NORTH DAKOTA PIPELINE COMPANY LLC

MINNESOTA PUBLIC UTILITIES COMMISSION

MPUC DOCKET NO. PL-6668/CN-13-473
OAH DOCKET NO. 8-2500-31260

DIRECT TESTIMONY OF WILLIAM J. RENNICKE

AUGUST 8, 2014

Q. Please state your name and business title.

A. My name is William J. Rennicke. I am a partner with Oliver Wyman, Inc.

Q. On whose behalf are you filing testimony?

A. I am testifying on behalf of North Dakota Pipeline Company LLC ("NDPC").

Q. What is Oliver Wyman, and what is your area of expertise?

A. Oliver Wyman is a general management consulting firm that serves the transportation and logistics sectors. I have been a railroad executive and consultant to railroads for more than 40 years. I have worked extensively with the railroad industry in the United States and Canada, and also have worked with railways in Europe, Asia, South America, Australia, and Africa. I specialize in railroad strategic planning, cost analysis, revenue management, and operations. I have particular expertise in transportation pricing, restructuring, organizational design, and transactions (including mergers and acquisitions) to improve the performance of rail operators, major rail equipment suppliers, and users of transportation services. My curriculum vitae is attached as **Schedule 1**.

Q. What is the purpose of your report and testimony?

A. NDPC asked me to examine the impact of the "No Action" alternative, that is, what could happen in terms of crude oil transportation if the NDPC Sandpiper pipeline (the "Project") is not constructed. Specifically, my "Report on the Impact of Crude-by-Rail and the 'No-Action' Scenario for the Sandpiper Pipeline Project in Minnesota" dated August 8, 2014 (the "Report"), attached as **Schedule 2**, examines the most likely means by which crude oil would be transported to refineries in the Midwest and beyond if the Project is not built, which would be by rail. I also examine the potential impact of the increase in traffic this crude oil would represent on the current capacity of the railroads that would transport it. Finally, I describe how the current level of congestion on Minnesota's rail lines impacts the economics of other sectors of Minnesota's economy.

Q. What is your conclusion?

A. As described in my Report, rail is the only viable alternative to the Project for transporting large volumes of crude oil. Rail also transports the majority of bulk commodities that move to/from and through Minnesota, such as grain, coal, and minerals, and the same rail lines are used for passenger rail service as well. The current rail system in Minnesota does not presently have the surplus capacity required to support the increase in crude-by-rail traffic that will occur if the Project is not approved. Construction of the Project would mitigate the need for some crude oil to use the railroads, which would, in turn, allow the railroads more flexibility to respond to the transportation demand cycles of other commodities, such as grain and other agricultural products. This would enable Minnesota to reduce the risk of economic disruption as a result of rail congestion.

Q. Does this conclude your direct testimony?

A. Yes, it does.

William J. Rennicke

William J. Rennicke, a Partner in the Corporate Finance and Restructuring Practice of Oliver Wyman's Manufacturing, Transportation, and Energy Unit, specializes in transportation strategic planning, management, marketing, economics, and operations. He has particular expertise in restructuring, organizational redesign, and transactions to improve financial and operating performance of transport operators around the world.

Mr. Rennicke's career in the transportation industry spans nearly four decades, including senior management and operating positions at Class I railways. He has been in the forefront of restructuring and transaction-related activities for both private and government-owned transport operators. He has also managed the development of strategic and financial planning, simulation, and control models for transportation companies. Mr. Rennicke has worked closely with service providers and operating companies; commercial and investment banks; large investors and investment fund firms; operators; equipment manufacturers and leasing companies; construction and engineering companies; and government transportation entities in many countries.

Drawing on his extensive experience, Mr. Rennicke has served as an expert witness in litigation, regulatory and arbitration cases, and he has provided expert testimony before the Canadian and US legislatures. His relevant experience includes the following:

Testimony on Behalf of or Before	Subject	Year
US State Department	Review of Enbridge Energy's Application for Amendment of the August 2009 Presidential Permit for Line 67, Supplemental Environmental Report on "No Action" Alternatives	04/2014
Provided an expert report identifying "no action" transportation options (i.e., if permit amendment were denied). This assessment included detailed route descriptions, capacity constraints, and capital investment requirements for the most feasible "no action" options.		
Federal Energy Regulatory Commission	Petition for Declaratory Order, North Dakota Pipeline Company LLC (OR14-21-00)	03/2014
Provided an expert witness statement on the nature of railroad-shipper contracts, the characteristics of rail network capacity, and the multi-commodity nature of rail operations.		
Minnesota Public Utilities Commission	Application of Enbridge Energy for a Certificate of Need for the Line 67 Station Upgrade Project, Phase 2 (Pl-9/Cn 13-153)	03/2014
Provided expert witness testimony on the potential impact of the "no action" alternative (i.e., non-approval of the upgrade project) on freight and passenger rail capacity and services in the State of Minnesota.		

Testimony on Behalf of or Before	Subject	Year
US Surface Transportation Board	Ex Parte No. 711, Petition for Rulemaking to Adopt Revised Competitive Switching Rules	03/2014
Provided expert witness testimony concerning the operation of railroad interchanges and the potential service and cost impacts of a proposed change to switching rules		
US Surface Transportation Board	Finance Docket No. 27590/4, TTX Company Application for Approval of Pooling of Car Service with Respect to Flatcars	01/2014
Provided an expert report assessing the benefits provided by TTX's flatcar pooling activities and the potential consequences for the railroad industry if TTX were no longer authorized to engage in pooling.		
US District Court for the District of Columbia	Civil Action MDL No. 1869 (confidential client)	01/2013
Provided expert witness testimony on surface freight modal competition and rail freight network operations		
US Surface Transportation Board	Genesee & Wyoming Application for Control of RailAmerica, FD 35654	8/2012
Provided an expert report on the impact of G&W's acquisition of RailAmerica on competition in the North American rail industry		
Department of Commerce and Consumer Affairs, State of Hawaii	Evidentiary Hearing in the Matter of Sumitomo Corporation of America vs. City and County of Honolulu and Ansaldo Honolulu JV (PCX-2011-5)	07/2011
Provided expert witness testimony on price realism and past performance as a criterion in bid evaluations		
US Surface Transportation Board	Ex Parte No. 705, Competition in the Railroad Industry	04/2011
Provided expert witness testimony concerning the current state of competition in the freight railroad industry and proposals to change the current regulatory structure		
Confidential North American client	Confidential arbitration proceeding	05/2010
Provided expert witness testimony on rail costs and rates for an arbitration between a company-owned bulk railroad and a major shipper		
Confidential North American client	Confidential arbitration proceeding	03/2010
Advised on approaches and analytic techniques to more accurately attribute variable and fixed costs in a volatile volume environment. Built a dynamic tool that captured all direct cost for a commodity's movement to calculate the true cost to serve at various volume levels		
US Surface Transportation Board	Standalone rate case, NOR 42110 (confidential	01/2010

Testimony on Behalf of or Before	Subject	Year
	client)	
Provided expert witness testimony on railroad general and administrative costs in a standalone rate case between a North American Class I railroad and a major shipper		
US District Court for the California Eastern District	Civil Action No. 08-CV-1086-AWI (confidential client)	09/2009
Provided expert witness testimony with regard to the appropriate rate divisions and escalation of revenue shared between two railroads, and estimated damages for the client		
US House of Representatives Committee on Transportation & Infrastructure	Hearing on Rail Competition and Service	09/2007
Provided expert witness testimony evaluating the current performance of the US freight rail industry, the challenges it will face, and the potential for differential pricing to support a sound US rail network		
US House of Representatives Committee on Transportation & Infrastructure	Congressional Forum on High-Speed Rail	03/2007
Provided a perspective on the role high-speed rail could play in the United States, potential high-speed rail markets, structural reform options, and options for public-private development of high-speed rail		
US Bankruptcy Court, Southern District of Texas	Confidential bankruptcy proceeding	02/2007
Provided expert witness testimony that a copper refining mill satisfied the criteria to be considered a going concern and the appropriate methods for valuing such an operation		
Confidential North American client	Confidential arbitration proceeding	10/2006
Provided expert witness testimony on 1) trends in the North American surface transportation and logistics market, with a focus on motor carriers, and 2) third-party logistics contracting processes and risk mitigation strategies for an arbitration between a major consumer products company and a third-party logistics provider		
Confidential Canadian client	Confidential arbitration proceeding	09/2006
Provided expert witness testimony on the North American rail wheel market and rail wheel supply and demand for an arbitration between a railroad equipment distributor and a European manufacturer		
US District Court of New Jersey	Civil Action No. 05-4010 (confidential client)	12/2005
Provided expert witness testimony on the interface between rail and intermodal facilities for litigation involving a Class II railroad and state environmental agency		
Confidential Canadian client	Confidential arbitration proceeding	08/2005

Testimony on Behalf of or Before	Subject	Year
Provided expert witness testimony on rail costs and rates for an arbitration between a company-owned bulk railroad and a major shipper		
Confidential Canadian client	Confidential arbitration proceeding	05/2005
Provided expert witness testimony on rail costs and rates for an arbitration between a company-owned bulk railroad and a major shipper		
Confidential Canadian client	Confidential arbitration proceeding	04/2005
Provided expert witness testimony on rail costs and rates for an arbitration between a company-owned bulk railroad and a major shipper		
US Surface Transportation Board	Standalone rate case, NOR 41191 (confidential client)	05/2004
Provided expert witness testimony analyzing the construction schedule and cost estimates for a standalone railroad in a dispute between a utility and railroad over common carrier rates		
Confidential Canadian client	Confidential arbitration proceeding	2004
Provided expert witness testimony on rail costs and rates for an arbitration between a company-owned bulk railroad and a major shipper		
US Surface Transportation Board	Ex Parte No. 646, Rail Rate Challenges in Small Cases	2004
Submitted a statement that identified key issues and challenges facing the rail industry (in particular long-term capital funding needs) and explained how the risk of increasing the regulatory exposure of significant portions of railroad revenue would adversely affect the financial condition of the industry and its ability to meet the challenges it faces.		
US House of Representatives Committee on Transportation and Infrastructure, Subcommittee on Railroads	Hearing on the Status of the Surface Transportation Board and Railroad Economic Regulation	2004
Testified regarding Oliver Wyman's perspective on the state of the railroad industry, including its current financial conditions and transformation since enactment of the Staggers Rail Act of 1980		
US Surface Transportation Board	Arbitration (confidential client)	2003
Submitted a statement analyzing the economic and business conditions faced by the railroad industry and by a Class I railroad preceding its decision to furlough certain MOE and MOW employees		
US House of Representatives Committee on Transportation and Infrastructure, Subcommittee on Railroads	Hearing on Passenger Rail Service in America	2002
Testified regarding worldwide trends in private sector involvement in passenger railroad restructuring and privatization, and potential public policy changes and restructuring options for		

Testimony on Behalf of or Before	Subject	Year
the US passenger rail system		
US Senate Commerce Committee	Hearing on S. 1991, the National Defense Rail Act	2002
Testified as to worldwide trends toward private sector involvement in passenger railroad restructuring and privatization over the past 10 years		
Canadian Transportation Agency	In the matter of an application by the Ferroequus Railway Co. Ltd. pursuant to sections 93 and 138 of the *Canada Transportation Act*, seeking third-party running rights over CN infrastructure	2002
Testified as to the adverse impacts on CN and the Canadian rail system of granting FE, a "virtual railroad," forced access to CN's privately owned infrastructure		
Canadian Transportation Agency	In the matter of complaints filed by Naber Seed and Grain Co. Ltd. pursuant to section 116 of the *Canada Transportation Act*, alleging CN's failure to fulfill its level of service obligations	2002
Testified as to the adverse impacts on CN and the Canadian rail system of Naber's requested remedy of granting a third-party carrier access to CN's network		
US District Court for the Northern District of Maryland	In the matter of Allfirst Bank vs. Progress Rail Services Corp. and Railcar Ltd.	2002
Submitted a statement assessing the market demand for certain railcar equipment sold by PRSC and RL to Allfirst Bank		
US District Court for the Eastern District of Virginia, Alexandria Division	Civil Action No. 00-1489-A (confidential client)	2001
Expert witness in a major service dispute between one of the six North American Class I railroads and a major bulk shipper. Submitted a statement analyzing the actual service performance of the carriers and the underlying causes of transit time and reliability performance issues		
US Senate Subcommittee on Surface Transportation and Merchant Marine	Hearing on the State of the Rail Industry	2001
Testified as to the current financial conditions and transformation of the US rail industry since enactment of the Staggers Rail Act of 1980, infrastructure capacity and its impact on rail service, and long-term capital funding needs		
United States District Court for the District of Nebraska	Case No. 8:98CV 34 (confidential client)	2000
Expert witness in a major service dispute between one of the six North American Class I railroads and a major coal shipper. Analyzed the actual service performance of the carriers and the underlying causes of transit time and reliability performance issues as well as the impact of the		

Testimony on Behalf of or Before	Subject	Year
logistics practices of the rail customer		
Canada Transportation Act Review Panel	Review of the Canada Transportation Act	2000
Submitted a statement regarding the state of the Canadian rail industry and the application of differential pricing and efficient component pricing theory relative to the industry's financial needs		
US Surface Transportation Board	Ex Parte No. 582, Public Views on Major Rail Consolidations	2000
Assisted in preparation of Oliver Wyman's testimony with respect to Oliver Wyman's views on major railroad consolidations and the future structure of the North American railroad industry		
US Surface Transportation Board, on behalf of Assoc. of American Railroads	Ex Parte No. 575, Review of Rail Access and Competition Issues:	1998
Testified as to why open access or forced access is not required for the US freight rail network and the likely impacts if it were instituted		
US Senate Subcommittee on Surface Transportation and Merchant Marine	Hearing on the Financial Viability of Amtrak	1997
Assisted in the preparation of Oliver Wyman's testimony on the financial viability of Amtrak (US intercity passenger rail)		
Connecticut Department of Transportation	In the Matter of Arbitration Between the Connecticut Department of Transportation and the Metropolitan Transportation Authority (NY)	1996
Testified regarding Oliver Wyman's assessment of the economics of the New Haven commuter rail line and the fair and equitable allocation of operating deficit and shared capital costs between the two states that share the line		
Canadian National Railway	Before the Interstate Commerce Commission: FD 32640 – Contract to Operate Grand Trunk Western Railroad Inc. and Duluth, Winnipeg and Pacific Railway Co.	1994
Testified before the ICC concerning a restructuring of the GTW and DWP to enhance operational efficiency and overall profitability		
General Electric	For the Department of Justice and Federal Trade Commission: In the Matter of Chrysler Rail Transit	1993
Statement to the DOJ and FTC concerning the level of competition relative to the ownership of rail boxcars and the impact of the proposed acquisition on competition		
Consolidated Rail Corp.	President's Emergency Board No. 221: Dispute Between Consolidated Rail Corp. and Its	1992

Testimony on Behalf of or Before	Subject	Year
	Employees Represented by the Brotherhood of Maintenance of Way Employees	
Testified regarding the outlook for Conrail in the context of the financial condition and prospects of the Class I railroad industry		
Wisconsin Central	Before the Interstate Commerce Commission: FD 32036 – Wisconsin Central Transportation Corp. et al. – Continuance in Control – Fox Valley & Western Ltd.	1992
Testified before the ICC regarding the effect on competition of Wisconsin Central's proposed acquisition of the Fox Valley & Western Railroad		
National Carriers Conference Committee	Before Presidential Emergency Board No. 219, Financial Condition and Prospects for the Class I Railroad Industry	1990
Testified concerning the financial challenges facing the US freight rail industry, as part of the process of government intervention to resolve a labor dispute over wages and benefits		
Citicorp	Before the Federal Bankruptcy Court re: Chicago and Missouri Western Railway	1988
Testified on behalf of a major institutional creditor of the CM&W concerning the outlook for profitable operation of the railway		
Santa Fe Southern Pacific Corporation	Before the Interstate Commerce Commission: Docket Nos. 30400, 30400 (Sub No. 1) et al. – Santa Fe Southern Pacific Corp. – Control – Southern Pacific Transportation Company	Various 1984-85
Testified on behalf of the Applicants regarding the effect on competition of the proposed merger of the Santa Fe and Southern Pacific railroads		
Confidential investor in rail equipment	Confidential lawsuit	Early 1980s
Assessed overall demand for rail equipment in the late 1970's and early 1980's to determine the validity of long-term equipment plans		
Boston & Maine Railroad	Before a Federal Arbitration Panel re: Crew Consist Issues on the B&M	Various 1980s
Was a key witness for the B&M in the first crew consist arbitration case in the United States. Result was the creation of single brakeman and conductor only crews, ten years before the rest of the industry		
Boston & Maine Railroad	Before the Federal Bankruptcy Court re: Boston & Maine Railroad	Various Late 70s-Early

Testimony on Behalf of or Before	Subject	Year
		80s
Testified numerous times on a wide variety of subjects related to the future of the B&M and the validity of the reorganization plan		

Before joining Oliver Wyman, Mr. Rennicke held various senior positions at the Boston and Maine Railroad. He is a member of the Transportation Research Forum and the Council of Supply Chain Management Professionals.

Mr. Rennicke holds a B.S.B.A. in accounting from the School of Business Administration at Georgetown University and an M.B.A. with a concentration in transportation and logistics from the University of Minnesota.

BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

MPUC Docket No. PL6668/CN-13-473
OAH Docket No. 8-2500-31260

IN THE MATTER OF THE APPLICATION OF THE NORTH DAKOTA PIPELINE COMPANY FOR A CERTIFICATE OF NEED FOR THE SANDPIPER EXPANSION AND EXTENSION PROJECT

REPORT ON THE IMPACT OF CRUDE-BY-RAIL AND THE "NO-ACTION" SCENARIO FOR THE SANDPIPER PIPELINE PROJECT IN MINNESOTA

Prepared by:
William J. Rennicke
Partner
Oliver Wyman, Inc.

August 8, 2014

Contents

I. Introduction

A. Qualifications

I am William J. Rennicke, a Partner with Oliver Wyman, Inc. Oliver Wyman is a leading general management consulting firm. It maintains one of the largest practices in the world dedicated to serving the transportation and logistics sectors. That practice provides a comprehensive set of services and capabilities to transportation carriers across all modes, and to the users and regulators of transportation services. Oliver Wyman's transportation clients include national and regional governments on six continents, as well as many of the world's largest users of rail services, railroads, motor carriers, leasing companies, and industrial and consumer manufacturing firms.

I have been a railroad executive and a consultant to railroads for more than 40 years. I have worked extensively with the railroad industry in the United States and Canada, and also have worked with railroads in Europe, Asia, South America, Australia, and Africa. I specialize in railroad strategic planning, cost analysis, revenue management, and operations. I have particular expertise in transportation pricing, restructuring, organizational design, and transactions (including mergers and acquisitions) to improve the performance of rail operators, major rail equipment suppliers, and users of transportation services. I have worked with senior executives at all of the major North American railroads, as well as with senior officials at many government-owned railroads worldwide. I have testified before the United States Congress and the Canadian Parliament, as well as federal transportation agencies, concerning railroad regulation, rate policy, access issues, and rail mergers. I have spoken and published widely on issues affecting the railroad industry.

Before joining Oliver Wyman, I was a vice president of the Boston & Maine Railroad. During my tenure, I managed rail industry service performance project case studies as part of the industry-wide Freight Car Utilization Program. I have also held operating positions with the Southern Pacific (now Union Pacific) and New Haven (now CSX) railroads and was a transportation consultant with Deloitte Haskins & Sells (the predecessor of Deloitte & Touche). I have a B.S.B.A. in accounting from the School of Business Administration at Georgetown University and an M.B.A. with a concentration in transportation and logistics from the University of Minnesota. I am also a member of the Council of Supply Chain Management Professionals.

B. Purpose

Based on my expertise, I was asked by North Dakota Pipeline Company LLC ("NDPC") to describe the freight rail system in Minnesota, assess the impact of using rail to transport crude oil through Minnesota, and assess the impact on rail services in Minnesota of the "No Action" alternative, which is the denial of permits for the Sandpiper Pipeline Project ("Sandpiper" or the "Project") by the Minnesota Public Utilities Commission ("MPUC").

C. Key Findings

Based on the analysis presented in this report, my key findings are:

- Minnesota's rail network is of vital importance to the state's economy. Railroads pick up $11.2 billion in goods in Minnesota and deliver some $9.7 billion in goods. The railroads bring raw materials into Minnesota factories and haul finished products to markets throughout North America and to seaports for delivery to international markets. The railroads

are also the primary source of transportation for moving Minnesota's major bulk products, such as ore and grain, which are cornerstones of the Minnesota economy.

- Bakken crude oil is currently transported by rail through Minnesota to serve refineries located in the Midwest and Eastern U.S. and Canada. Crude oil by rail volumes have ramped up rapidly in the past 5 years and can be expected to continue to increase. Thus, shippers of other commodities vital to the Minnesota economy face increased competition for rail service. This competition may already be impacting key sectors of the Minnesota economy, in terms of delivering products to markets in a timely fashion. Shippers in a range of industries have reported increased supply chain delays due to greater railroad congestion. Peak demand, such as during the grain harvest, and harsh weather conditions, including during the past winter, exacerbate congestion and delays. Passenger trains and communities also have experienced recent disruptions due to rail congestion.
- Denying NDPC's Application for a Certificate of Need (the "Application") for the Project, would increase reliance on rail as the primary mode of transportation for Bakken crude oil. Current rail congestion issues and projected continued growth in demand for rail service for other commodities vital to Minnesota's economy could adversely affect energy supply to refineries in Minnesota, neighboring states, and the Midwest, should the railroads be unable to invest sufficiently to ensure reliable service for all shippers.
- In terms of the efficiency of moving large volumes of crude oil, pipelines serve to move only one or two commodities (e.g., fuel, diluent), unlike railroads, which move hundreds of different commodities. Thus, while rail is a viable alternative to pipelines for the movement of crude oil, when pipeline capacity is available, it is preferred due to pipeline's lower costs and lower risks of service disruptions (such as due to the congestion caused by the movement

of other commodities or extreme weather). The Project would not entirely replace rail for the movement of crude oil, only reduce the use of rail for crude oil shipments, thus freeing up rail capacity for other uses. Should the Project not be approved, however, Bakken crude will move by rail through Minnesota, that is a certainty. And in addition to serving the crude oil traffic under the "No Action" scenario, the railroads also would need to accommodate growth in crude-by-rail to markets that are not served by pipeline or that have no available pipeline capacity. Meanwhile, railroads also face growth in demand for service for other commodities and for passenger rail services, which they seek to accommodate while attempting to minimize community disruption. In the absence of the Project, all of this taken together likely would lead to significant congestion on rail lines serving Minnesota, requiring significant additional capital investment. Furthermore, any such capital investment on the part of the railroads would have to be in addition to the approximately 18 percent of revenue they already spend each year for planned capital expenditures and maintenance.

- There are four potential rail routes the crude oil would likely use in a "No Action" scenario. Three of the routes pass through the Minneapolis-St. Paul area and have a combined population exposure of 790,000 to over one million, approximately 20 percent of Minnesota's population. These routes pass a combined 1,800 at-grade road-rail crossings; Minnesota ranks 15th in the nation for the highest number of accidents at such crossings and 12th for fatalities and injuries resulting from these accidents.

In summary, weather and crop cycles make Minnesota and the surrounding region one of the most challenging parts of the North American network for rail freight movements. Grain and other agricultural products currently require and will require in the future significant rail capacity. Ensuring that sufficient resources are available to meet what can be wide fluctuations

in demand historically has presented a challenge for both railroads and agricultural shippers. Even if crude-by-rail movements increase with appropriate additions in rail capacity, it is still likely that the unpredictability of weather and the irregularities of agricultural traffic flows on Minnesota rail lines over which crude oil moves would experience periods of increased congestion. Adding large volumes of crude oil onto a complex network, particularly when coupled with the potential for sudden and unforeseeable changes in demand or service conditions, increases the likelihood of congestion and the potential for rail service disruptions. Diversifying or broadening modal shipping options, such as by expanding and extending the Project to provide an additional option for the movement of crude oil, could help ensure that the rail network can continue to fully support Minnesota's economic base, by providing the broadest set of freight transportation options for its shippers.

II. Bakken Crude Oil Projections and Movement by Rail

As reported in Section 7853.0240, Subp. B of the Application, the United States Geological Survey ("USGS") has estimated that there are 7.4 billion barrels of recoverable oil in the Bakken and Three Forks formations located in the Williston Basin of North Dakota, South Dakota, and Montana (hereafter "Bakken" or "Bakken region").[1] Using a million barrels per day of production as a simple estimate, the Bakken region should be able to supply crude oil for more than 20 years.

Transportation of this crude oil to refineries throughout the United States and Canada will be required, and the portion of this crude oil destined for refineries in the Midwest and East will traverse Minnesota, regardless of whether or not the Project is approved and built.

A. Projections for Continued Growth of Bakken Crude

Demand for Bakken crude oil is expected to remain strong throughout the forecast period. Figure II-1 summarizes a study performed by Muse Stancil, which looked at the potential markets for Bakken light crude that could be served by the Sandpiper Pipeline. The markets were divided into five broad geographies: Upper Midwest, Lower Midwest, Ontario/Quebec, Mid-Continent, and Gulf Coast. For each region, the study listed the refineries that could be served along with their capacity. The study then developed a total estimate of the demand for light crude which the Bakken region could serve. For example, the Upper Midwest has a total refining

[1] "USGS Releases New Oil and Gas Assessment for Bakken and Three Forks Formations," U.S. Department of the Interior, press release, April 30, 2013 (http://www.doi.gov/news/pressreleases/usgs-releases-new-oil-and-gas-assessment-for-bakken-and-three-forks-formations.cfm).

capacity of 1,682 thousand barrels per day ("kbpd"), of which 550 to 650 kbpd could be supplied by the Bakken region.[2]

Figure II-1: Potential Demand for Bakken Crude Oil That Could Use the Sandpiper Pipeline[3]

Includes current refinery capacity and projects underway

Region	States	Light Crude Demand That Could be Served by the Bakken	Does the Route Traverse Minnesota?
Upper Midwest	ND, MN, WI, MI and the northern portions of IL, IN, and OH	550-650 kbpd	Yes. Except for a small amount processed in the Dakotas, Bakken crude oil to Upper Midwest refineries would terminate in or pass through MN.
Lower Midwest	KY, TN and the southern portions of IL, IN, and OH	700-900 kbpd	Yes. This crude would pass through MN en route to the Chicago area for distribution to refineries in the Lower Midwest.
East Coast	Ontario and Quebec, plus access to refineries in the Northeastern United States	250-350 kbpd	Yes. Although some crude could move north by rail and pass through Canada, the preferred route would be through MN then on to refineries in Ontario and Quebec.
Mid-Continent	KS, OK, NM, and northern TX	700 kbpd	Yes. Some crude could pass through MN to the Mid-Continent.
Gulf Coast	Southeast TX, LA, MS, and AL	2,000 kbpd	Most of the Gulf Coast demand will be met by crude from other regions, so very little Bakken crude will pass through MN to the Gulf Coast.

Based on this study, the most likely markets for Bakken crude transported via Sandpiper are the Upper Midwest, Lower Midwest, and the East Coast, representing total demand for light crude of 1,500 to 1,900 kbpd.[4] The 700 kbpd demand from the Mid-Continent region also is a viable market.

Clearly then, potential demand for Bakken crude oil exists. Under the "No Action" alternative, up to 1,900 kbpd of Bakken crude could transit Minnesota by rail to reach these

[2] "Market Prospects and Benefits Analysis for the Sandpiper Project for North Dakota Pipeline Company, LLC," Muse Stancil, February 2014, pp. 18-22, attached as Exhibit 4 to the Petition for Declaratory Order of North Dakota Pipeline Company LLC, FERC Docket No. OR14-21 (Feb. 12, 2014).
[3] Ibid., pp. 17-22.
[4] Ibid., pp. 17-22.

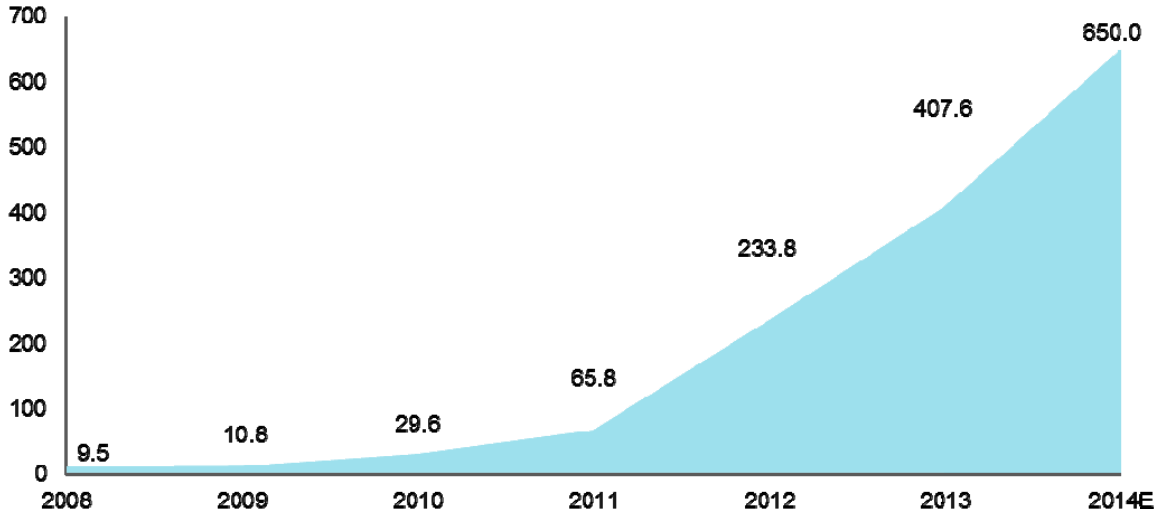
markets. With the approval of the Project, while rail would continue to be utilized for the movement of crude oil, the need for it would be diminished by the addition of pipeline capacity.

B. Crude Oil Movement by Rail

In 2008, U.S. Class I railroads, defined by the U.S. Surface Transportation Board ("STB") as those with $433.2 million or more in annual revenues,[5] transported just 9,500 carloads of crude oil. The seven Class I railroads in the United States are Burlington Northern Santa Fe ("BNSF"), Canadian National ("CN"), Canadian Pacific ("CP"), CSX Transportation ("CSX"), Kansas City Southern ("KCS"), Norfolk Southern ("NS"), and Union Pacific ("UP"). By 2013, the number of crude oil carloads transported by these railroads had increased to 407,642, representing growth of more than 4,190 percent in 5 years. The tally for 2014 is expected to be in the range of 650,000 carloads (Figure II-2).[6]

[5] The U.S. Surface Transportation Board defines railroads based on revenue and miles operated. Class I railroads have $433.2 million or more in annual revenues. Regional, or Class II, railroads have annual revenues of $40 million or more, or operate at least 350 miles with revenues of $20 million or more. Local railroads provide line haul services, but are neither a Class I nor a regional railroad. Terminal and switching railroads are non-Class I railroads engaged primarily in switching and terminal services for other railroads.
[6] "Moving Crude by Rail," Association of American Railroads (AAR), December 2013, p.1.

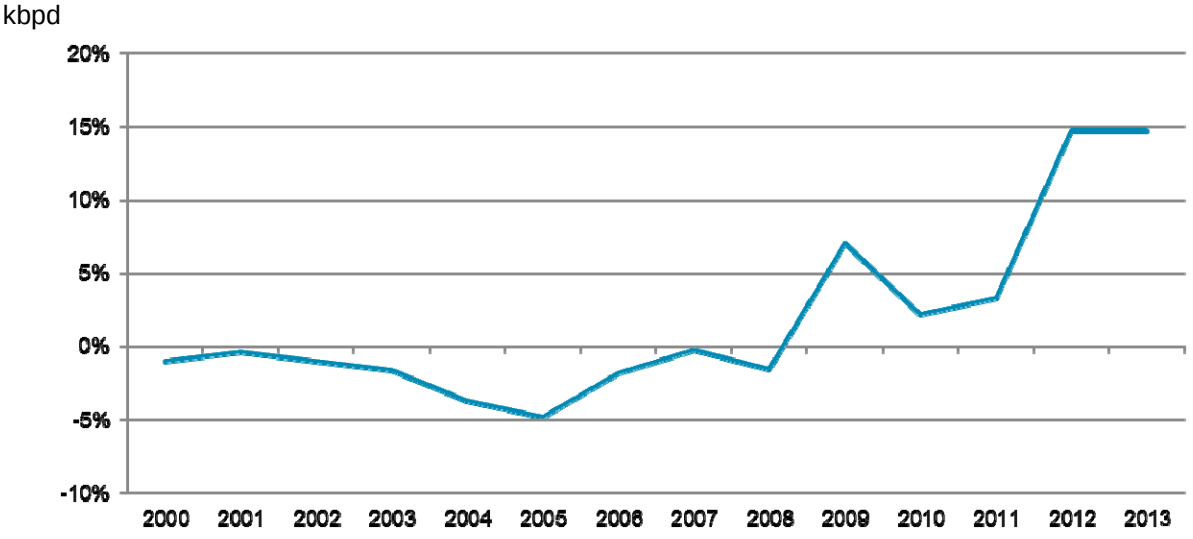
Figure II-2: Total U.S. Class I Originated Carloads of Crude Oil, 2008-2014E[7]
Thousands



The growth in crude-by-rail has mirrored the resurgence of U.S. domestic production of crude oil (Figure II-3), which has been spurred by new methods of crude oil extraction. This rapid increase (15 percent growth in both 2012 and 2013), has put pressure on all modes of transportation to keep pace with delivering this crude oil to meet demand at North American refineries. To do so, oil transport companies have invested hundreds of millions of dollars in capacity expansion, as exhibited by the current NDPC proposal to build the Project and by BNSF's plans to invest $400 million in North Dakota and another $120 million in Minnesota rail projects in 2014.[8]

[7] "Moving Crude by Rail," AAR, op. cit., p. 4 for 2008-2011 data; "AAR Reports Crude Oil Traffic up for 2013," AAR press release, March 13, 2014 for 2012-2013 data; "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress," Congressional Research Service, May 5, 2014, summary page for 2014 estimate.
[8] "BNSF 2014 Capital Spending Now in Full Swing: $1 Billion Going to Northern Corridor States," BNSF press release, May 1, 2014 (http://www.bnsf.com/media/news-releases/2014/may/2014-05-01a.html).

Figure II-3: Percentage Change in U.S. Field Production of Crude Oil from Prior Year, 2000-2013[9]



Despite a higher freight rate than pipelines for the movement of crude oil and despite being subject to service conditions that can impact reliability (such as weather and transport demand for other commodities), rail has proven to be a viable mode of transport for crude oil. Figure II-4 outlines some of the key differences between the movement of crude oil by rail and pipeline.

[9] "U.S. Field Production of Crude Oil," U.S. Energy Information Administration news release, May 29, 2014.

Figure II-4: Comparison of Pipeline and Rail Transport of Crude Oil[10]

Factor	Pipeline	Rail
Rate	• Approximately $5 per barrel, depending on the origin, destination, and type of crude	• Approximately $10-$15 per barrel, depending on the origin, destination, and type of crude
Reliability	• Pipelines provide nearly uninterrupted service, with no delays due to weather and other traffic.	• Railroads can experience service disruptions from weather; the winter of 2013-2014 caused severe service problems, as an example. • Service interruptions can occur during peak periods for other commodities; e.g., during grain harvests and retail inventory buildup for the holidays.
Transit Time	• Can take 40 days to move from North Dakota to the Gulf Coast/Atlantic Coast	• Requires 5-7 days to move from North Dakota to the Gulf Coast or the Atlantic Coast
Geographic Flexibility	• There are 57,000 miles of crude oil pipelines in the United States. • These pipelines connect production regions with destinations that have the most refining capacity (Midwest, Mid-Continent, and Gulf Coast).	• The railroads operate 140,000 route miles in the United States. • As they have greater geographic flexibility than pipelines, rail can serve refineries in most of the U.S., including the West Coast and East Coast, which are not connected to pipelines.
Contracts	• Typically 5, 10 or 15 years • Longer contracts are required to offset the high capital costs of installing a pipeline.	• Railroads will enter into 1 to 2 year contracts for the movement of crude.
Service Implementation	• It can take years for pipelines to obtain the necessary permits and construct the line prior to moving any oil.	• Railroads can quickly (in less than a year) increase line and terminal capacity on existing right-of-way. • There can be a delay in obtaining the necessary federal approval from the STB if building rail lines on new right-of-way. • Lead time is also required if additional tank cars or locomotives are required.

Where pipelines are available, they are the preferred mode of transportation for crude oil due to lower costs and more dependable service. Crude-by-rail movements will continue to occur, however, especially in areas where there is insufficient pipeline capacity or availability. And to the extent that pipeline project approvals are delayed, producers and refiners will be incented to develop additional rail projects; for example, high-speed rail unloaders capable of processing 230 kbpd have been installed at refineries in the Philadelphia area to receive shipments of Bakken crude.[11]

[10] Adapted from "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress," op. cit.
[11] "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress," op. cit., p. 5.

III. The Importance of Railroads in Minnesota

A. Key Sectors of Minnesota's Economy Are Dependent on Rail Service

Minnesota's rail network is of vital importance to the state, from extending the reach of Minnesota-based industries to helping alleviate congestion on state roadways. The Minnesota Statewide Rail Plan highlights the importance of rail transportation to the Minnesota economy:

> "Minnesota's railroads form a critical part of the State's multimodal transportation system. Many of the State's major industries rely on the rail system for efficient delivery of goods. The rail system is particularly critical in providing efficient connections to markets beyond the State's borders, throughout North America, and to the world through the seaports on the Pacific and Atlantic coasts, and the Great Lakes."[12]

Railroads originate $11.2 billion in goods in Minnesota and terminate $9.7 billion in goods.[13] The railroads bring raw materials into Minnesota factories, and haul finished products to markets throughout North America and to seaports for delivery to international markets. The railroads are also the primary source of transportation for moving Minnesota's bulk products, such as ore and grain. Metallic ores (mostly iron ore and taconite), for example, account for approximately 45 percent of tonnage loaded onto freight railroads in Minnesota in 2012.[14] A wide range of agricultural products also play a key role in Minnesota's economy: From 2006 to 2010, Minnesota ranked fourth in the U.S. for grain and oilseed production, with corn comprising 75

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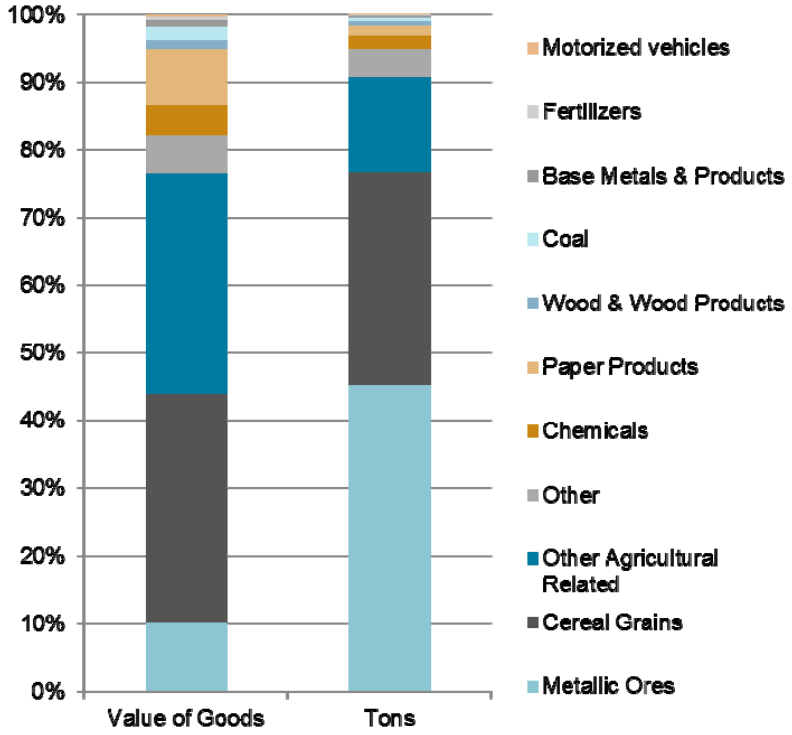
[12] "Minnesota Comprehensive Statewide Freight and Passenger Rail Plan, Final Report," Minnesota Department of Transportation (MN DOT), February 2010, pp. 1-2.
[13] Based on data extracted from the U.S. Department of Transportation Freight Analysis Framework Version 3.5.
[14] Freight Analysis Framework Data Tabulation Tool (http://faf.ornl.gov/fafweb/Extraction1.aspx).

percent of Minnesota crops.[15] Agricultural products in aggregate represent more than 40 percent of rail loadings,[16] with cereal grains[17] accounting for over 30 percent of rail tonnage originating in Minnesota in 2012. Figure III-1 provides an overview of the major rail-hauled commodities that originate in Minnesota in terms of the value and tonnage of goods. Metallic ores are a high-tonnage originating commodity that generates relatively low value; agricultural products and paper products account for a larger share of value than tonnage.

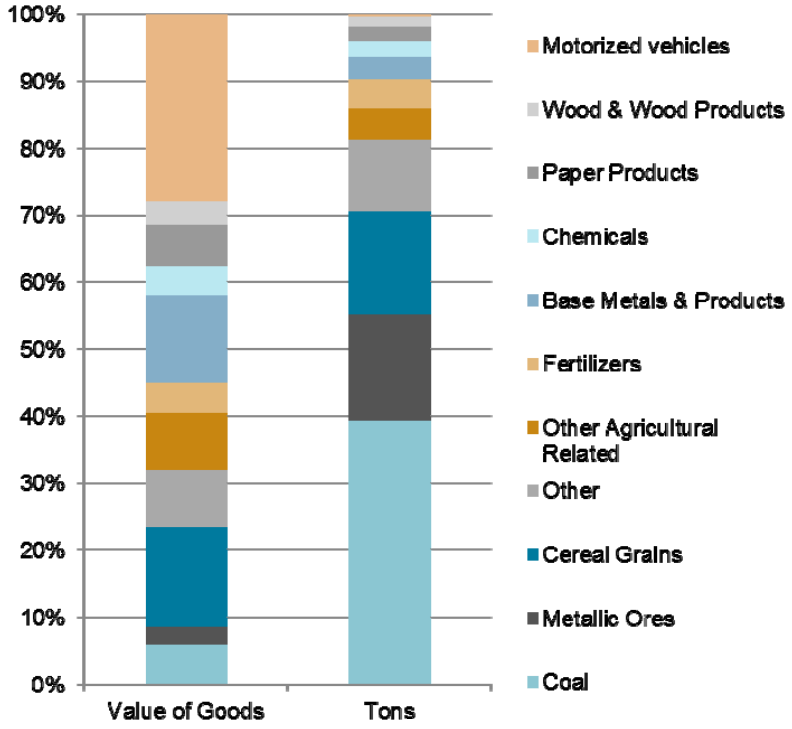
Figure III-1: Primary Rail Commodity Groups Originating in Minnesota[18]
Percent of total value and tons



[15] "Shipments of Grain by Rail in Minnesota," U.S. Department of Agriculture, January 2014, p.1.
[16] U.S. DOT Freight Analysis Framework Data Tabulation Tool, op. cit. Products include cereal grains, fertilizer, other agricultural products and foodstuffs, animal feed, and milled grain products.
[17] Including corn, barley, wheat, sorghum, and oats.
[18] U.S. DOT Freight Analysis Framework Version 3.5. The U.S. DOT Freight Analysis Framework contained no crude oil originations by rail in MN; crude oil only crosses the state by rail.

For rail trips with a destination in Minnesota, coal is the highest volume commodity, accounting for approximately 39 percent of tonnage. Metallic ores and cereal grains each represent approximately 15 percent of destination volumes. Cereal grains, when combined with other agriculturally related products, represent approximately 20 percent of destination rail tonnage in 2012. Figure III-2 provides an overview of the major rail-hauled commodities terminating in Minnesota in terms of the value and tonnage of goods. Coal is a high-tonnage terminating commodity that generates relatively low value, while motor vehicles generate a larger share of value than tonnage.

Figure III-2: Primary Rail Commodity Groups Terminating in Minnesota[19]
Percent of total value and tons

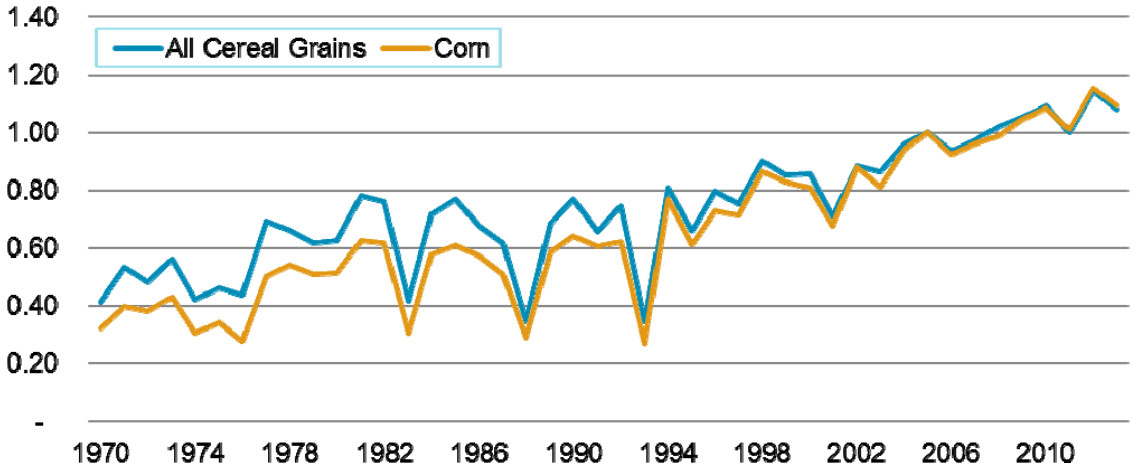


[19] U.S. DOT Freight Analysis Framework Version 3.5. The U.S. DOT Freight Analysis Framework contained no crude oil terminations by rail in MN; crude oil only crosses the state by rail.

Like any other form of transportation, rail is based on "derived demand;" how much and what kind of transportation services are needed depend on the types and amounts of economic activity in a given location. Railroads spend considerable effort on long-term forecasting to establish the capital allocation plans for growing capacity where need is projected to be the greatest, and also in short-term forecasting to establish the allocation of existing capacity. Despite the use of sophisticated computer-based models, this can be quite challenging due to fluctuations in demand.

For example, production of high-volume cereal grains in Minnesota has exhibited a steady increase over the past 40 years, as shown in Figure III-3, although the harvest can fluctuate greatly from year to year.

Figure III-3: Indexed Minnesota Production of Cereal Grains and Corn, 1970-2013[20]
2005 = 1.00



Not only does grain production vary from year to year, but it also varies from month to month, with harvest season causing a huge spike in demand for rail resources. Other commodities, such as the buildup of consumer goods prior to the holiday season, can exhibit similar demand

[20] National Agricultural Statistics Service, U.S. Department of Agriculture (http://quickstats.nass.usda.gov/).

volatility from year to year and month to month. The implications of fluctuating demand are that railroads in Minnesota, and around the world, must work constantly to balance changes in demand against available capacity. For geographically fixed assets such as grain elevators and track, delays can occur if available capacity is less than demand, a condition which the "No Action" scenario could exacerbate. Minnesota's agricultural businesses in particular require highly reliable and, at times, "on demand" rail freight service, as time-to-market and the ability to move product to meet price "windows" is crucial to Minnesota's competitiveness as an agricultural supplier to both domestic and export markets. As discussed in Section IV, added competition with crude oil on rail lines that are already near or above capacity is likely to reduce the effectiveness of this and other sectors of the Minnesota economy, in terms of delivering product on demand into high-value markets.

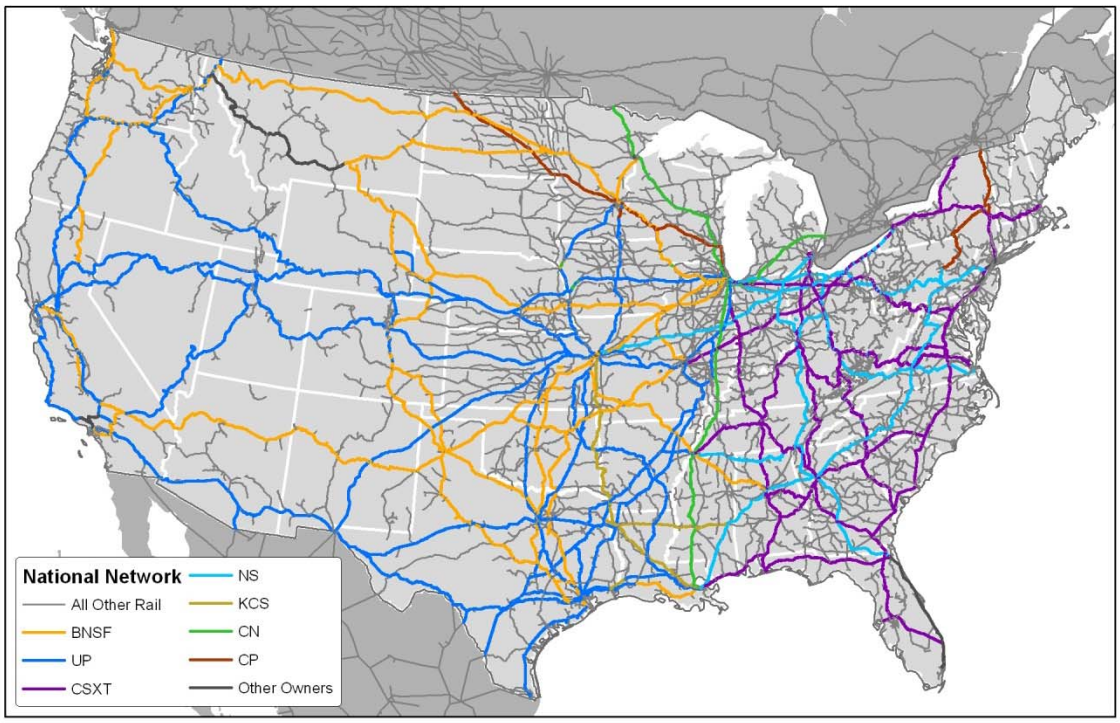
External factors, such as a harsh winter or flooding, also can impact rail capacity and can be felt across a wide range of rail customers. As an example, Northstar Commuter Rail Service experienced significant delays in January and February of 2014, with trains running as much as an hour late due to congestion on a rail line shared with freight in harsh winter weather conditions.[21] Given Minnesota's climate, these external factors can further exacerbate the negative impacts of growing competition among crude oil, other commodities, and passenger rail service on the industries and citizens of Minnesota.

[21] "Commuting on Northstar? Sorry, You've been BNSFed," *Minneapolis/St. Paul Business Journal*, February 25, 2014 (http://www.bizjournals.com/twincities/morning_roundup/2014/02/commuting-on-northstar-youve-been-bnsf.html).

B. National and Minnesota Freight Rail Network

There are over 570 railroads operating on nearly 140,000 miles of track in the United States, forming a highly interconnected system vital not only to Minnesota but to the entire country.[22] This is illustrated in Figure III-4, which shows that the rail network crosses all 48 continental states, Alaska (not shown), Canada, and Mexico.

Figure III-4: National Rail Freight Network and Primary Rail Freight Corridors[23]



In 2013, this rail network transported approximately 40 percent of the ton-miles (a measure of traffic defined as one ton of freight moved one mile) moved in the United States and impacted nearly every industry by hauling goods such as:[24]

- Intermodal containers and trailers, often filled with consumer goods: 12.8 million

[22] "Overview of America's Freight Railroads," AAR, April 2014.
[23] "National Rail Freight Infrastructure Capacity and Investment Study," AAR, September 2007, Figure 4.1.
[24] "Overview of America's Freight Railroads," op. cit. Quantities of goods moved are for the year 2013.

- Coal: 6.0 million carloads
- Plastics, fertilizers, and other chemicals: 2.4 million carloads
- Food products: 1.7 million carloads
- Motor vehicles and parts: 1.7 million carloads
- Farm products: 1.5 million carloads
- Lumber, paper, and other forest products: 1.3 million carloads
- Sand, stone, and gravel: 1.1 million carloads

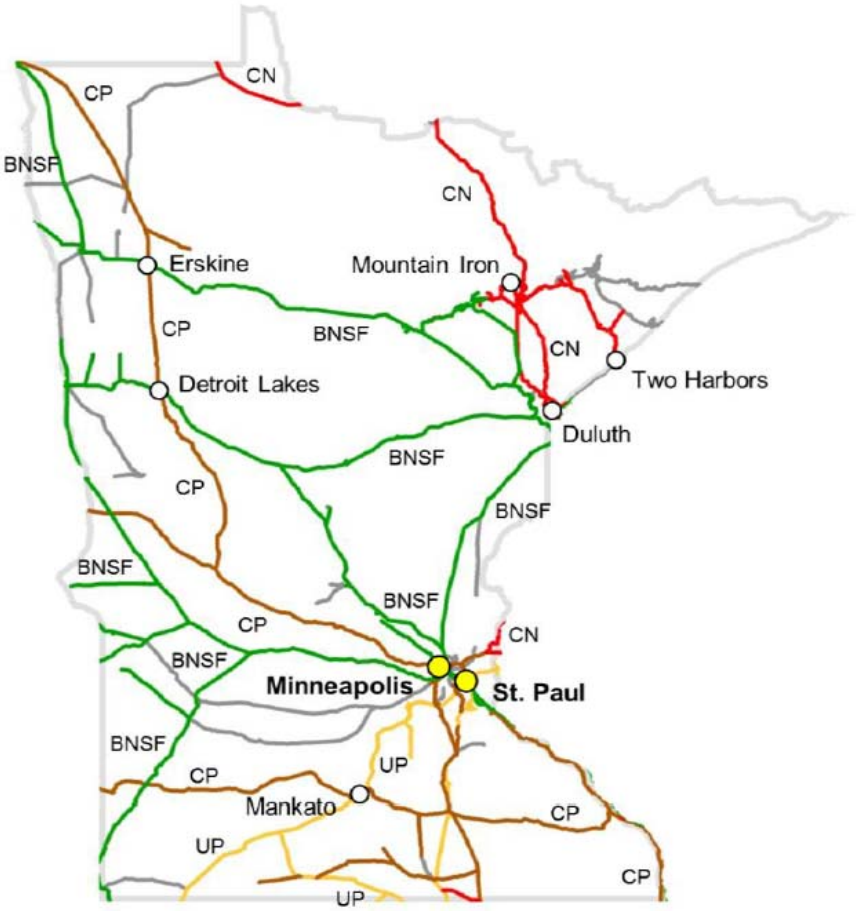
The rail network in Minnesota is not only critical to many Minnesota businesses, but due to the highly interconnected network, the Minnesota rail system is critical to businesses throughout North America, as goods pass through the state over primary national corridors.

There are 4,437 miles of rail lines in Minnesota, over which 18 freight railroad companies provide service to industries throughout the state.[25] These 18 railroads include four Class I railroads (BNSF, CN, CP and UP), one regional railroad (Red River Valley & Western), nine local railroads, and three switching and terminal railroads.[26] Amtrak's Empire Builder service and Northstar commuter passenger trains also share the network displayed in Figure III-5.

[25] "Freight Railroads in Minnesota," Rail Fast Facts for 2011, AAR.
[26] Note that the total sums to 17 rather than 18 as CN is counted as two railroads: It operates both a U.S. subsidiary (formerly the Grand Trunk) and a Canadian subsidiary in Minnesota.

Figure III-5: Railroad Map of Minnesota[27]

Class I railroads labeled. Regional, local, terminal, and switching railroads are shown in gray.



If the Project is denied, the most viable alternative for transporting the Bakken crude oil in a "No Action" scenario is rail, and the additional rail traffic would traverse Minnesota over key primary and secondary corridors. The addition of eastbound trains of crude oil and westbound trains of empty tank cars would contribute to congestion on Minnesota rail lines, potentially impacting other industries using these lines, unless railroads are able to spend even more of their revenues on capital projects to expand capacity.

[27] "Freight Railroads in Minnesota," op. cit.

C. Railroads Are Investing Record Amounts for Growth

Crude-by-rail growth will require more investment on the part of U.S. railroads, which are already one of the most capital intensive industries in the country, as they reinvest approximately 18 percent of revenues back into maintaining and expanding their infrastructure.[28] As of mid-March, the seven Class I railroads have planned over $17 billion in capital expenditures in 2014, as shown in Figure III-6:

Figure III-6: Class I Railroad Planned 2014 Capital Expenditures[29]

Railroad	Planned 2014 Capex (billions)	Change from 2013 Capex
BNSF	$5.0	16.3% increase
UP	$3.9	8.3% increase
CSX	$2.3	4.5% increase
CN	$2.2	5% increase
NS	$2.2	12% increase
CP	$1.3	Stable
KCS	$0.6	7% decrease

BNSF has announced that approximately $1 billion of its planned $5 billion investment in 2014 will improve and expand rail capacity in states along its Northern Corridor between the Pacific Northwest and Chicago. Carl Ice, president and chief executive officer of BNSF, has noted that these investments "are critical to expanding our capacity to support the region's rapidly growing economy, improving our ability to meet our customers' expectations, and ensuring our railroad remains the safest mode of ground transportation for freight."[30]

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[28] "Railroads will set another capex record in 2014. But will what they spend be enough?" *Progressive Railroading*, March 2014 (http://www.progressiverailroading.com/class_is/article/Railroads-will-set-another-capex-record-in-2014-But-will-what-they-spend-be-enough--39812).
[29] Ibid.
[30] "BNSF 2014 Capital Spending Now in Full Swing: $1 Billion Going to Northern Corridor States," op. cit.

BNSF plans to invest approximately $120 million in Minnesota to expand rail capacity, replace and maintain the network, and continue the implementation of positive train control ("PTC") technology.[31] Planned BNSF expansion projects in Minnesota include parking expansions at the St. Paul Intermodal Facility, adding track extensions in Gunn, and construction of a new siding and new interchange tracks close to the Canadian border near St. Vincent.[32] BNSF planned maintenance projects in Minnesota include the surfacing and undercutting of more than 600 miles of track, replacing about 72 miles of rail, and replacing more than 340,000 ties.

It is important to be aware that large portions of the railroads' planned capital expenditures are earmarked to maintain existing capacity (e.g., replace track and ties) and to continue implementing the federally mandated, multi-billion dollar PTC project. Unplanned traffic growth, as would be the case under a "No Action" scenario, is thus outside of current railroad capital expenditure plans. Railroads would need to find yet more capital beyond the planned $17 billion in 2014 to accommodate additional crude oil trains from the Bakken region moving through Minnesota.

[31] PTC is the next generation of railroad signaling systems, aimed at improving rail safety by preventing collisions between trains.
[32] "BNSF 2014 Capital Spending Now in Full Swing: $1 Billion Going to Northern Corridor States," op. cit.

IV. The Impact of Crude-by-Rail and the "No Action" Scenario on Minnesota

Given that demand for crude oil is unlikely to abate, under the "No Action" scenario, whereby the Project is not approved, rail would continue to be the most likely alternative mode of transportation. BNSF and CP both access loading facilities in the Bakken area and provide the most viable rail options to Superior and to connections with eastern railroads at Chicago.

If BNSF and/or CP transport Bakken crude oil that could otherwise move through the Project, this traffic would be in addition to traffic generated by increased demand for other commodities (grains, ores, chemicals, retail goods, etc.), continued growth in crude-by-rail from other sources, and existing and proposed passenger rail services.

A. Crude-by-Rail Volumes May Already Be Impacting Other Rail-Dependent Commodities, Passenger Trains, and Communities

Competing for rail resources with a rapidly growing crude oil industry may already be impacting key sectors of the Minnesota economy, in terms of delivering product to markets in a timely fashion. Details of these impacts can be found in the news today, as grain, coal, and other rail shippers believe that the combination of the recent harsh winter and railroad congestion (due in part to crude-by-rail shipments) has been responsible for an increase in supply chain delays. Passenger trains and communities also have experienced recent disruptions due to rail congestion. Given this situation, the likely impact of the "No Action" scenario, which would be to increase the number of crude-by-rail trains moving through Minnesota, must be given careful consideration.

The *current status* of freight railroads in Minnesota and the surrounding region illustrates the impact that increasing crude-by-rail transportation could have on other parts of the economy – a

situation the Project could mitigate or that a "No Action" decision could worsen. The following paragraphs, derived from recent news articles and a hearing before the STB in April 2014 on U.S. rail service issues (Ex Parte No. 724-1), summarize some of the impacts attributed to crude-by-rail transport at its *current* level in the region.

Cereal Crops/Grain Transport

- **Confirmed delays for grain trains:** The U.S. Department of Agriculture ("USDA") reported that BNSF grain train speeds had decreased by 15 percent in February 2014.[33] During January, grain unit trains from Minnesota or Iowa to the Pacific Northwest were taking up to 22 days, compared to a normal transit time of 12 days.[34] Grain carloads for 2013-2014 (Oct.-March) were reported to be about 42,000 carloads behind the 2009-2010 harvest and about 110,000 carloads behind the 2007-2008 harvest (both record harvests).[35] Recently, the executive director of the Minnesota Grain and Feed Association blamed crude oil shipments for increasing congestion in regional rail yards (such as St. Paul and Chicago), further delaying grain trains still working off this year's harvest.[36]

  In testimony before the STB, the USDA noted that the railroads had cited track work to expand future capacity, severe weather, and increased traffic from several commodities, including grain, coal, intermodal, and petroleum as reasons for the service delays.[37] Similarly, BNSF's Chief Marketing Officer noted that the growth in oil shipments out of

[33] Before the Surface Transportation Board (STB), Ex Parte No. 724-1, United States Rail Service Issues, U.S. Department of Agriculture (USDA) Comments (235838), April 10, 2014, p. 3.
[34] Ibid.
[35] Ibid.
[36] "Grain shipments still on hold," *Minneapolis Star Tribune*, op. cit.
[37] Before the STB, Ex Parte No. 724-1, USDA Comments (235838), op. cit., p. 3.

North Dakota's Bakken Field, combined with record harvests, increased containerized shipping, and surging coal demand had created delays.[38]

- **Reported/projected monetary loss due to delays:** In early May, according to the *Wall Street Journal*, U.S. senators representing Minnesota, North Dakota, and South Dakota asked regulators to "push the railroad companies to step up grain shipments," noting that if the situation did not improve "some farmers faced financial hardship due to their inability to market their crops."[39] In July, a report released by the University of Minnesota Center for Farm Financial Management estimated that rail delays, attributed to increased oil shipments and a harsh winter, cost Minnesota corn, soybean, and wheat growers a total of $99.3 million for the period of March to May 2014 alone.[40] In addition, the report estimated remaining corn in on-farm storage was worth $122 million less because of rail bottlenecks. Similarly, North Dakota State University estimated that farmers in that state lost $67 million in revenue from January to May due to delayed rail shipments of grain and soybeans,[41] with a further $100 million loss predicted before the end of 2014.[42]
- **Delays causing buyers to turn elsewhere – or loss of contracts:** Bill Gordon, Minnesota Soybean Association President, related to the STB during the April 10 hearing that Chinese buyers, who purchase a large percentage of U.S. soybeans, had turned to South American producers because U.S. farmers were not getting their crops to market.[43] Similarly, Wheaton-Dumont Elevator, which has elevators in Harkinson, Wheaton, and Campbell, Minnesota,

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[38] "Rail Execs Deny Any Preference for Crude," *Minneapolis Star Tribune*, April 10, 2014 (http://www.startribune.com/business/254835671.html).
[39] "Where's the Fertilizer? Some Farmers Grow Worried," *Wall Street Journal*, May 13, 2014.
[40] "Report: Rail shipping delays cost Minnesota corn, soybean, wheat farmers nearly $100 million," *Minneapolis Star Tribune*, July 10, 2014 (http://www.startribune.com/local/266600701.html).
[41] "Where's the Fertilizer? Some Farmers Grow Worried," op. cit.
[42] "Dakota Resource Council to protest oil transport, rail congestion," *Grand Forks Herald*, July 22, 2014.
[43] "Rail Execs Deny Any Preference for Crude," op. cit.

and is one of the largest shippers of agricultural products in the area, reported having to buy back some of its contracts because of a lack of railcars arriving on time, cutting outgoing shipments from 600 a month to 300-400 a month.[44]

- **Grain car supply issues:** The USDA reported to the STB that the secondary railcar market for empty grain cars had set new records in December through March, with shippers paying up to $6,000 per empty grain car delivery or approximately $1.65 per bushel. It was the USDA's opinion that this could make U.S. grain less competitive in world markets and reduce the amount of revenue earned by producers.[45]

  According to the Montana Farmer's Union, BNSF's MT Rail Equipment Summary of March 31, 2014 showed that the total number of non-shuttle covered hopper orders for Montana was 3,369 cars past due for an average of 28.3 days.[46] In a March 28, 2014 podcast, a BNSF representative reported that the railroad would have limited ability that season to pre-position cars in preparation for the winter wheat harvest, meaning that farmers would not have cars immediately available to ship grain.[47]

- **Grain storage issues:** According to a July *Star Tribune* article, "Minnesota farmers and grain elevator operators are worried about millions of bushels of corn and soybeans from 2013 that still haven't shipped, even as this year's crop is in the ground. An overburdened rail system has backlogged grain car orders and delayed grain shipments for months, and some of the worst problems are in Minnesota and the Dakotas."[48] The STB even has taken the step of

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[44] "Crude oil causes shipping delays," *Walpeton, ND-Breckenridge MN Daily News*, May 19, 2014 (http://www.wahpetondailynews.com/news/article_25e23cd8-ddc5-11e3-a3f3-001a4bcf887a.html).
[45] Before the STB, Ex Parte No. 724-1, USDA Comments (235838), op. cit., p. 2.
[46] A "non-shuttle covered hopper" refers to railcars used to haul grain (covered hoppers), which are operating as individual cars rather than in large dedicated blocks of cars.
[47] Before the STB, Ex Parte No. 724-1, MFU Comments (235844), op. cit., pp. 1-2.
[48] "Grain shipments still on hold as railroads struggle to keep up," *Minneapolis Star Tribune*, July 2014.

ordering the railroads serving the region to provide specific plans and schedules, with weekly updates, to ensure that all of last year's grain gets shipped before the next harvest.[49]

- **Missing grain export windows and increased demurrage charges:** Recently, a grain ship (the *Federal Mattawa*) had to wait from May 19 to June 10 at the Port of Duluth for grain to arrive by train. This was reportedly symptomatic of shortages of grain at various terminals in the Twin Ports, the result of rail congestion and weather issues delaying grain cars.[50] According to the USDA, some grain shippers had reported either paying ocean vessel demurrage charges, estimated between $30,000 and $50,000 per day ($0.07 to $0.11 cents per bushel), or missing vessels that departed before the delayed grain shipments could be loaded.[51]

Coal Transport

The Western Coal Traffic League ("WCTL") submitted comments to the STB expressing concerns about rail's ability to deliver coal, both now and in the coming summer months.[52] Rail service issues, according to the WCTL, had led to low coal stockpiles, cost/price increases (to protect coal stockpiles and replace reduced coal-fired generation), and a lack of railroad-provided cars for shippers.[53]

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[49]"Grain shipments still on hold," op. cit.; "STB orders rail companies to deliver weekly reports on grain car delays," *AgWeek*, June 23, 2014 (http://www.agweek.com/event/article/id/23571).
[50] "Trains Take Longer to Get to Destination and Back," *DTN Progressive Farmer*, June 13, 2014.
[51] Before the STB, Ex Parte No. 724-1, USDA Comments (235838), op. cit., p. 2.
[52] Before the STB, Ex Parte No. 724-1, United States Rail Service Issues, Western Coal Traffic League (WCTL) Comments (235923), March 13, 2014, p. 1.
[53] Ibid., p. 2.

Xcel Energy's Sherco power plant in Becker, MN, supplies nearly one-quarter of the electricity to a five-state region. According to the *Grand Forks Herald*, the Sherco plant saw its rail deliveries of western coal cut to barely half the normal flow in the first quarter of 2014.[54]

At their April 2014 meeting, members of the Federal Energy Regulatory Commission ("FERC") voiced their concern that "a tight rail system, events during the winter and increasing crude shipments on some lines" were disrupting coal deliveries to utilities in the Upper Midwest, including Minnesota.[55] David McMillan, an official with Minnesota Power, told the Commission at the meeting that coal stockpiles still were "precariously low," requiring coal to be trucked in and leading to higher electricity costs.[56]

Fertilizer Transport

Another concern expressed by the farming community is the need to ensure fertilizer supplies are available in time for spring planting. Dave Andresen, who leads a farmer's cooperative in South Dakota, reported that suppliers were having difficulties delivering product, and that without a quick improvement in rail service, only two-thirds of required product might be available. [57] In mid-April, the STB took the step of requiring the railroads serving the Upper Midwest to report weekly for six weeks (through May 30) on their progress in delivering fertilizer to the region, to ensure the backlog was resolved. Mosaic, a Minneapolis-based company and one of largest fertilizer producers in the world, reported being "hundreds of

[54] "The Oil Boom's Spillover," op. cit.
[55] "FERC officials raise concerns over coal shipments in U.S. Upper Midwest," *Platts*, April 17, 2014 (http://www.platts.com/latest-news/coal/washington/ferc-officials-raise-concerns-over-coal-shipments-21505390).
[56] Ibid.
[57] "Rail Execs Deny Any Preference for Crude," op. cit.

thousands of tons behind" in spring fertilizer shipments at one point, and saw a 43 percent decline in first-quarter 2014 earnings.[58]

Transport for Other Commodities

Ethanol makers also have reported delays due to being unable to secure railcars for transport. This has led in some cases to scaling back production and idling plants. Corn Plus, one of the first ethanol plants in Minnesota, reported slow and unpredictable returns of its own railcars by the railroad through March.[59] Redfield Energy, LLC of South Dakota reported a $1 million loss in revenue so far this year due to rail transport issues.[60]

Similarly, American Crystal Sugar, a major cooperative with facilities in Minnesota, reported delays in the rail shipment of coal to sugar processing plants and in receiving railcars for sugar transport during the first quarter of the year.[61]

Passenger Trains

D. J. Stadtler, Vice President of Operations at Amtrak, described in his testimony before the STB delays reported in FY 2014, especially for the Empire Builder route through St. Paul, Minnesota. Stadtler noted that the Empire Builder intercity rail service reaches an area that does not have a parallel interstate highway system or intercity bus service, and limited essential air service. In the first quarter of FY 2014, nearly 100,000 Empire Builder passengers arrived late at their destinations, and as of July 2014, Empire Builder trains had been on time only 21 percent of

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[58] "Where's the Fertilizer? Some Farmers Grow Worried," op. cit.
[59] "Rail delays hurt energy and commodities," *Minneapolis Star Tribune*, March 21, 2014 (http://www.startribune.com/business/251623281.html).
[60] "Where's the Fertilizer? Some Farmers Grow Worried," op. cit.
[61] "Farmers, elevators fume at costly grain train delays; oil trains to blame?" *MPR News*, March 26, 2014 (http://www.mprnews.org/story/2014/03/26/business/train-delays).

the time in the previous 12 months.[62]According to Stadtler, freight train interference rates had nearly tripled and delays were of longer duration on the Empire Builder run, leading to a year-over-year falloff of 15 percent in ridership and ticket revenues.[63] Longer and more frequent delays on the Northstar Commuter Rail line due to stalled freight traffic also have been reported.[64]

Communities

Trains blocking intersections and disrupting traffic is a significant concern for communities, as this can lead to economic disruption and adversely impact quality of life. In Buffalo, Minnesota, for example, according to an April *Star Tribune* article, freight trains, which "residents believe are longer and more numerous than ever thanks to the North Dakota oil boom, have increasingly been blocking intersections, cutting off the city's north side from its south side and sending drivers scrambling sometimes out of town to find an open crossing."[65] The article reported similar problems with blocked tracks and traffic disruptions in Coon Rapids and Rockford. The situation has gone on long enough that as of June 2014, police in Benson, Minnesota began ticketing trains that block streets longer than state law allows.[66] Delays in 2013 were reported to be averaging 45 minutes, versus a state law maximum of 10 minutes. In Benson, because the rail line bisects the town, there is a concern that not only are trains blocking motorists, but they could impede emergency vehicles and fire trucks.

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[62] Before the STB, Ex Parte No. 724-1, United States Rail Service Issues, Testimony of D.J. Stadtler, Vice President of Operations, Amtrak (201404), April 10, 2014, p. 4; "Empire Builder Blues," *MPR News*, July 10, 2014 (http://blogs.mprnews.org/newscut/2014/07/empire-builder-blues-oil-trains-kill-amtrak-schedule).
[63] Before the STB, Ex Parte No. 724-1, Stadtler Testimony (201404), op. cit., p. 5.
[64] Before the STB, Ex Parte No. 724-1, United States Rail Service Issues, Senator Al Franken Comments (235874), April 14, 2014, p. 1.
[65] "Buffalo Grows Impatient with North Dakota Oil Boom Trains," *Minneapolis Star Tribune*, April 16, 2014.
[66] "Minnesota town issues traffic tickets to BNSF railroad," KARE11.com, June 11, 2014.

B. Under the "No Action" Scenario, Bakken Crude Oil Will Continue to Move Through Minnesota by Rail

Should the Project not be approved, refineries will need to rely on rail services to transport the crude necessary to meet their feedstock requirements. Taking no action on expanding pipeline capacity would in essence mean approving the rail transportation of this crude oil from the Bakken region through Minnesota to Superior and/or Chicago.

For the purposes of illustrating the potential impact on rail capacity in Minnesota of crude oil movements under the "No Action" scenario, the following assumptions were made:

- The Bakken area originations on BNSF will be at Tioga, North Dakota.
- The Bakken area originations on CP will be at New Town, North Dakota.
- In a "No Action" scenario, the total volume moved by rail will be 375 kbpd. Of this, 225 kbpd will originate in North Dakota, and the remaining 150 kbpd will move through an existing NDPC pipeline to Clearbrook, MN, from which point it will access the railroads. It is possible that rail could be used for the entire 375 kbpd from North Dakota, but the existing pipeline will likely be used to reduce transportation costs.
- The Project, if approved, will move the crude oil to Superior, where it will likely be distributed through existing pipelines to refineries. Under the "No Action" scenario, rail may move this crude to Superior for distribution, or rail may move the crude to the Chicago area, where it can interchange with other railroads for distribution to refineries. Therefore, both Superior and Chicago are considered as rail destinations in the "No Action" scenario. While Superior is a logical interchange location for crude oil moving to other pipelines, Chicago is a more logical rail interchange due to the large number of railroads serving the Chicago area.
- The short distances from Clearbrook to Superior (209 miles on BNSF and 282 on CP) could allow the crude oil to move by truck rather than rail. A truck can haul 200 to 250 barrels

each, so using an average of 225 barrels per truck would require 667 loaded trucks per day and another 667 empty trucks back to Clearbrook from Superior. These 1,300 trucks would require a departure approximately every minute, 24 hours per day, 365 days per year. Thus, there are practical limitations on the trucking option, and short haul rail shuttle service is more likely to be used.

- The destinations of Superior, Wisconsin and Western Avenue in Chicago represent locations where the crude oil can be either transferred into existing pipelines or interchange with eastern railroads for movement to refineries in the Midwest, Mid-Continent, Eastern Canada, and the Eastern United States.

Establishing which rail routes would be used between crude oil loading points and the Superior and Chicago destinations involves several considerations. First, there is the question of whether one or more railroads must be involved in a specific movement:

- If the railroad that picks up the shipment from the shipper, known as the "originating railroad," also serves the destination (i.e., the refinery), then the railroad generally will move the shipment directly from the origination point to the destination point. This is known as "single-line" service.
- If the originating railroad does not serve the destination, then it will haul the traffic as far as it can, and then hand off the traffic to the railroad that does serve the destination. This is known as an "interchange" or "interchange service." Routes with the fewest interchanges are generally used, since these routes tend to have lower costs and a higher probability of on-time delivery.

In addition, a number of rail line characteristics that impact shipping time and safety must be considered in determining how traffic is routed, such as distance, maximum allowable speed,

track quality, available track capacity, and type of signaling control system.[67] Current discussions between the rail industry and the U.S. Department of Transportation may lead to additional guidelines to minimize risks to population centers and environmentally sensitive areas, which would impact the routes available to crude-by-rail shipments.

BNSF and CP are the two originators of crude oil traffic in North Dakota, and both can deliver shipments to Superior and Chicago. Under a "No Action" scenario, the most likely rail routes that would be used are described and illustrated in Figures IV-1 through IV-7:

- Figure IV-1 provides a high-level description of the routes and their distances from North Dakota to Superior and Chicago on BNSF and CP.
- Figures IV-2 and IV-3 illustrate these routes for BNSF and CP, respectively.
- Detailed descriptions of the actual lines used by BNSF through Minnesota are shown in Figure IV-4 and described in Figure IV-5. The numbers on the map in Figure IV-4 correspond to the numbers for each line segment in the table in Figure IV-5. Each line segment description includes a definition, length, signal type, speed limit, existing freight and passenger trains per day, and current level of service ("LOS").
- Figures IV-6 and IV-7 are the corresponding map and description for the CP line segments in Minnesota. While the BNSF has direct access into Superior, CP must operate on track owned by BNSF (through what are known as "trackage rights") from Erskine to Superior and from the Twin Cities to Superior.

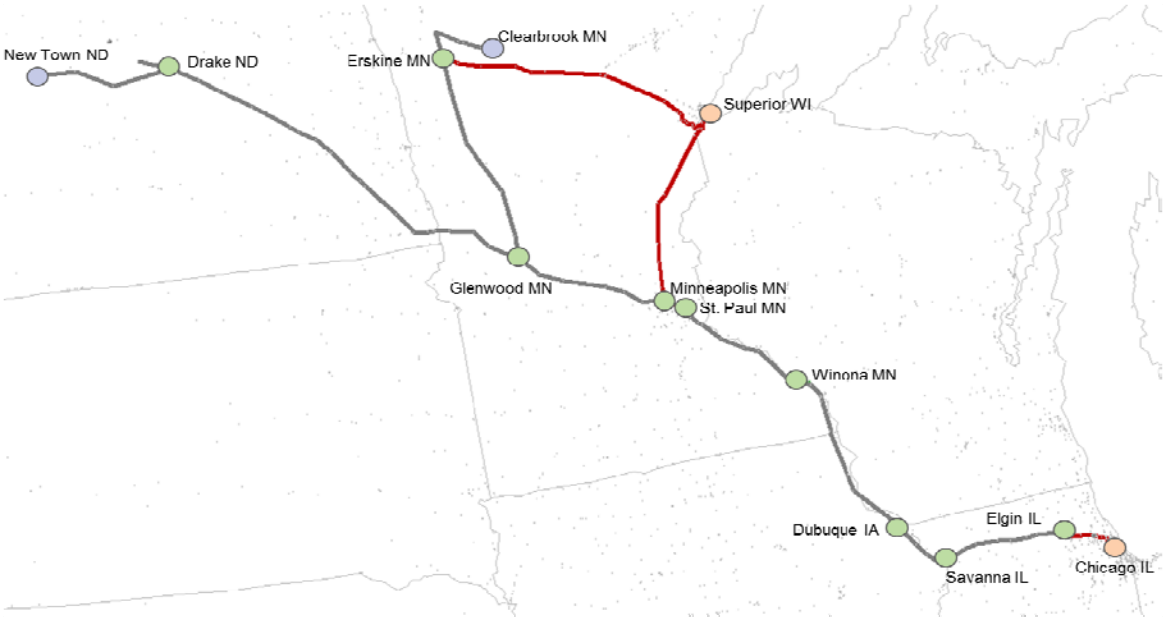
[67] There are three types of signaling control systems in use: No signal, otherwise known as "dark territory;" automatic block signaling ("ABS"); and, centralized traffic control ("CTC"). Dark territory has the lowest capacity, while lines with CTC have the most capacity. Positive train control ("PTC") is the next generation of signal system; it is being installed as an overlay on the existing signal system specifically to prevent train collisions, and as such will not increase capacity.

Figure IV-1: Rail Routes from Bakken Through Minnesota to Superior and Chicago

Origin	Destination	Burlington Northern Santa Fe (BNSF)	Canadian Pacific (CP)
Bakken Region, North Dakota	Superior, WI	Tioga to Superior via Grand Forks, Bagley, Schley and Brookston (577 miles)	New Town to Superior via Glenwood, Minneapolis and north using trackage rights on the BNSF (671 miles)
Clearbrook, MN	Superior, WI	Clearbrook to Superior via Bagley, Schley, and Brookston. A new 11 mile line is required from Clearbrook to Bagley. (209 miles)	Clearbrook to Superior via Erskine and then via BNSF trackage rights via Bagley, Schley, and Brookston. A new 11 mile line is required from Clearbrook west to the CP line. (282 miles)
Bakken Region, North Dakota	Chicago Area	Tioga to Western Avenue (Chicago). There are multiple options, but the two most likely are 1) via Fargo, Staples, and Minneapolis (988 miles) and 2) via Fargo, Willmar, and Minneapolis. (998 miles).	New Town to Western Avenue (Chicago) via Glenwood and Minneapolis (975 miles)
Clearbrook, MN	Chicago Area	Clearbrook to Western Avenue (Chicago) via Bagley toward Superior and then on BNSF line south through Coon Creek and Minneapolis. A new 11 mile line is required from Clearbrook to Bagley. (772 miles)	Clearbrook to Western Avenue (Chicago) via Erskine, Glenwood, and Minneapolis. A new 11 mile line is required from Clearbrook west to the CP line. (769 miles)

Figure IV-2: BNSF Routes from Tioga, ND to Superior, WI and Chicago, IL[68]
Note: Connection into Clearbrook, MN would need to be constructed

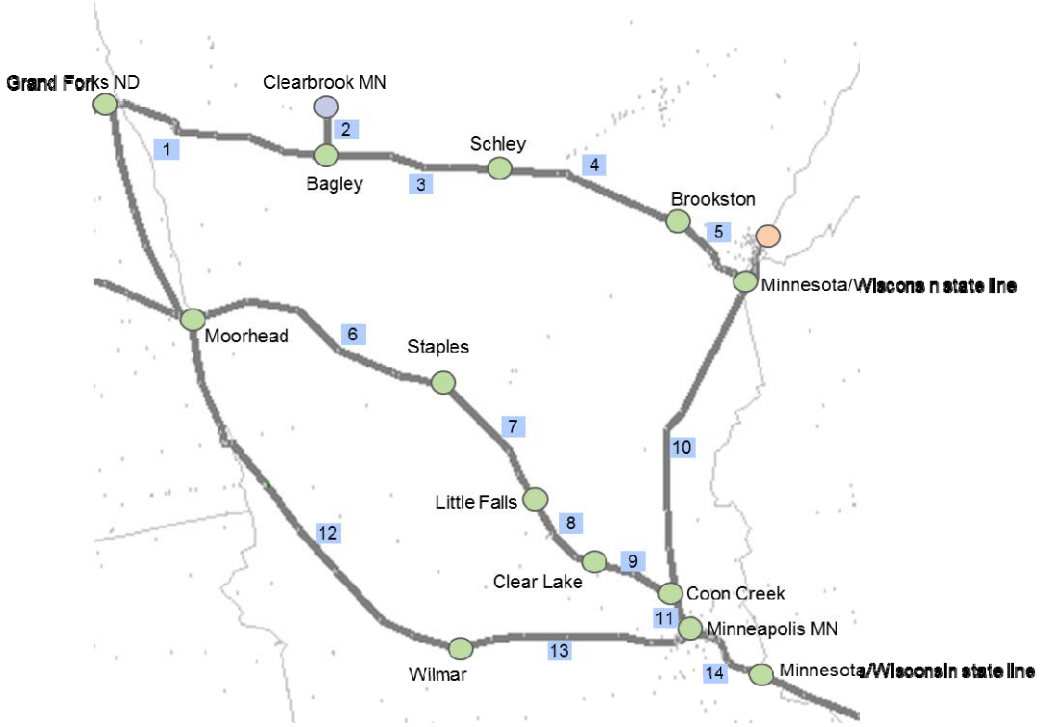
Figure IV-3: CP Routes from New Town, ND to Superior, WI and Chicago, IL[69]
Note: Connection to Clearbrook, MN would need to be constructed. Lines in red are trackage rights on routes owned by BNSF



[68] Map generated by Oliver Wyman using Oak Ridge National Laboratory railroad network and Oliver Wyman's MultiRail software.
[69] Ibid.

Figure IV-4: Minnesota Portion of BNSF Routes from Tioga, ND to Superior, WI and Chicago, IL[70]

Note: Connection into Clearbrook, MN would need to be constructed



[70] Ibid.

Figure IV-5: BNSF Likely Rail Routes for Crude Oil Through Minnesota[71]

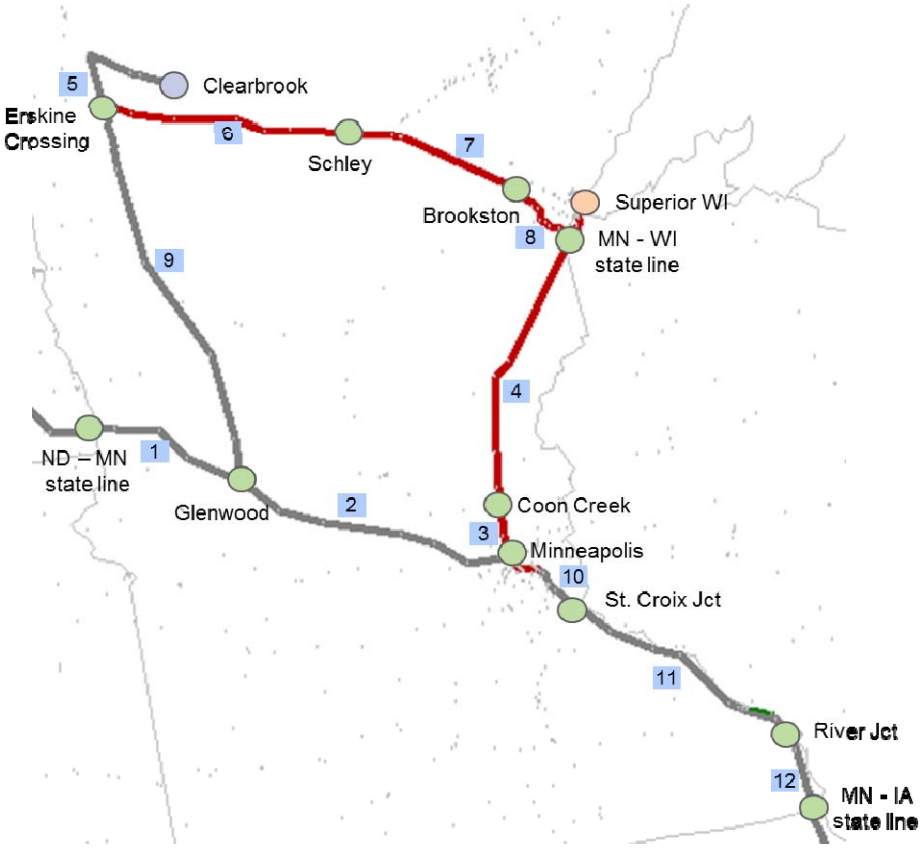
	Route Segments
1	Segment definition: BNSF line from North Dakota state line near Grand Forks to Bagley Length/type:91 miles of 74 miles of single track dark territory and 16 miles of single track ABS Speed limit: 49 mph Freight trains/day: 6-10, passenger trains/day: 0 Service level: B
2	Segment definition: BNSF line required between Clearbrook and Bagley (new construction) Length/type: 11 miles of single track dark territory Speed limit: 10 mph Freight trains/day: 0, passenger trains/day: 0 Service level: A
3	Segment definition: BNSF line between Bagley and Schley Length/type: 50 miles of single track with dark territory Speed limit: 49 mph Freight trains/day: 6, passenger trains/day: 0 Service level: B
4	Segment definition: BNSF line between Schley and Brookston Length/type: 96 miles with single track CTC Speed limit: 25-50 mph Freight trains/day: 6, passenger trains/day: 0 Service level: A
5	Segment definition: BNSF line from Brookston to Wisconsin state line toward Superior Length/type: 33 miles of single track CTC Speed limit: 35-50 Freight trains/day:19, passenger trains/day: 0 Service level: C
6	Segment definition: BNSF line from Moorhead to Staples Length/type: 109 miles double track ABS Speed limit: 60-75 mph Freight trains/day: 56, passenger trains/day: 2 Service level: E
7	Segment definition: BNSF line from Staples to Little Falls Length/type: 33 miles of single track CTC Speed limit: 25-79 mph Freight trains/day: 40, passenger trains/day: 2 Service level: E

[71] Freight trains per day from "Minnesota Freight Railroad Map," MN DOT, Office of Freight and Commercial Vehicle Operations, May 2013. Level of service from "Minnesota Comprehensive Statewide Freight and Passenger Rail Plan, op. cit., Figure 4.2, pp. 4-5. Distances calculated by Oliver Wyman from the Oak Ridge National Laboratories railroad networks. Passenger trains from the Northstar and the Amtrak timetables, accessed online.

Route Segments	
8	Segment definition: BNSF line between Little Falls and Clear Lake Length/type: 43 miles of double track with ABS (24 miles) and CTC (19) Speed limit: 75 mph Freight trains/day: 40, passenger trains/day:2 Service level: D
9	Segment definition: BNSF line between Clear Lake and Coon Creek Length/type: 42 miles of double track with ABS (18 miles) and CTC (24 mi) Speed limit: 75 mph Freight trains/day: 40, passenger trains/day: 14 (2 Amtrak – 12 Commuter on weekdays) Service level: E
10	Segment definition: BNSF line between Wisconsin state line and Coon Creek Length/type: 112 miles with single track ABS Speed limit: 50 mph Freight trains/day: 14; Passenger trains/day: 0 Service level: D
11	Segment definition: BNSF line Coon Creek to Minneapolis Length/type: 10 miles of double track CTC Speed limit: 30 mph Freight trains/day: 49, passenger trains/day: 14 (2 Amtrak & 12 Commuter on weekdays) Service level: E
12	Segment definition: BNSF line from Moorhead to Wilmer Yard Length/type: 159 miles single track with ABS (46 mi) and CTC (112 mi) Speed limit: 40 mph Freight trains/day: 11, passenger trains/day: 0 Service level: C
13	Segment definition: BNSF line from Willmar Yard to Minneapolis Length/type:92 miles consisting of 86 miles of single track with ABS (9 mi) and CTC (76 mi) and 6 miles of double track ABS Speed limit: 40 mph Freight trains/day: 17, passenger trains/day: 0 Service level: C
14	Segment definition: BNSF line between Minneapolis through St. Paul to the Wisconsin state line to the south. This line is used by multiple railroads. Length/type: 30 miles of double track CTC Speed limit: 70 mph Freight trains/day: 49, passenger trains/day: 2 Service level: C

Figure IV-6: Minnesota Portion of CP Routes from New Town, ND to Superior, WI and Chicago, IL[72]

Note: Connection to Clearbrook, MN would need to be constructed. Lines in red are trackage rights on routes owned by BNSF



[72] Map generated by Oliver Wyman using Oak Ridge National Laboratory railroad network and Oliver Wyman's MultiRail software.

Figure IV-7: CP Likely Rail Routes for Crude Oil Through Minnesota [73]

	Route Segments
1	Segment definition: CP line between North Dakota state line east to Glenwood Length/type: 67 miles of single track with no signals (i.e., "dark territory") Speed limit: 49 mph Freight trains/day: 12, passenger trains/day: 0 Service level: D
2	Segment definition: CP line from Glenwood to Minneapolis Length/type: 120 miles of single track CTC. Speed limit: 25 to 60 Freight trains/day: 20; passenger trains/day: 0 Service level: C
3	Segment definition: BNSF line with CP Trackage between Minneapolis and Coon Creek (same as BNSF segment 11) Length/type: 10 miles of double track CTC Speed limit: 30 mph Freight trains/day: 49, passenger trains/day: 14 (2 Amtrak and 12 commuter on weekdays) Service level: E
4	Segment definition: BNSF line with CP Trackage rights between Coon Creek and Wisconsin state line (approaching Superior) (same as BNSF segment 10) Length/type: 112 miles with single track ABS Speed limit: 50 mph, Freight trains/day: 14; Passenger trains/day: 0 Service level: D
5	Segment definition: CP line between Clearbrook and Erskine Crossing – requires the construction of approximately 11 miles between Clearbrook and Gully Length/type: 51 miles of single track dark territory Speed limit: 10-40 mph Freight trains/day: 9, passenger trains/day: 0 Service level: C
6	Segment definition: BNSF line with CP trackage rights line between Erskine Crossing and Schley (contains elements of BNSF segments 1 & 3) Length/type: 84 miles of single track dark territory Speed limit: 49 mph Freight trains/day: 6, passenger trains/day: 0 Service level: B
7	Segment definition: BNSF line with CP trackage rights between Schley and Brookston (same as BNSF segment 4) Length/type: 96 miles with single track CTC Speed limit: 50 mph Freight trains/day: 6, passenger trains/day: 0 Service level: A

[73] Freight trains per day from "Minnesota Freight Railroad Map," op. cit. Level of service from "Minnesota Comprehensive Statewide Freight and Passenger Rail Plan," op. cit., Figure 4.2, pp. 4-5. Distances calculated by Oliver Wyman from the Oak Ridge National Laboratories railroad networks. Passenger trains from the Northstar and the Amtrak timetables, accessed online.

Route Segments	
8	Segment definition: BNSF line with CP trackage rights, between Brookston and Wisconsin state line (toward Superior) (same as BNSF segment 5) Length/type: 33 miles of single track CTC Speed limit: 35 – 50 mph Freight trains/day:19, passenger trains/day: 0 Service level: C
9	Segment definition: CP line between Erskine Crossing and Glenwood Length/type: 170 miles of single track dark territory Speed limit: 40 mph Freight trains/day: 9, passenger trains/day: 0 Service level: C
10	Segment definition: CP on combination of CP and joint lines between Minneapolis and St. Croix Jct Length/type: 30 miles of double track CTC Speed limit: 70 mph Freight trains/day: 49, passenger trains/day: 0 Service level: C
11	Segment definition: CP line St. Croix Jct and River Jct. Length/type: 107 miles with single track CTC Speed: 40-79 mph Freight trains/day: 26, passenger trains/day: 2 Service level: E
12	Segment definition: CP line between River Jct. and the Iowa state line Length/type: 25 miles single track dark territory Speed limit: 25-30 mph Freight trains/day: 9, passenger trains/day: 0 Service level: C

C. Impacts on Rail Transportation in Minnesota Under the "No Action" Scenario

Just as a highway can become congested at rush hour due to too many people needing to arrive at work at the same time, a rail line can become congested when there are more trains that need to use it to meet shipper demand than there is available capacity. The Minnesota State Rail Plan includes information on the current level of congestion on rail lines in the state. It uses a calculation called "level of service" or LOS to determine how congested a particular line or line segment may be. (LOS is determined by dividing the volume of trains on a line by the line's

practical capacity).[74] In the Minnesota State Rail Plan, the level of congestion is then expressed by a letter, from A to F, as shown in Figure IV-8.[75] A LOS of D, E, or F means that a line is becoming too congested; that is, there are too many trains running on the line compared to available capacity, which could result in slowdowns and service failures. Such congestion indicates that the line needs capital investment to expand capacity, or it may be necessary to reduce the number of trains if service impacts become too severe.

Figure IV-8: Minnesota State Rail Plan: Rail Line Level of Service Definitions[76]

Level of Service (LOS)	Ratio of Train Volume to Practical Capacity
A	0.0 – 0.2
B	0.2 – 0.4
C	0.4 – 0.7
D	0.7 – 0.8
E	0.8 – 1.0
F	>1.0

Figures IV-5 and IV-7 above provided the *current* level of service for the rail line segments in Minnesota that would likely move the crude oil in a "No Action" scenario. That information is repeated in Figures IV-9 and IV-10, along with the *projected* level of service after inclusion of the additional loaded and empty crude oil trains expected in the "No Action" scenario.

[74] Practical capacity refers to the number of trains that can be expected to operate on a given line segment, as opposed to theoretical capacity, which is the maximum number that can be moved over a line segment. Practical capacity is about 70 percent of theoretical capacity, which allows for recovery from events such as bad weather, mechanical problems, scheduled maintenance, etc.
[75] "Minnesota Comprehensive Statewide Freight and Passenger Rail Plan, Final Report," op. cit., p. 4-4 and Figure 4-2.
[76] Ibid., Figure 4-2.

Figure IV-9 provides the level of service for lines if crude oil movement should terminate in Superior, Wisconsin. The top part of Figure IV-9 assumes that BNSF moves the crude oil, while the bottom part assumes that CP moves the crude.

- Green shading (LOS of A, B, or C) indicates that the rail line is operating under capacity and there are no congestion problems.
- Orange shading (LOS D or E) indicates that the traffic is approaching the capacity limit and the line cannot accommodate more trains without additional investment or increased train delays.
- Red shading (LOS F) means that the line is exceeding the design capacity and will require capital investment to return it to a more fluid operating condition.

Figure IV-9: Projected Level of Service for Rail Lines in Minnesota with Movement of Bakken Crude Oil to Superior, WI[77]

RR	Segment	Origin	Miles	Capacity trains/day	Volume trains/day	Current LOS	Additional Trains/Day Regular	New LOS	Additional Trains/Day Restricted	Restricted LOS
BNSF	1	North Dakota	91	16	6	B	6	D	8	E
BNSF	2	Clearbrook	11	16	0	A	4	B	6	B
BNSF	3	Both	50	16	6	B	10	F	14	F
BNSF	4	Both	96	30	6	A	10	C	14	C
BNSF	5	Both	33	30	19	C	10	E	14	F
CP	1	North Dakota	67	16	12	D	6	F	8	F
CP	2	North Dakota	121	30	20	C	6	E	8	E
CP	3	North Dakota	10	75	63	E	6	E	8	E
CP	4	North Dakota	112	18	14	D	6	F	8	F
CP	5	Clearbrook	51	16	9	C	4	E	6	E
CP	6	Clearbrook	84	16	6	B	4	C	6	D
CP	7	Clearbrook	96	30	6	A	4	B	6	B
CP	8	Clearbrook	33	30	19	C	4	D	6	E

BNSF Segment 1in Figure IV-9 is the 91-mile section from the North Dakota/Minnesota state line near Grand Forks to Bagley. This segment has a capacity of 16 trains per day and a current

[77] Oak Ridge National Labs Rail Network, May 6, 2010;"National Rail Freight Infrastructure and Investment Study," op. cit., pp. 4-7 and 4-8; "Minnesota Comprehensive Statewide Freight and Passenger Rail Plan," op. cit., pp. 4-5 and 4-6; "Minnesota Freight Railroad Map," op. cit.; *Professional Railroad Atlas of North America*, DeskMap System, Inc., Fourth Edition, 2012.

volume of 6 trains per day, and currently is not congested. During normal operations, the 225 kbpd of crude oil from Tioga, North Dakota could be moved in 6 daily trains (3 loaded and 3 empty); during more restricted operations (i.e., shorter train lengths in cold weather), 8 additional trains per day would be required.[78] Therefore, communities along this line, such as Bagley, would see a doubling of the number of trains passing through their towns.

Segment 2 on BNSF is the newly constructed 11-mile line connecting Clearbrook to the BNSF track. This new line has no existing traffic, and would pick up 4 trains per day under regular operations, or 6 trains per day under restricted operations, from the 150 kbpd of oil transported by the existing NDPC pipeline serving the current Clearbrook terminal. Segments 3 through 5 on BNSF would haul both the North Dakota and Clearbrook traffic, for a total of 375 kbpd.

If the CP were to haul the crude oil under the "No Action" scenario, the route between North Dakota and Superior would have no overlap with the route from Clearbrook to Superior.

Figure IV-10 provides a similar analysis, assuming that the crude oil moves from North Dakota and Clearbrook to the Chicago area. The BNSF route through Moorhead and Willmar is less congested than the route through Staples, therefore BNSF is more likely to use this route for the additional crude-by-rail traffic in the "No Action" scenario. The Willmar route is shown for BNSF in Figure IV-10.

[78] For "regular operations" three loaded trains would each haul 114 tank cars. During restricted operations, four loaded trains would each haul 85 tank cars.

Figure IV-10: Level of Service for Rail Lines in Minnesota for Bakken Crude Oil to Chicago, IL[79]

RR	Segment	Origin	Miles	Capacity trains/day	Volume trains/day	Current LOS	Additional Trains/Day Regular	New LOS	Additional Trains/Day Restricted	Restricted LOS
BNSF	12	North Dakota	159	25	11	C	6	C	8	D
BNSF	13	North Dakota	92	30	17	C	6	D	8	E
BNSF	2	Clearbrook	11	16	0	A	4	B	6	B
BNSF	3	Clearbrook	50	16	6	B	4	C	6	D
BNSF	4	Clearbrook	96	30	6	A	4	B	6	C
BNSF	5	Clearbrook	33	30	19	C	4	D	6	E
BNSF	10	Clearbrook	112	18	14	D	4	F	6	F
BNSF	11	Clearbrook	10	75	63	E	4	E	6	E
BNSF	14	Both	30	75	51	C	10	E	14	E
CP	1	North Dakota	67	16	11	C	6	F	8	F
CP	9	Clearbrook	170	16	9	C	4	E	6	E
CP	2	Both	120	30	20	C	10	F	14	F
CP	10	Both	30	75	51	C	10	E	14	E
CP	11	Both	107	30	28	E	10	F	14	F
CP	12	Both	25	16	9	C	10	F	14	F

Figure IV-11 shows the mileage for each of the rail routes, summarized by the current level of congestion and the projected level of congestion under the "regular" and "restricted" assumptions for additional crude oil traffic. The BNSF route into Superior operates below capacity for the entire 282 miles in Minnesota, but with the addition of the crude oil on Sandpiper, 124 miles would be near capacity and 50 miles would be too congested for sustained service. During "restricted" service in cold weather, track operating over capacity would increase to 84 miles on BNSF into Superior.

[79] Oak Ridge National Labs Rail Network, May 6, 2010;"National Rail Freight Infrastructure and Investment Study," op. cit., pp. 4-7 and 4-8; "Minnesota Comprehensive Statewide Freight and Passenger Rail Plan," op. cit., pp. 4-5 and 4-6; "Minnesota Freight Railroad Map," op. cit.; *Professional Railroad Atlas of North America*, op. cit.

Figure IV-11: Change in Level of Service on Rail Lines Impacted by "No Action" Scenarios

Returning the rail lines to their current level of service would involve capital investments in construction projects to increase capacity, such as:

- Adding signals to dark territory lines to safely allow more trains per day and higher operating speeds
- Adding safety enhancements at road-rail grade crossings where operational speeds are increased
- Adding sidings (locations where one train can wait while an opposing train passes) or a second track on some sections of lines

D. Route Profiles: Environmental Areas, Waterways, and Grade Crossings

Unlike pipelines, which are typically buried underground and out of public view, trains can be seen operating through towns, traversing waterways, blocking roadways at grade crossings, and passing by environmentally sensitive and recreational areas. Over one million people, approximately 20 percent of Minnesota's 2013 population, live in cities and towns that are transited by rail lines included in the potential crude-by-rail routes identified in the "No Action" scenario. The sizes of the cities and towns involved vary from populations under 100 to the cities and suburbs of the Minneapolis-St. Paul metropolitan area. Three of the four potential rail routes transit portions of the Minneapolis-St. Paul area.

Throughout Minnesota, it is common for automobile drivers to cross railroad tracks on their daily drives and sometimes to be stopped waiting for a train at one of the more than 4,500 public road-rail at-grade crossings in the state.[80] In 2013, there were 53 road-rail crossing accidents in the state, resulting in six fatalities and 26 injuries. As a result, Minnesota ranks 15th in the nation for the highest number of road-rail crossing accidents and 12th for fatalities and injuries resulting from such accidents.[81] The fault usually lies with the automobile driver, who tries to cross the tracks not realizing that a fully loaded freight train traveling at 50 miles per hour can take up to 1.5 miles to come to a complete stop.[82] The four routes that could be used in a "No Action" scenario pass a combined 1,800 at-grade crossings.

Another facet of railroad integration into our natural and built environments is track proximity to waterways and open spaces. As with highways, railroad tracks cross waterways either via

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[80] "Railroads in Minnesota," MN DOT (http://www.dot.state.mn.us/ofrw/railroad/railroad.html).
[81] "Rail safety and education in Minnesota," MN DOT (http://www.dot.state.mn.us/ofrw/railroad/safety.html), based on FRA data.
[82] Ibid.

bridges or over culverts. For the northern rail routes, the rail lines cross various branches of the Mississippi River and tributaries. Rail shipments entering into Minneapolis from the west cross the Mississippi River, and if going to Chicago, cross it again when exiting the suburbs south of St. Paul.

Finally, the identified rail routes traverse or adjoin various public lands, including Glacial Ridge National Wildlife Refuge, the Mississippi National River and Recreation area, national and state forests, state parks, state wildlife management areas, and state nature areas, as well as numerous recreational areas.

Figure IV-12 provides a summary profile for each of the potential "No Action" rail routes defined in the previous section, and Figures IV-13 through IV-20 provide maps and tables with further details.

Figure IV-12: Summary of Route Profiles

Route (MN Portion Only)	Environmental Areas	Waterway Crossings	Population Exposure	At-Grade Crossings	Incidents at Crossings (Avg. Annual)
BNSF – Superior	8	17	68,331	347	1.2
BNSF – Chicago	8	39	1,031,017	686	5.2
CP – Superior	9	33	787,770	719	6.4
CP-Chicago	9	46	1,017,905	824	6.4

The definitions for each of the columns in Figure IV-12 are as follows:

- **Route (Minnesota portion only)**: The route is defined by the railroad and the destination. BNSF-Superior refers to the Minnesota portion of the route on BNSF that originates in North Dakota and at Clearbrook and runs to Superior, WI.
- **Environmental areas:** A count of the natural areas or open spaces traversed by or adjoining potential crude-by-rail routes. These environmental areas include a national wildlife refuge, a national river and recreation area, national and state forests, state parks, state wildlife

management areas, and state nature areas. Figure IV-12 does not include recreational areas such as city parks and golf courses; however, these are noted in the detailed exhibits that follow.[83]

- **Waterway crossings:** A count of the waterways crossed by potential crude-by-rail routes. These include rivers, creeks, tributaries to named waterways, and channels between lakes. Lakes which are adjacent to but not traversed by the defined rail segments are excluded.[84]
- **Population exposure:** 2013 population estimate for cities and towns that are traversed by potential crude-by-rail routes.[85]
- **At-grade crossings:** The count of road-rail at-grade crossings on potential crude-by-rail lines. Grade-separated crossings, which are above or below the highway or pedestrian walkway, are excluded.[86]
- **Incidents at crossings (average annual):** The average annual number of highway crossing accidents/incidents reported to the Federal Railroad Administration ("FRA") for the 5-year period of 2009-2013 for the at-grade crossings included in the at-grade crossing count.[87]

Figure IV-13 provides a schematic of the BNSF route from the North Dakota/Minnesota state line at Grand Forks to the Minnesota/Wisconsin state line near Superior. Green call-out boxes on the schematic contain the names of potentially sensitive environmental areas adjacent to the rail

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[83] Oliver Wyman analysis using Google Maps (https://maps.google.com).
[84] Ibid.
[85] Incorporated Places and Minor Civil Divisions Datasets: Subcounty Resident Population Estimates, U.S. Census Bureau, Population Division, May 2014 (http://www.census.gov/popest/data/cities/totals/2013/SUB-EST2013.html); Oliver Wyman analysis to assign to route segments.
[86]Highway-Rail Crossing Inventory database, U.S. DOT, FRA, Office of Safety (http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Downloaddbf.aspx); Oliver Wyman analysis to assign to route segments.
[87] Highway-Rail Grade Crossing Accident/Incident database (2009 – 2013), U.S. DOT, FRA, Office of Safety (http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/on_the_fly_download.aspx); Oliver Wyman analysis to assign to route segments.

route; blue call-out boxes contain the names of waterways which would be crossed by crude-by-rail trains in a "No Action" scenario. Figures IV-15, IV-17, and IV-19 provide similar schematics for the BNSF to Chicago, CP to Superior, and CP to Chicago routes, respectively.

Figure IV-13: Environmental Areas and Waterway Crossings Along the BNSF Route to Superior, WI[88]

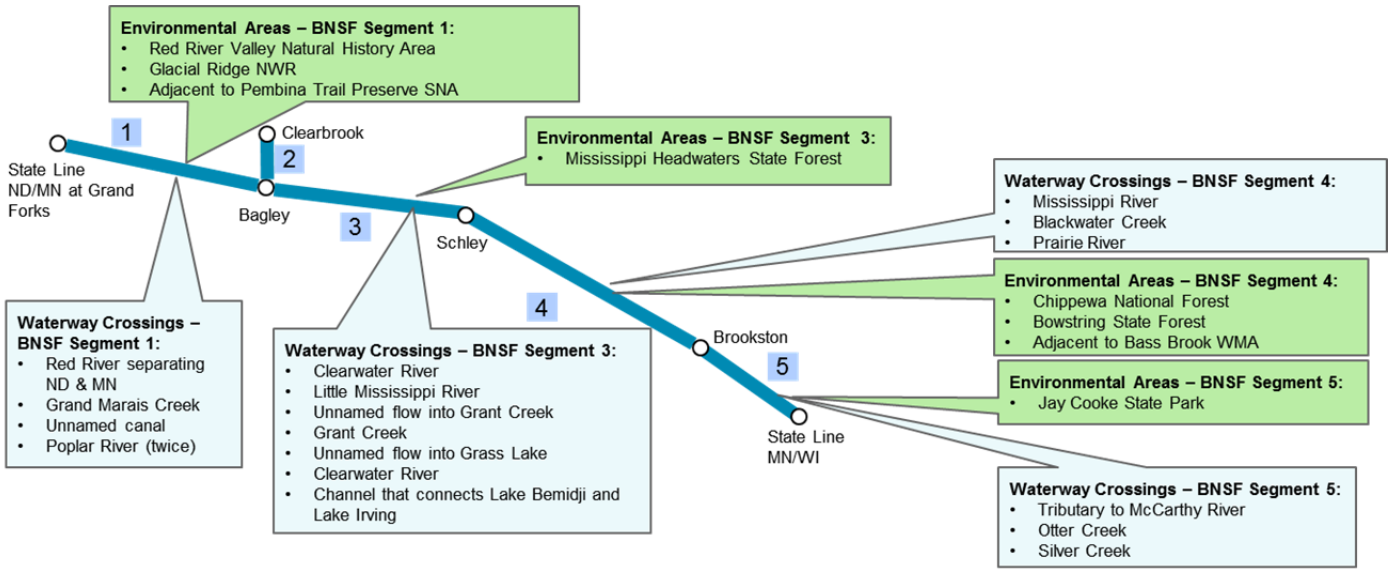


Figure IV-14 provides the details by route segment for the number of cities, total population, smallest and largest city, number of at-grade crossings, number of incidents, number of injuries, and number of fatalities for the projected BNSF route into Superior, Wisconsin under the "No Action" scenario. Figures IV-16, IV-18, and IV-20 contain similar tables for the BNSF to Chicago, CP to Superior, and CP to Chicago routes, respectively. Note that to avoid double counting of population, the population for a town was assigned to the first segment reaching the town. The population for Brookston, for example, is included in the Schley to Brookston segment and not the Brookston to Minnesota/Wisconsin state line segment.

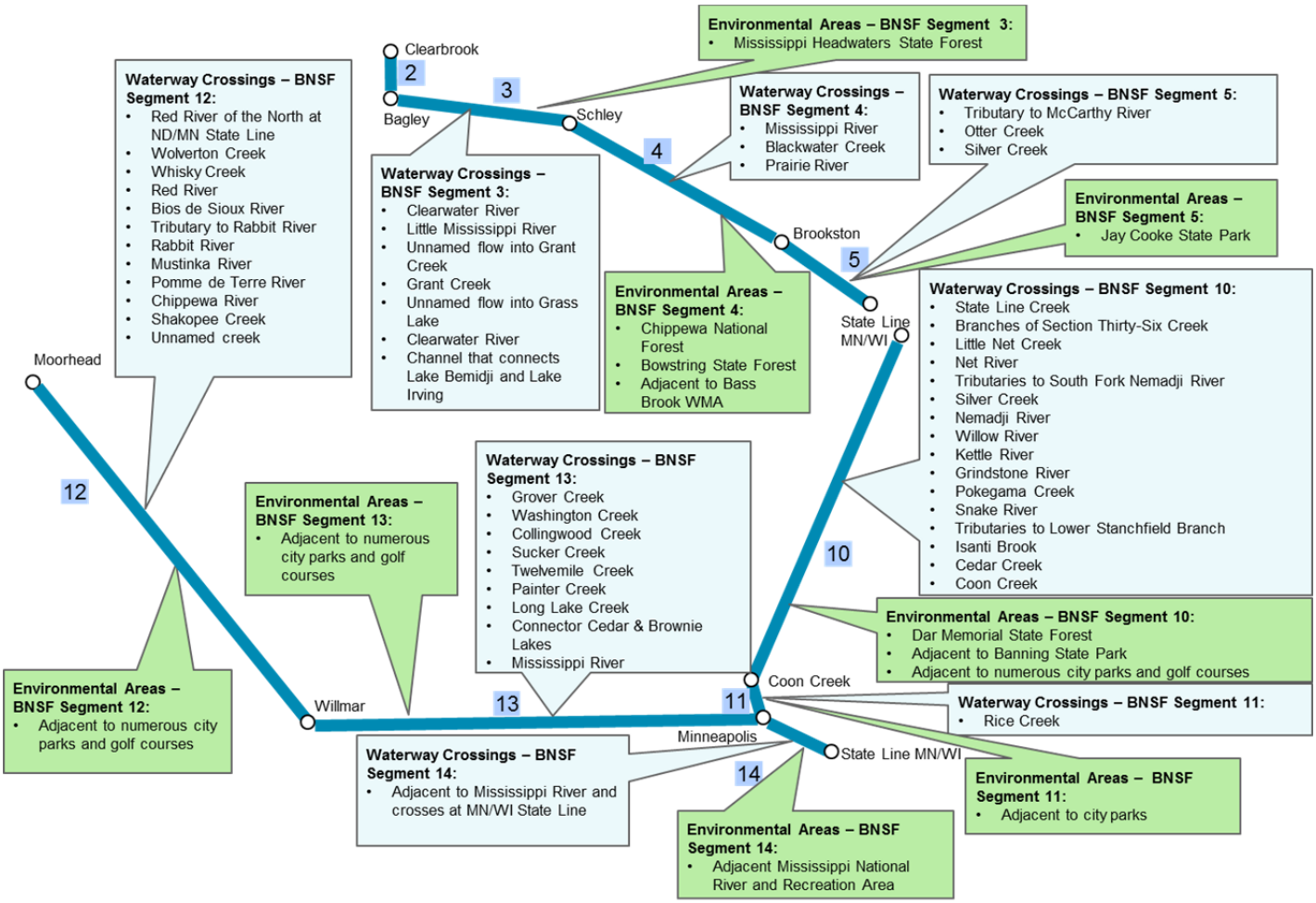
[88] Oliver Wyman analysis using Google Maps (https://maps.google.com).

Figure IV-14: Towns and Grade Crossings Along the BNSF Route to Superior, WI[89]

Segment	Number of cities/ towns along rail line	Total population for cities/ towns along rail line	Pop. of smallest city/town	Pop. of largest city/town	At-grade crossings	Incidents at crossings (2009-13)	Injuries (2009-13)	Fatalities (2009-13)
1 – ND/MN State Line to Bagley	9	21,194	86	8,602	150	2	3	0
2 – Clearbrook to Bagley	1	526	-	-	-	-	-	-
3 – Bagley to Schley	5	15,712	99	14,435	55	2	1	0
4 – Schley to Brookston	10	16,613	78	10,989	108	2	2	0
5 – Brookston to MN/WI State Line	14	14,286	391	12,050	34	0	0	0

[89] Cities and towns were identified using: "Minnesota Freight Railroad Map," op. cit.; Oak Ridge National Labs Rail Network, May 6, 2010; *Professional Railroad Atlas of North America*, op. cit.; "Division Map," BNSF Engineering Services, August 12, 2000; Bartlett & West from data provided by BNSF Engineering Systems GIS, "BNSF Railway System Map," June 2011; "North American Rail Network Map," CP, February 2012; *Road Atlas*, Rand McNally, 2006; *Comprehensive Railroad Atlas of North America, Great Lakes West*, Steam Powered Publishing, Kent, U.K., 1996, pp. 42 and 52; Google Maps (https://maps.google.com).Grade crossings, incidents, injuries, and fatalities were obtained from the FRA accident/incident data detailed in the footnotes for the Figure IV-12 column descriptions.

Figure IV-15: Environmental Areas and Waterway Crossings Along the BNSF Route to Chicago, IL[90]



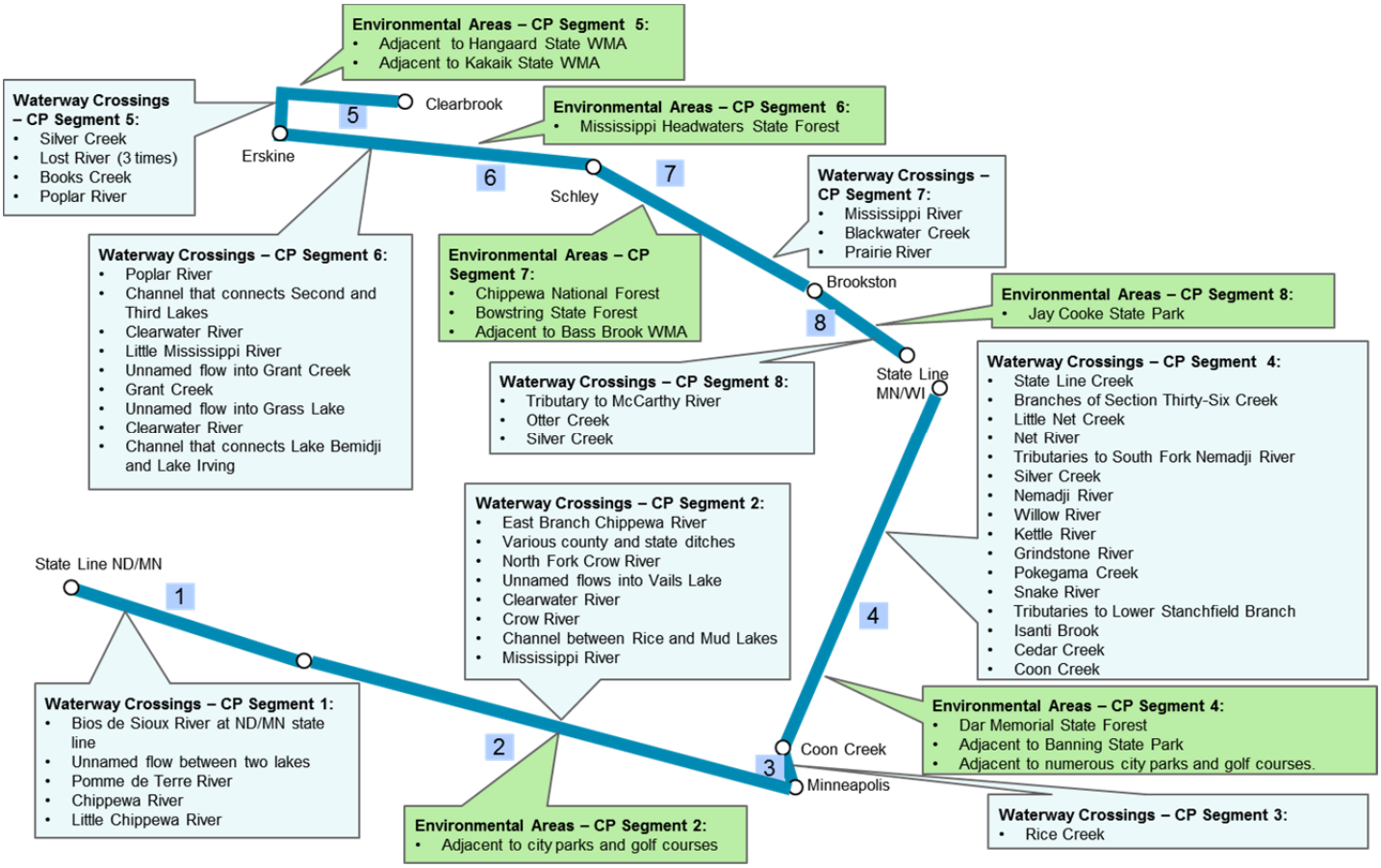
[90] Oliver Wyman analysis using Google Maps (https://maps.google.com).

Figure IV-16: Towns and Grade Crossings Along the BNSF Route to Chicago, IL[91]

Segment	Number of cities/ towns along rail line	Total population for cities/ towns along rail line	Pop. of smallest city/town	Pop. of largest city/town	At-grade crossings	Incidents at crossings (2009-13)	Injuries (2009-13)	Fatalities (2009-13)
12 – Moorhead to Willmar	16	70,106	55	39,398	193	7	2	2
13 – Willmar to Minneapolis	17	85,750	343	47,411	103	4	4	0
2 – Clearbrook to Bagley	1	526	-	-	-	-	-	-
3 – Bagley to Schley	5	15,712	99	14,435	55	2	1	0
4 – Schley to Brookston	10	16,613	78	10,989	108	2	2	0
5 – Brookston to MN/WI State Line	14	14,286	391	12,050	34	0	0	0
10 - WI/MN State Line to Coon Creek	19	124,114	64	62,013	166	8	7	1
11 – Coon Creek to Minneapolis	3	447,411	19, 674	400,700	7	3	1	0
14 – Minneapolis – MN/WI State Line	3	303,636	3,441	294,873	20	0	0	0

[91] Same sources as footnoted for Figure IV-14.

Figure IV-17: Environmental Areas and Waterway Crossings Along the CP Route to Superior, WI[92]



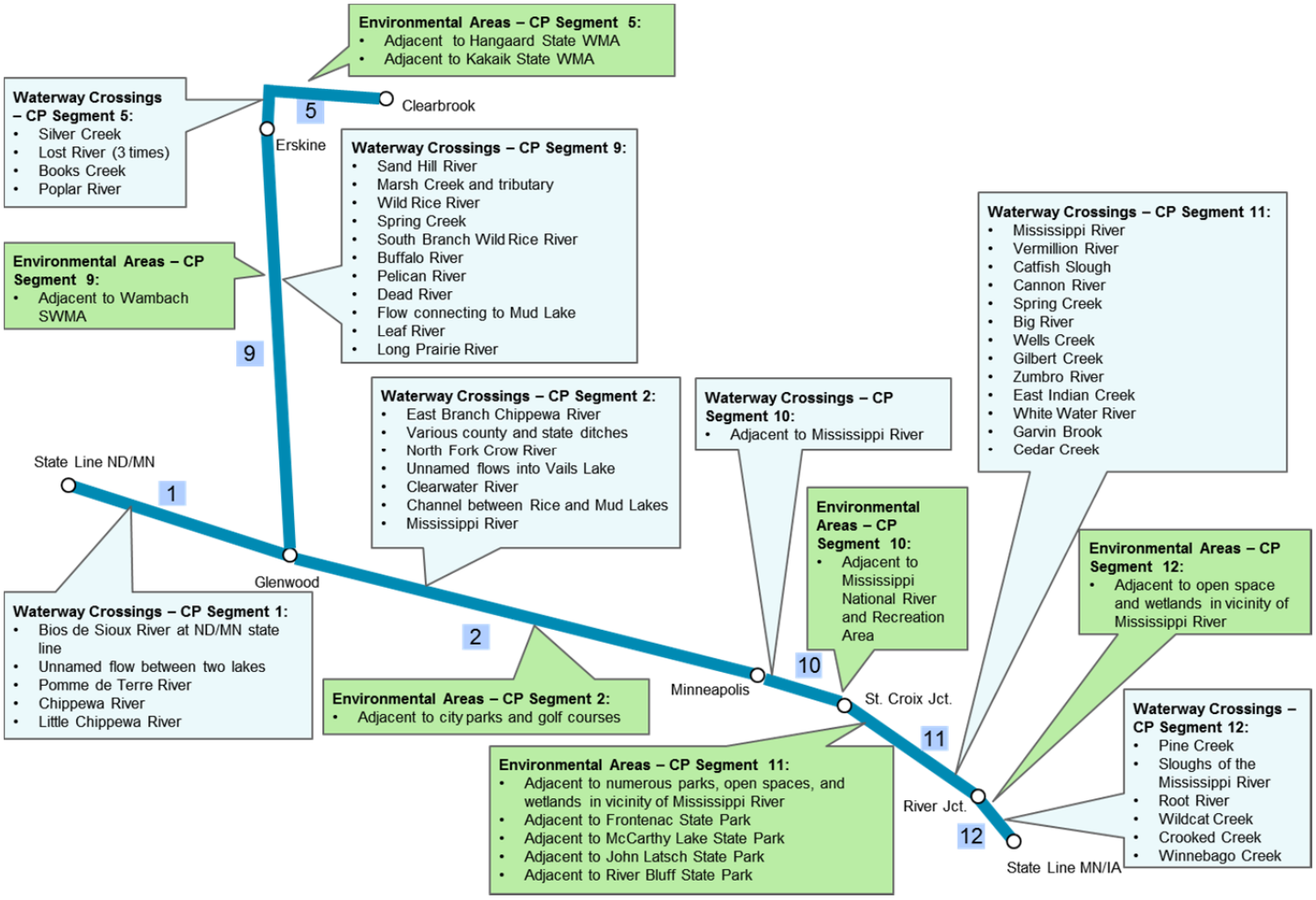
[92] Oliver Wyman analysis using Google Maps (https://maps.google.com).

Figure IV-18: Towns and Grade Crossings Along the CP Route to Superior, WI[93]

Segment	Number of cities/ towns along rail line	Total population for cities/ towns along rail line	Pop. of smallest city/town	Pop. of largest city/town	At-grade crossings	Incidents at crossings (2009-13)	Injuries (2009-13)	Fatalities (2009-13)
1 – ND/MN State Line to Glenwood	8	5,596	68	2,530	107	5	2	0
2 – Glenwood to Minneapolis	17	556,605	34	400,070	228	9	3	1
3 – Minneapolis to Coon Creek	4	109,598	244	62,013	7	3	1	0
4 – Coon Creek to MN/WI State Line	17	61,857	64	31,709	66	8	7	1
5 – Clearbrook to Erskine	7	1,985	46	526	68	1	0	1
6 – Erskine to Schley	11	21,230	86	14,435	101	4	4	0
7 – Schley to Brookston	9	16,613	78	10,984	108	2	2	0
8 - Brookston to MN/WI State Line	4	14,286	391	12,050	34	0	0	0

[93] Same sources as footnoted for Figure IV-14.

Figure IV-19: Environmental Areas and Waterway Crossings Along the CP Route to Chicago, IL[94]



[94] Oliver Wyman analysis using Google Maps (https://maps.google.com).

Figure IV-20: Towns and Grade Crossings Along the CP Route to Chicago, IL[95]

Segment	Number of cities/ towns along rail line	Total population for cities/ towns along rail line	Pop. of smallest city/town	Pop. of largest city/town	At-grade crossings	Incidents at crossings (2009-13)	Injuries (2009-13)	Fatalities (2009-13)
1 – ND/MN State Line to Glenwood	8	5,596	68	2,530	107	5	2	0
5 – Clearbrook to Erskine	7	1,986	46	526	68	1	0	1
9 – Erskine to Glenwood	16	26,801	92	11,580	264	7	2	0
2 – Glenwood to Minneapolis	17	556,605	34	400,070	228	9	3	1
10 – Minneapolis to St. Croix. Jct.	3	335,604	5,332	294,873	20	1	1	0
11 – St. Croix Jct. to River Jct.	13	85,648	110	27,546	123	9	4	0
12 – River Jct. to MN/IA State Line	3	5,665	295	4,810	14	0	0	0

E. Additional Future Demand for Rail Service in Minnesota

According to the Minnesota State Rail Plan, freight rail traffic in Minnesota is projected to grow by 25 percent, from 240 million to 300 million tons, by the year 2030; this figure does not include the additional volumes of crude oil rail traffic that would be generated if the "No Action" option were exercised for the Project.[96] This baseline level of growth will require investment simply to keep the system operating at current service levels. Without investment in additional capacity, several rail lines in Minnesota will exceed available capacity by 2030 even without increased volumes of crude oil rail traffic.[97] The costs of improvements required in Minnesota to meet baseline projected demand for rail service range from $2.2 billion to $4.4 billion.[98] (Based

[95] Same sources as footnoted for Figure IV-14.
[96] "Minnesota Comprehensive Rail Plan," op. cit., p. 3-15.
[97] Ibid., Figure 4-3.
[98] Ibid., Table 4-4.

on expected "flat-line" annual growth in grain, coal, ores, and other commodities, and not including the annual "boom or bust" cycles exhibited by some commodities.)

In addition to projected growth in a range of rail-hauled commodities over time, a more immediate concern is the capacity of the Minnesota rail system to absorb sudden and large new traffic flows. One such potential flow is increased crude oil shipments by TransCanada from Alberta, Canada to U.S. Gulf Coast refineries, which could add a total of 14 unit trains per day (each approximately 100 cars long) moving through Minnesota – in addition to a similar number moving Bakken crude.[99]

In addition, propane in tank cars is coming onto Minnesota's rail network and can be expected to grow in the future, as a result of the April 2014 shutdown of Kinder Morgan's Cochin Pipeline, which supplied 40 percent of Minnesota's propane.[100] Some 230,000 homes, farms, and businesses (particularly in rural areas of the state) depend on propane, with agriculture using 30 percent of the propane shipped into Minnesota. Propane suppliers are thus gearing up to move significant shipments through the state by rail, with plans for this supply chain to be in place by fall/winter this year, to meet peak demand for propane. Already, CHS, headquartered in Inver Grove Heights, the country's largest agricultural cooperative and one of the largest wholesalers of propane, has leased more than 640 rail tank cars; others serving the propane market can be expected to follow suit.[101] Dan Mack, vice president for rail transportation and terminal operations at CHS, also has noted, however, that "Rail is less predictable than pipelines. That

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[99] "Are more oil trains headed for Minnesota?" *MPR News*, May 28, 2014 (http://blogs.mprnews.org/statewide/2014/05/are-more-oil-trains-headed-for-minnesota/).
[100] "Propane industry scrambles to replace supply from major pipeline," *Minneapolis Star Tribune*, December 7, 2013 (http://www.startribune.com/business/234815871.html).
[101] "Rail delays hurt energy and commodities," *Minneapolis Star Tribune*, March 21, 2014 (http://www.startribune.com/business/251623281.html).

could make it even harder for the industry to respond to propane shortages like the one that drove up prices this past winter."[102]

In March, an official with BNSF predicted that oil shipments would nearly double, to 1.5 million barrels per day, in the next few years.[103] Expanding train service to haul such large amounts of crude oil, if it cannot be moved through pipelines instead, would place additional stress on the rail network in the future and would require higher levels of investment in both Minnesota and the region, either by the railroads themselves or through public-private partnerships. As shown in Figure IV-11 above, depending on which route the crude oil would take, under the "No Action" scenario (as well as on potential new traffic from other sources) there could be hundreds of miles of rail line requiring capacity expansion investments.

[102] Ibid.
[103] "Farmers, elevators fume at costly grain train delays," op. cit.

V. Summary

In summary, rail is the most viable transportation option for certain bulk commodities moving through Minnesota and the surrounding region, such as grain, coal, and minerals, and increased competition for rail capacity has been shown to adversely impact the economics of these commodities. At the same time, passenger rail services must share space on increasingly busy rail lines, which can compromise the reliability of these services. Communities bisected by rail lines have experienced increased rail traffic, with associated delays and public safety concerns.

Therefore, careful consideration should be given as to how to the "No Action" decision for the Project might affect multiple sectors of Minnesota's economy. Railroads are investing record amounts into capital expansion projects to support forecasted growth across many industries. The current rail system in Minnesota does not have surplus rail capacity available to accommodate "unplanned" traffic, as would be the case in the "No Action" scenario, without significant additional capital investments. Authorizing the development of the Project to transport crude oil presents a significant opportunity for Minnesota to lessen the risks of economic disruption. Increased availability of pipeline capacity will mitigate the need for some crude oil to use the railroads, thereby providing more flexibility for railroads to meet both peak demand and growing demand for a broad range of commodities important to the state. Reducing pressure on rail service also can help ensure that capacity is available for passenger services, while ameliorating disruptions to communities along rail lines.

In the words of U.S. Senator Al Franken (MN), "If any of these shippers had just one more option that they could consider, I believe that we wouldn't be hearing so much about substandard service levels," particularly, as he also notes, "The rail industry is essential to an effective economy in Minnesota and the nation."[104]

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[104] Before the STB, Ex Parte No. 724-1, Franken Comments (235874), op. cit., p. 2.

Pursuant to 28 U.S.C. § 1746, and under penalty of perjury, I, William J. Rennicke, declare that the foregoing is true and correct to the best of my knowledge. Executed on August 8, 2014.

_____
Signature

William J. Rennicke

_____
Name

Partner

_____
Title

August 8, 2014

_____
Date