terminal would be designed for a minimum 30-year period of operation.

1.1.3 No-Action Alternative

Under the No-Action Alternative, the U.S. Army Corps of Engineers would not issue the requested Department of the Army permit under the Clean Water Act Section 404 and the Rivers and Harbors Act Section 10. This permit is necessary to allow the Applicant to construct and operate the proposed export terminal.

The Applicant plans to continue operating its existing bulk product terminal located adjacent to the On-Site Alternative project area, as well as expand this business whether or not a Department of the Army permit is issued. Ongoing operations would include storing and transporting alumina and small quantities of coal, and continued use of Dock 1. Maintenance of the existing bulk product terminal would continue, including maintenance dredging at the existing dock every 2 to 3 years. Under the terms of an existing lease, expanded operations could include increased storage and upland transfer of bulk products utilizing new and existing buildings. The Applicant would likely undertake demolition, construction, and other related activities to develop expanded bulk product terminal facilities.

In addition to the current and planned activities, if the requested permit is not issued, the Applicant would intend to expand its bulk product terminal business onto areas that would have been subject to construction and operation of the proposed export terminal. In 2014, the Applicant described a future expansion scenario under No-Action Alternative that would involve handling bulk materials already permitted for off-loading at Dock 1. Additional bulk product transfer activities could involve products such as a calcine pet coke, coal tar pitch, cement, fly ash, and sand or gravel. While future expansion of the Applicant's bulk product terminal business might not be limited to this scenario, it was analyzed to help provide context to a No-Action Alternative evaluation and because it is a reasonably foreseeable consequence of a Department of the Army denial.

1.2 Regulatory Setting

The jurisdictional authorities and corresponding regulations, statutes, and guidance for determining potential impacts on rail safety are summarized in Table 1. Those regulations pertaining to at-grade crossings are used in the NEPA Vehicle Transportation Technical Report (ICF International and DKS Associates 2016).

Table 1. Regulations, Statutes, and Guidelines for Rail Safety

Regulation, Statute, Guideline	Description
Federal	
National Environmental Policy Act (42 USC 4321 *et seq*.)	Requires the consideration of potential environmental effects. NEPA implementation procedures are set forth in the President's Council on Environmental Quality's Regulations for Implementing NEPA (49 CFR 1105).
U.S. Army Corps of Engineers NEPA Environmental Regulations (33 CFR 230)	Provides guidance for implementing the procedural provisions of NEPA for the Corps. It supplements Council on Environmental Quality regulations 40 CFR 1500–1508.
Federal Railroad Safety Act of 1970	Gives FRA rulemaking authority over all areas of rail line safety. FRA has designated that state and local law enforcement agencies have jurisdiction over most aspects of highway/rail grade crossings, including warning devices and traffic law enforcement.
Highway Safety Act and the Federal Railroad Safety Act	Gives FHWA and FRA regulatory jurisdiction over safety at federal highway/rail grade crossings. USDOT has promulgated rules addressing grade-crossing safety and provides funding for installation and improvement of warning devices. FRA has issued rules that impose minimum maintenance, inspection, and testing standards for at-grade crossing warning devices for highway/rail grade crossings on federal highways and state and local roads.
FRA General Regulations (49 CFR 200–299)	Regulates safety, including operations, engineers, and crew (e.g., control of alcohol and drug use), track, signaling, and rolling stock (e.g., locomotives and passenger and freight cars) for common carrier rail lines that are part of the general rail line system of transportation.
State	
Washington State Environmental Policy Act (WAC 197-11, RCW 43.21C)	Requires state and local agencies in Washington to identify potential environmental impacts that could result from governmental decisions.
Title 81, Transportation—Railroads, Crossings (RCW 81.53)	Establishes requirements and process for railroad construction and extensions that would cross any existing railroad or highway at grade. Includes approval from the commission.
Rail Companies—Clearances (480-60 WAC)	Establishes operating procedures for railroad companies in Washington State. Includes rules of practice and procedure, walkway clearances, side clearances, track clearances, side clearances, track clearances, and rules for operation of excess dimension loads.
Rail Companies—Operation (480-62 WAC)	Establishes railroad operating procedures in Washington State. Includes general and procedural rules, safety rules, reporting requirement rules, and the establishment and distribution of a grade-crossing protective fund.

Regulation, Statute, Guideline	Description
Local	
Cowlitz County SEPA Regulations (CCC Code 19.11)	Provide for the implementation of SEPA in Cowlitz County.

Notes:
NEPA = National Environmental Policy Act; CFR = Code of Federal Regulations; FRA = Federal Railroad Administration; FHWA = Federal Highway Administration; USDOT = U.S. Department of Transportation; WAC = Washington Administrative Code; RCW = Revised Code of Washington; CCC = Cowlitz County Code; SEPA = Washington State Environmental Policy Act

1.3 Study Area

The study areas are the same for both the On-Site Alternative and Off-Site Alternative. For direct impacts on rail safety, the study area is the project area. For indirect impacts, the study area is the project area plus the rail corridor of the Longview industrial area. For the purposes of the analysis, the rail corridor of the Longview industrial area is defined as the Reynolds Lead and BNSF Spur.

Chapter 2
Affected Environment

This chapter describes the methods for assessing the affected environment and determining impacts in the study area as they pertain to rail safety and the affected environment.

2.1 Methods

This section describes the sources of information and methods used to characterize the affected environment and assess the potential impacts of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative on rail safety.

The analysis used existing rail accident data from the Federal Railroad Administration (FRA) as the basis for the rail safety and accident analysis. While the Washington Utilities and Transportation Commission (WUTC) gathers information on accidents that occur in Washington State, WUTC does not have the corresponding data on train miles within the state for determining accidents per million train miles. Such accident rates provided by FRA, broken down by track class, are the basis of the rail safety analysis. Appendix A describes the observed data on accident rates nationwide.[3]

The analysis used the following definition of a rail accident from FRA.

> Collisions, derailments, fires, explosions, acts of God, or other events involving the operation of railroad on-track equipment (standing or moving) and causing reportable damages greater than the reporting threshold for the year in which the accident/incident occurred.

The FRA reporting threshold was $10,500 in 2015. Therefore, accidents include a wide variety of incidents and are not limited to collisions or derailments.

Historically, accident rates (accidents per train mile) do not change dramatically from one year to the next, but generally trend downward over time due to improved control systems, communications, and inspection practices. As a result, using current data for future projections is conservative. Typically, year-to-year accident rates are more consistent than year-to-year traffic volumes on any specific route, which may vary substantially as new projects are added or demands change.

2.1.1 Data Sources

The following sources of information were used to evaluate the rail safety characteristics of the study area.

- **Train parameters** including the number of rail cars (125 rail cars per unit trains) were based on information provided by the Applicant and existing BNSF train operations.
- **Baseline train traffic volumes** for the Reynolds Lead and BNSF Spur were collected from LVSW and field observations.

[3] Appendix A illustrates data for the most recent data available when the analysis was completed.

- **Future project-related train traffic** from the NEPA Rail Transportation Technical Report (ICF International and Hellerworx 2016), notably 8 loaded and 8 empty trains per day if the export terminal is constructed and operated at full terminal throughput in 2028.
- **Accident rates** compiled by FRA for 2012 to 2014,[4] along with analyses by Liu et al. (2011), and Anderson and Barkan (2004) giving derailment rates by track class and discussing the impacts of track class, train length, and signal systems.

2.1.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative on rail safety (train accidents). For the purposes of this analysis, construction impacts are based on peak construction period, assumed to be in 2018, which would average 1.3 construction trains per day (average of 0.65 loaded trains and 0.65 empty trains). Operations impacts are based on the maximum export terminal throughput capacity (up to 44 million metric tons of coal per year), which would result in 8 loaded and 8 empty trains per day by 2028.

2.1.2.1 Accident Frequency

The analysis considered one construction scenario and two operations scenarios.

- **2018 Construction:** Average of 1.3 trains per day
- **2028 Baseline Conditions:** 2028 conditions without the proposed export terminal
- **2028 On-Site Alternative and Off-Site Alternative:** Full train operations in 2028 (8 loaded and 8 empty trains per day on the Reynolds Lead and BNSF Spur)

Train accident rates are generally distinguished only by freight versus passenger service, not by specific cargoes. Both loaded and unloaded project-related trains were evaluated, as well as other existing rail traffic. Given that the project would operate *unit trains* of approximately 125 rail cars that would travel from the mines to the project area without being split up, trains would generally pass around or straight through yards without switching.

The number of accidents (primarily collisions and derailments) resulting from train operations based on accident rates from FRA were estimated. Rates, in combination with the specifics of the operations (e.g., number of trains, route length, track class), were analyzed to estimate the number of accidents per year. The analysis compared predicted rates (in accidents per million train miles) for all railroads for reference with rates specific to BNSF and UP (as co-owners of LVSW) as the first step in estimating the accident rates with project-related trains (Table 2).

[4] 2014 data were the most recent available data when the analysis was completed.

Table 2. Nationwide Train Accident Rates

	Accident Rate per Million Train Miles		
Year	All Railroads (Passenger and Freight Trains)	BNSF (Freight Trains)	UP (Freight Trains)
2012	2.41	2.20	3.04
2013	2.43	2.11	3.02
2014	2.27	1.89	2.82

Notes:
Source: Federal Railroad Administration (2015).
BNSF = BNSF Railway Company; UP = Union Pacific Railroad

BNSF's accident rates are similar to but lower than the average for all railroads. UP has slightly higher accident rates. LVSW did not have any reported train accident data in the FRA database for 2012 to 2014; that is, there were no train accidents experienced in this time period on the Reynolds Lead or BNSF Spur. Given the rail transportation associated with the proposed export terminal would primarily be BNSF trains, a rate of 2 accidents per million train miles (the national average for BNSF over the last 2 years) was used as the starting point of the accident analysis. Specific train accident rates for the Reynolds Lead and BNSF Spur were not available because FRA data do not include train accident rates by state, only nationally. In addition, WUTC does not collect data for a Washington State accident rate to be calculated. For these reasons, the national average for BNSF over the last 2 years was used. FRA data include accident count by state (Appendix A) but does not include accident rate data by state.

The predicted number of accidents per year was calculated by multiplying segment length by the number of trains per year by accident rate. Accident rates have been shown to vary considerably by track class, with higher accident rates (i.e., yielding more accidents for a given number of train miles) occurring on lower track classes. Lower track classes have lower maximum operating speeds, which can reduce the consequences of those accidents which occur (Table 3).[5]

Liu et al. (2011) derived derailment rates by track class,[6] using the baseline rates provided by Anderson and Barkan (2004). They found the derailment rates for Track Class 3 were twice the average across all track classes. Derailment rates for Track Class 2 were six times the average for all track classes (accident rates increase with lower track classes generally due to lower track quality). Conversely, derailment rates for Track Class 5 were roughly a third of the overall average rates (accident rates decrease with higher track classes due to higher track quality and other factors).

[5] Train accidents are more likely to occur on lower track classes (which have lower maximum allowable speeds) because lower track classes are not designed and maintained to the same standards as higher track classes. Track Class 1 is restricted to 10 miles per hour (mph) for freight trains. Rail yards, branch lines, many short lines, and industrial track are typical places to see Track Class 1 track. Track Class 2 may have travel up to 25 mph for freight trains. Secondary main lines, branch lines, and many regional railroads may have track in this category.

[6] FRA's track safety standards establish nine specific classes of track (Class 1 to Class 9). Class of Track is based on standards for track structure and geometry, and inspection frequency. Each Class of Track has a maximum allowable operating speed for both freight and passenger trains. The higher the Class of Track, the greater the allowable track speed and the more stringent the track safety standards that apply.

Table 3. Railroad Track Classes

Class	Maximum Allowable Speed (mph)	
	Freight Rail	Passenger Rail
Excepted (X)	10	NA
1	10	15
2	25	30
3	40	60
4	60	80
5	80	90
6	NA	110
7	NA	125
8	NA	150
9	NA	200

Notes:
Source: 49 CFR Part 213.9 Classes of track: operating speed limits
mph = miles per hour; NA = not applicable

Anderson and Barkan (2004) found that the overall accident rate (collisions, derailments, and other types) on Track Class 3 was roughly twice the total rate for all track classes (the same pattern seen for just derailments), and the overall rate on Track Classes 4 and higher was roughly half the total rate for all track classes.

Data on accident rates by track class was used to generate a base accident rate for each segment. The Reynolds Lead and BNSF Spur are currently maintained in accordance with the Track Class 1 standard. LVSW plans to make improvements to the Reynolds Lead and BNSF Spur to Track Class 2 for full capacity operation of the proposed export terminal (ICF International and Hellerworx 2016).

Using the base rate of two accidents per million train miles, a multiplier of six was then applied as an adjustment to better represent Track Class 2, as indicated by Anderson and Barkan (2004) and Liu et al. (2011), resulting in a rate of 12.0 accidents per million train miles for the Reynolds Lead and the BNSF Spur if improvements are made to Track Class 2.

Accident rates for Track Class 1, which include the Reynolds Lead and BNSF Spur (without planned improvements), are more uncertain, given the small percentage of train miles that occur on such track. Moreover, many sources group Excepted Track (Class X) and Track Class 1 in their data collection making it harder to obtain accident rates specific to just Track Class 1. (Track Class X is excepted from many of the stated geometry and structural requirements and is thus limited to extremely low speeds.) As such, it is hard to predict accident rates for Track Class 1, but they could be 10 to 20 or more times higher than the base (total) accident rate. Thus, if the Reynolds Lead and the BNSF Spur are not improved, the estimates for the Reynolds Lead and the BNSF Spur presented in this report would increase by roughly a factor of 1.5 to 3 times higher than Track Class 2.

2.2 Affected Environment

As described in Section 1.1, *Project Description*, the project areas for both the On-Site Alternative and the Off-Site Alternative are located near Longview, Washington. Both project areas would connect to the BNSF main line and Longview Junction via the Reynolds Lead and the BNSF Spur. The Reynolds Lead currently serves several industries, including Weyerhaeuser and North Pacific Paper Corporation, and existing operations in the Applicant's leased area of the On-Site Alternative. The BNSF Spur and Reynolds Lead are described as follows.

- **BNSF Spur.** This section of track (approximately 2.1 miles) runs from the BNSF Seattle Subdivision main line switch at Longview Junction, across the Cowlitz River Bridge to the LVSW yard (Figure 1). Baseline traffic on the BNSF Spur is about 7 trains per day, on average. The Port Industrial Rail Corridor connects with the BNSF Spur just east of the LVSW yard. Trains to or from various port facilities leave or enter the BNSF Spur at the Industrial Rail Corridor switch. The rest of the trains originate or terminate in the yard.
- **Reynolds Lead.** This section of track (approximately 5.0 miles) runs from the west end of the yard to the existing bulk product terminal (Figure 1). Baseline traffic is just over 2 trains per day, on average. Trains operating on the Reynolds Lead include an LVSW local crew switching industries along the Reynolds Lead 3 days per week and a local crew that delivers and picks up rail cars that are interchanged at two sidings west of California Way.

Chapter 3
Impacts

This chapter describes the impacts on rail safety that would result from construction and operations of the On-Site Alternative or the Off-Site Alternative or the ongoing conditions under the No-Action Alternative.

3.1 On-Site Alternative

Potential impacts on rail safety from the On-Site Alternative are described below.

3.1.1 Construction: Direct Impacts

As described previously, trains transporting construction materials for the On-Site Alternative would travel to and from the project area. Any accidents would be related to construction activities in the project area and would not affect rail safety on the Reynolds Lead.

3.1.2 Construction: Indirect Impacts

Construction of the On-Site Alternative would result in the following indirect impacts.

Increase the Potential for Train Accidents

The Applicant has indicated materials needed for construction of the On-Site Alternative could be delivered by rail. This would require an estimated 350 loaded trains of 100 rail cars each to deliver rock. There would also be the same number of empty trains returning. All rail traffic would use the Reynolds Lead and BNSF Spur.

It is anticipated two-thirds of the rock would be transported during the first year of construction (2018), which would amount to approximately 467 one-way train trips (half loaded, half empty; an average of 1.3 trains per day). The numbers of accidents were predicted using the rates described in Section 2.1.2.1, *Accident Frequency,* and are presented in Table 4 for the major route segments.

Table 4. Predicted Construction Train Accidents during Peak Year of Construction

Segment	Length (miles)	Predicted Project-Related Train Accidents[a]
Loaded Trains		
Longview Junction to LVSW Yard (BNSF Spur)	2.1	0.01
LVSW Yard to Project Area (Reynolds Lead)	5.0	0.03
Empty Trains		
Project Area to LVSW Yard (Reynolds Lead)	5.0	0.03
LVSW Yard to Longview Junction (BNSF Spur)	2.1	0.01

Notes:
[a] Accidents related to the construction of the On-Site Alternative; these would be additive to the baseline results.

Project-related construction rail traffic would have a relatively small increase on predicted train accidents.

3.1.3 Operations: Direct Impacts

During operation of the On-Site Alternative at full terminal capacity, 8 loaded trains would travel to the project area and 8 empty trains would travel from the project area on average per day. These trains would maneuver along the rail loop in the project area. The predicted accident frequency within the project area was not analyzed because the rail loop is in an industrial facility. Any rail accidents in the project area would be related to overall operation of the export terminal and would not affect rail safety on the Reynolds Lead or BNSF Spur.

3.1.4 Operations: Indirect Impacts

Operation of the On-Site Alternative would result in the following indirect impact.

Increase the Potential for Train Accidents

The predicted number of train accidents during operation of the On-Site Alternative is based on accident rates as described in Section 2.1, *Methods*; however, only inbound accidents would involve loaded trains. In addition, some accidents might involve standing derailments of a few rail cars.

The predicted accident frequencies on the Reynolds Lead and BNSF Spur in 2028 are shown in Table 5. The analysis is based on 8 loaded inbound trains per day and 8 empty outbound trains per day. As described previously, if the Reynolds Lead and BNSF Spur are not improved to Class 2 standards, the estimates for the Reynolds Lead and BNSF Spur would increase by roughly a factor of 1.5 to 3.

Table 5. Predicted Train Accidents per Year by Scenario

Segment	Length (miles)	Project-Related Trains 2028[a]	Baseline 2028
Loaded Trains			
Longview Junction, WA to LVSW Yard (BNSF Spur)	2.1	0.07	0.06
LVSW Yard to Project Area (Reynolds Lead)	5.0	0.18	0.04
Empty Trains			
Project Area to LVSW Yard (Reynolds Lead)	5.0	0.18	0.04[b]
LVSW Yard to Longview Junction (BNSF Spur)	2.1	0.07	0.06[b]

Notes:
[a] Additive to Baseline 2028 results.
[b] Due to overlap of inbound and outbound routes on these segments, avoid double counting Baseline 2028 results in totals.

The predicted number of accidents on the Reynolds Lead and BNSF Spur is 0.25 accident per year for the loaded project-related trains and 0.25 accident per year for empty project-related trains. This is roughly one accident for each type of train (inbound and outbound) every 4 years.

Not every accident of a loaded train would result in a coal spill. A collision or derailment could involve only a few rail cars or lead to a greater number of rail cars being derailed in certain circumstances. Not all rail cars that derail would end up in a position where some or all of their

contents could be spilled, depending on the nature of the accident (such as size, speed, and terrain). Spills on the Reynolds Lead or BNSF Spur would be expected to be small given the lower operating speeds, which yield less energetic collisions and derailments, and therefore fewer rail cars derailing and even fewer releasing cargo.

Available data (Liu et al. 2012) indicate that while the average number of rail cars derailed on main line track (all classes and speeds) for 2001 through 2010 was 8.4 cars, the number of rail cars on yard, siding, and industry track ranged from 4.3 to 5.7 rail cars. These types of track provide an indication of the consequences of derailments at very low speeds.

3.2 Off-Site Alternative

Potential direct and indirect impacts on rail safety for an export terminal constructed at the Off-Site Alternative location would be the same as those described for the On-Site Alternative. However, the predicted number of accidents for project-related trains on the Reynolds Lead would be slightly higher for the Off-Site Alternative because trains would travel approximately 0.5 mile further on the Reynolds Lead to the Off-Site Alternative project area. During operations in 2028, the predicted number of accidents for project-related trains on the Reynolds Lead would be 0.38 accident per year.

3.3 No-Action Alternative

A limited-scale future expansion scenario proposed by the Applicant was evaluated, as described in Section 1.1.3, *No-Action Alternative*. Under this scenario, approximately 2 trains per day would use the Reynolds Lead and BNSF Spur (mixed-load trains). The potential for a mixed-load train accident on the Reynolds Lead and BNSF Spur would presumably be lower than for a unit train because mixed-load trains tend to not have as many rail cars as a unit train.

Chapter 4
Permits

No permits or approvals related to rail safety would be required from federal, state, or local authorities for the construction or operation of the On-Site Alternative or Off-Site Alternative.

Chapter 5
References

Anderson, R.T. and C.P.L. Barkan. 2004. Railroad Accident Rates for Use in Rail Transportation Risk Analysis*. Transportation Research Record: Journal of the Transportation Research Board* 1863:88–98.

Federal Railroad Administration. 2015. Data Analyses. January 2012 through December 2014. Available: http://safetydata.fra.dot.gov.

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Liu, X., M.R. Saat and C.P.L. Barkan, 2012. Analysis of Causes of Major Train Derailment and Their Effect on Accident Rates. *Transportation Research Record: Journal of the Transportation Research Board*. 2289:154–163.

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This appendix summarizes the rail accident data used in the rail safety analysis.

Observed Accident Rates

Rail accident data available from the Federal Railroad Administration (FRA) were used as the initial basis for the analysis. The specific data analyzed were for 2012 through 2014, with the data compiled in 2015 (Federal Railroad Administration 2015), the most recent available data when the analysis was completed.

The following image shows the raw data as it appears in the FRA database for all railroads. FRA data include accident counts on the state and county levels, and accident rates are calculated on a nationwide basis. The data of interest to the analysis are the total year rates for 2012, 2013, and 2014. The rates are per million train miles.

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ACCIDENTS IN DESCENDING FREQUENCY BY CAUSE (By CALENDAR YEAR)
IMPORTANT: Rates calculated are National Level - they do not display for Region or State Geography

Selections: Railroad - All Railroads
State - All States County - All Counties
All Regions
All Causes / All Types of Accidents
All Track Types / All Track Classes
CALENDAR YEAR - 2015
Reporting Level - ALL
End Month of Report - December

	Total		Total Year Counts			Total Year Rates			YTD Counts Jan - Dec		% Change Over Time			YTD Rates To Dec	
	Accs	Pct of Total	2012	2013	2014	2012	2013	2014	2014	2015	2012 to 2014	2013 to 2014	To Dec 2014 2015	2014	2015
-----GRAND TOTAL.....	5,480	100.0	1,760	1,822	1,736	2.41	2.43	2.27	1,736	162	-1.4	-4.7	-90.7	2.27	2.58

The following two figures show the extracted data for BNSF Railway Company (BNSF) and Union Pacific Railroad (UP) for all track classes.

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ACCIDENTS IN DESCENDING FREQUENCY BY CAUSE (By CALENDAR YEAR)
IMPORTANT: Rates calculated are National Level - they do not display for Region or State Geography

Selections: Railroad - BNSF Rwy Co. [BNSF]
State - All States County - All Counties
All Regions
All Causes / All Types of Accidents
All Track Types / All Track Classes
CALENDAR YEAR - 2015
Reporting Level - INDIVIDUAL
End Month of Report - December

	Total		Total Year Counts			Total Year Rates			YTD Counts Jan - Dec		% Change Over Time			YTD Rates To Dec	
	Accs	Pct of Total	2012	2013	2014	2012	2013	2014	2014	2015	2012 to 2014	2013 to 2014	To Dec 2014 2015	2014	2015
-----GRAND TOTAL.....	1,178	100.0	397	390	359	2.20	2.11	1.89	359	32	-9.6	-7.9	-91.1	1.89	2.42

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2.09 - Train Accidents and Rates

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ACCIDENTS IN DESCENDING FREQUENCY BY CAUSE (By CALENDAR YEAR)
****IMPORTANT: Rates calculated are National Level - they do not display for Region or State Geography****

Selections: Railroad - Union Pacific RR Co. [UP]
State - All States County - All Counties
All Regions
All Causes / All Types of Accidents
All Track Types / All Track Classes
CALENDAR YEAR - 2015
Reporting Level - INDIVIDUAL
End Month of Report - December

	Total		Total Year Counts			Total Year Rates			YTD Counts Jan - Dec		% Change Over Time			YTD Rates To Dec	
	Accs	Pct of Total	2012	2013	2014	2012	2013	2014	2014	2015	2012 to 2014	2013 to 2014	To Dec 2014 2015	2014	2015
-----GRAND TOTAL.....	1,538	100.0	506	501	489	3.04	3.02	2.82	489	42	-3.4	-2.4	-91.4	2.82	3.01

The analysis compared the historic rates (in accidents per million train miles) for all railroads with rates specific to BNSF and UP (as co-owners of Longview Switching Company [LVSW]) as the first step in determining the appropriate accident rates for the project, as shown in Table 1. The data in this table summarize the outputs from the FRA database.

Table 1. Train Accident Rates

	Accident Rate per Million Train Miles (FRA 2015)		
Year	**All Railroads**	**BNSF**	**UP**
2012	2.41	2.20	3.04
2013	2.43	2.11	3.02
2014	2.27	1.89	2.82

These data were then supplemented with data from analyses by Liu et al. (2011) and Anderson and Barkan (2004), which identify derailment rates by track class.

References

Anderson, R. T. and C. P. L. Barkan. 2004. Railroad Accident Rates for Use in Rail Transportation Risk Analysis. *Transportation Research Record: Journal of the Transportation Research Board* 1863:88–98.

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