

Interagency Report on Oil Pipelines

This report by the Interagency Pipeline Coordination Team provides an overview of the environmental, economic, human health, safety, and transportation infrastructure impacts as a result of increased crude oil pipelines in the state of Minnesota.



Environmental Quality Board

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Contributors/acknowledgements

The Environmental Quality Board (EQB) brings together leaders of nine state agencies, five citizens, and a representative of the governor. The board reviews interagency issues that affect Minnesota's environment, advises policymakers, and creates long-range plans. Strategic planning and coordination activities are important EQB functions.

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Executive Summary

Minnesota is close to two of the largest oil formations in North America – the Bakken fields of North Dakota, Montana and Saskatchewan, and the Alberta, Canada, oil sands. Due to advancements in technology such as horizontal drilling and hydraulic fracturing, oil can now be extracted from shale and other geological formations such as those to Minnesota's west. Together the crude oil extraction from these areas contributes to an oil supply boom in North America. As of May 2014, Bakken crude production reached 1 million barrels per day and in 2013, total Canadian crude oil production was approximately 3.5 million barrels per day.

More recently, oversupplied markets and weakening demand have caused global oil prices to plummet and may have an impact on oil production. In the long term, declining prices would lead to declining production. However, in the short term, price fluctuations have had little impact on production; as the large capital investments by oil firms will take time to wind down.

Minnesota is referred to as a pass-through state, linking crude oil from the north and west to the south and eastern United States and will continue to do so into the future. A team comprised of technical staff from 11 state agencies – the Interagency Pipeline Coordination Team – was formed in 2014 to coordinate state resources and expertise on issues related to the increase in oil transported by way of pipelines across Minnesota. The team assembled this report to serve as an information resource for the general public and policy makers.

This report addresses these four key areas: the economics of oil transportation; environmental and human health impacts; spill prevention, preparedness, emergency response and safety and pipeline approvals.

Economics of Oil Transportation

Minnesota, despite not having any of its own sources of oil, is directly impacted, both positively and negatively, as oil reserves are tapped for energy production. An estimated 2.7 million barrels of crude oil from the Bakken fields and Canada move across the state by pipeline each day. The existing 4,100 miles of crude oil and petroleum pipeline capacity in the state is not meeting the demand for transport. This means up to 600,000 barrels of oil per day are moving through Minnesota by train.

The increase in shipping of Bakken crude oil by rail, and the resulting congestion, has hurt Minnesota's farming, mining, energy, retail, and manufacturing industries. Increased prices and delays have made it more difficult for producers to get inputs to maintain operations or send goods to market. Another major commodity, silica sand, has emerged due to the hydraulic fracturing of the shale oil beds of the Bakken and other fields to release oil and gas. While only a small percentage of rail traffic involves this bulk material shipment, it is a significant – and growing – addition to the existing mix of rail traffic. Moreover, trains moving silica sand use the same main lines that handle the majority of crude oil and grain shipments, exacerbating the main points of congestion in the rail network.

While some industries are hurt by the increased transportation, the proliferation of pipelines and railroads will offer new sources of product demand for Minnesota industry suppliers. Nationally in 2012, there was demand for 9.6 million metric tons of oil and gas pipe products.

Construction and management of pipelines and railroads also has ramifications on the broader Minnesota economy. Jobs in these areas tend to produce above-average wages and have strong multiplicative effects. Approximately \$1 million in investment in construction of pipelines could result in about 12 direct and indirect jobs. One direct job in rail and pipeline operations means approximately 2.5 additional jobs

throughout the state. However, many of these jobs are temporary, and the scale is small relative to the overall state economy.

Job gains are only one portion of the economic narrative. Minnesota must also weigh the ability of additional rail and pipeline construction to relieve congestion on transportation networks with the risk of adverse side effects (for example, personal, environmental, and economic damage related to construction and spills).

Taxes

This report reviews tax laws that govern pipelines transporting crude oil and refined petroleum products in and through Minnesota. The discussion is broken down into three parts – property tax, sales tax, and corporate franchise tax.

Property tax is levy-based and is imposed on that portion of the pipeline's taxable market value attributable to the portion of the pipeline located within the local jurisdiction. Pipelines are valued under a "dual" property tax system:

- The Department of Revenue values the pipeline's operating property, which includes items like pipes and pumping stations.
- Land or other real property owned by pipeline companies that is not part of the operating property is assessed locally by a city or county assessor.

Sales tax is a transactional tax that applies to Minnesota retail sales of taxable services and tangible personal property. Regarding pipelines, sales and use tax is generated primarily during the construction phase when the tangible personal property is purchased. For every \$1 million of new pipeline construction expenditures, the taxable pipeline materials would be approximately \$420,000, which could generate around \$28,875 in sales and use tax revenue.

Corporations that operate in Minnesota are subject to Minnesota's corporate franchise tax. There are about 14 unitary groups filing Minnesota corporate franchise tax returns that include pipeline activity within Minnesota.

Environmental and Human Health Impacts

Pipelines that traverse Minnesota are inevitably hundreds of miles long, which during their construction disturb thousands of acres of habitat, private and state land, and have the potential to cross hundreds of bodies of water, including ecologically valuable wetlands and streams. In fact, when pipelines are constructed to cross the state, the disturbance of that amount of land has been compared to the development of a Minnesota taconite strip mine.¹ Development of infrastructure to support the extraction, refinement, and combustion of oil also has the potential to release additional carbon into the atmosphere and may perpetuate a carbon-based economic structure that contributes to climate change.² Consequently,

¹ Ruther, K. MEPA at 36: Perspectives on Minnesota's Little NEPA. *News & Analysis*. Environmental Law Institute. Vol. 39. Issue 7. July 2009.

² The White House; U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation (November 2014); retrieved on November 17, 2014 from www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c

the scope of the environmental and human health impacts as a result of the construction, operation and non-normal operation (including oil spills or pipeline ruptures) of crude oil pipelines is great.

This report explores the potential environmental and human health related impacts. Many impacts are temporary and construction-related, while others can be long lasting and even permanent, putting human health and the environment at risk. Many of these impacts are evaluated and addressed during the various stages of government approvals prior to pipeline construction, which are discussed in this report.

Emergency and Spill Response

A spill is the unintended loss of oil from the pipeline system and a rupture is a sudden and catastrophic loss and leak. The hazards and damage and cleanup of each pipeline spill, leak, or rupture depends entirely on incident-specific factors. The eventual hazard and damage depends on the spill's place, oil, quantity, topography, soils, hydrology, adjacent and downstream land type and use, weather, luck, and response by the spiller. Planning and prevention is one way to mitigate the effects of a spill or a rupture.

Federal regulations promulgated under the Oil Pollution Act³ of 1990 require extensive oil spill response planning and preparedness for some types of facilities and almost nothing for other facilities like railroads and pipelines. Other federal entities such as the U.S. Coast Guard⁴ and the U.S. Environmental Protection Agency⁵ regulations for ships, barges, refineries, and many large storage tanks have detailed requirements for equipment, staffing, training, organization, and other aspects of preparedness for large spills. The regulations also identify the amount of response equipment and staffing, and the timelines by which the equipment must be deployed and operating. However, no such detail has been promulgated on the federal level for railroads or pipelines.

Pipeline operators are required by federal law to submit a response plan to the Pipeline and Hazardous Material Safety Administration. These plans are not prescriptive, they allow for individual companies to determine their response.

In 2014, the Minnesota Legislature passed laws to address response times, equipment and personnel needs for spills and ruptures from railroad carrying oil. This addresses safety concerns as well as environmental impacts. These measures should be extended to pipelines to continue to prevent catastrophic spills with adequate responses.

Pipeline Permitting Process

A proposed pipeline project is reviewed with a two pronged approach – with the certificate of need process and the route permit proceedings. The certificate of need process under the Public Utilities Commission is designed to evaluate the need for a large energy project in Minnesota, specifically, whether the proposal will meet an identified need consistent with various Minnesota policies, including reliability, reasonable utility costs, and environmental protection. Applicants for a pipeline are also required to submit to the Commission a route permit application, including an environmental assessment supplement.⁶ Ultimately, after public comment, the Commission determines the routes and route segments that will be evaluated in the environmental review and considered in the contested case hearing. In its role as public advocate in these proceedings, the Division of Energy Resources of the Minnesota

³ U.S.C. Title 33, Chapter 40

⁴ CFR Title 33, Parts 154 and 155

⁵ CFR Title 40, Part 112

⁶ Minn. Rule 7852.2700

Department of Commerce evaluates all petroleum projects requiring a certificate of need according to Minnesota statutes and rules.

The purpose of the environmental review is to provide information about a project's environmental impacts before approvals or necessary permits are issued. This is followed by a discussion on the pipeline route permit from the Commission and applicable permits from state agencies and local governments.

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Background

Location of oil formations

The majority of all crude oil moving to or through Minnesota comes from two areas. The first is the Bakken oil shale fields in North Dakota, Montana, and Saskatchewan. The second is the oil sands development primarily in the Athabasca oil sands of Alberta, Canada.

Approximately 900,000 barrels a day of Bakken oil moved through Minnesota in the fall of 2014 with a third by pipeline and two-thirds by rail. At the same time, 2.4 million barrels per day of Canadian crude moved through Minnesota, almost all by pipeline. Minnesota has two petroleum refineries for a combined production capacity of about 400,000 barrels per day. These refineries produce more than two-thirds of the state's petroleum products. The refineries use about 15% of the crude oil coming into the state with the bulk of the products refined from Canadian crude oil, supplemented by supplies from North Dakota's Bakken field.⁷ Nearly all of the heavy crude oil refineries in the Upper Midwest receive a portion of their crude oil, either directly or indirectly, from pipeline systems that traverse Minnesota.

Crude oil characteristics

- **Mixture** – Crude oil is a natural mix of numerous hydrocarbon compounds that exists as a liquid at normal temperatures and pressures. The component compounds in the mixture range from light, simple molecules that may exist in a gaseous or semi-gaseous state to complex long-chain hydrocarbons that are relatively heavy and exist at the border between liquids and solids at normal temperatures. The crude mixture does not have the manufactured and consistent specifications of a refined product, such as diesel fuel or ethanol.
- **Flammability** – Flammability can be measured in three ways:
 - Flash point is when a material begins burning in the presence of a momentary ignition source, and its ability to keep burning.
 - Vapor pressure signifies how actively it evaporates under normal conditions into a gaseous state that readily supports burning.
 - Boiling point is the temperature at which the liquid bubbles and rapid vaporization occurs, thus supporting increased flames. Flammable materials require special handling and marking during transport.

⁷Minnesota's Petroleum Infrastructure: Pipelines, Refineries, Terminals. Information Brief. Research Development, Minnesota House of Representatives. June 2013. <http://www.house.leg.state.mn.us/hrd/pubs/petinfra.pdf>

- **Volatility** – The volatility of a flammable substance depends on ignition temperature and how fast the flame spreads as it vaporizes. For crude oil, light compounds that may be semi-gaseous easily vaporize. Light crudes may also have significant amounts of dissolved gaseous compounds such as methanes, ethanes, and propanes. In contrast, heavy crudes have a high percentage of heavy hydrocarbon compounds with high boiling points. In some cases, the crude is combustible but not flammable under ordinary conditions, like asphalts.⁸
- **Diluted crudes, diluents** – Some crudes derived from oil sands can be heavier than water, with a thickness bordering on a semi-solid state. At normal temperatures and pressures, it may not be profitable or it may be physically impractical to pump. These characteristics have limited the approaches to transporting this material.

Currently, the most common method for making oil sands crude transportable is to dilute the heavy crude with a light petroleum material. This diluted mixture, essentially a reconstituted medium crude oil, is lighter and offers better flow. As long as a steady volume of semi-refined diluent can be provided, a simple mixing operation will produce the diluted crude. This crude is then easily handled in pipeline or tank car at normal temperatures and pressures, in a liquid state.

In a spill, the specific gravity will cause the oil to float. Over time, the presence of a large percentage of heavy compounds in the mix may lead to separation as the oil emulsifies in water. Prompt cleanup response is essential in this case as it is with all crude oils.⁹

Refining and marketing

Different characteristics require different refining methods for crude oil types. To refine heavy crude oil, a refinery must have cracking or coking capacity in addition to basic refining equipment.

These processes, involving heat and chemicals, are used by refiners to further refine heavy, less valuable, petroleum products. Since heavy crude oils generally produce higher percentages of these products, additional processing is required to make refining of heavy crude oils profitable.

Because heavy crude oil requires additional treatment to produce valuable petroleum products such as gasoline, it trades separately and at a discount to lighter crudes that require only basic refinery processing.

⁸Light Ends Composition in Dilbit and Conventional Crudes. March 25, 2014. Alberta Innovates-Energy and Environment Solutions

⁹ Properties of Dilbit and Conventional Crudes. February, 2014. Alberta Innovates-Technology Futures

Bakken shale oil

The Bakken shale oil field has become a major source of high quality, sweet, light crude oil North Dakota, Montana, and Saskatchewan. Prior to 2000, this source was considered unrecoverable, with the petroleum essentially trapped in impervious rock. The paired technologies of accurate horizontal drilling and extreme-pressure hydraulic fracturing of the shale formations allowed economically feasible recovery rates for the first time. The U.S. Geological Survey (USGS) now estimates recoverable reserves of approximately 7.4 billion barrels.¹⁰ This ranks the Bakken roughly even with the Midland, Texas, oil formations and about half the size of Prudhoe Bay, Alaska, the two largest recorded oil fields in the U.S.

Figure 1: Shale play sand basins in the contiguous United States¹¹



The Bakken formation consists of at least five producing levels continuously covering a large part of the Williston Basin in North Dakota, Montana, and Saskatchewan. The five levels are the Upper Bakken shale, the middle Bakken, the Lower Bakken shale, and the Upper and Lower Three Forks, in descending order. By fall 2014, 10,000 wells had been drilled and one billion barrels of oil produced. Ultimate development plans suggest drilled wells totaling 45,000 to 60,000. High-speed drilling rigs are in use to complete about 11 wells per day. Industry estimates in 2014 suggested a peak field production of 1.6 to

¹⁰ U.S. Geological Survey Bakken-Three Forks Assessment Team, 2013, Input-form data for the U.S. Geological Survey assessment of the Devonian and Mississippian Bakken and Devonian Three Forks Formations of the U.S. Williston Basin Province, 2013: U.S. Geological Survey Open-File Report 2013-1094, 70 p., <http://pubs.usgs.gov/of/2013/1094/>.

¹¹ Shale play sand basins in the contiguous United States. 2011. Energy Information Administration

2.2 million barrels per day by 2023.¹² With the precipitous drop in crude oil prices in late 2014, plans have been announced to delay well drilling and well finishing. This would not impact production in the short term, but may move the date expected for peak field production into the future and could result in a decrease in production if the rig count falls below 130.

The Bakken shale formation represents the country's largest formation of tight oil,¹³ oil trapped in relatively impervious rock at significant depths. As previously mentioned the formation consists of five stacked producing layers of continuous source material or horizontal collecting zones. The technology of precise horizontal drilling allows wells to be drilled parallel to the surface and along each stratum to a distance of up to two miles from each vertical well bore which reaches from the surface to about 10,000 feet down.

After completing horizontal drilling, the well casing is perforated to allow large volume, high pressure hydraulic fracturing of the surrounding rock. The hydraulic fracturing employs large volumes of water and some chemical additives that assist flow to open cracks a hundred feet or more beyond the well. Critical to this operation is the use of a proppant such as sand to prop open the cracks and allow space for the oil to flow. This proppant is carried as slurry in water used in the fracturing. Natural sand with the unique characteristics needed for proppant is known as frac sand, and is found in large deposits in Illinois, Wisconsin, and Minnesota.

Bakken crude is listed as light, sweet crude, meaning it has a high specific gravity and is low in sulfur and heavy metals content. Unlike the majority of shale production in the U.S., the Bakken field produces about 85% liquid petroleum and a small percentage of natural gas. While ethane, propane, and butane are all an active part of the crude's volatility, the general characteristics resemble any light sweet crude. Vapor pressure and boiling point are consistent with the normal specifications for moving liquids in general purpose nonpressurized railroad tank cars. The flash point, specific gravity, and initial boiling points are similar to refinery condensate, comparable to a mix of gasoline and kerosene.¹⁴

¹² Bakken Oil Business Journal, 'Annual Energy Outlook', August-September 2013, 'Optimizing Production for Success', June-July 2014

¹³ The term tight oil does not have a specific technical, scientific, or geologic definition. Tight oil is an industry convention that generally refers to oil produced from very low permeability shale, sandstone, and carbonate formations, with permeability being a laboratory measure of the ability of a fluid to flow through the rock. In limited areas of some very low permeability formations, small volumes of oil have been produced for many decades. U.S. tight oil production: Alternative supply projections and an overview of EIA's analysis of well-level data aggregated to the county level.

April 2014. http://www.eia.gov/forecasts/aeo/tight_oil.cfm

¹⁴ A Survey of Bakken Crude Oil Characteristics Assembled for the U.S. Department of Transportation. May 14, 2014. American Fuel & Petrochemical Manufacturers as requested by Pipeline and Hazardous Material Safety Administration

Canadian heavy crude oil

Alberta heavy sour crude oil now makes up the majority of U.S. imports, with 2.4 million barrels per day traveling through or being consumed in Minnesota, mostly by pipeline. While Alberta has a significant conventional oil industry, most of the heavy crude comes from oil sands mining and processing. The oil sands in Alberta represent the second largest recoverable deposit of heavy oil in the world, second only to Venezuela. The most easily mined deposits are surface beds of sand impregnated with asphaltic tar, about 90% oil by weight. The tar can be separated from the sand by a number of mechanical measures, including water washes, solvent flushing, and heating. The resulting separated tar is heavy. It also contains a high sulfur content, 2.5 to 4.5% by weight, as well as heavy metals, consistent with a heavy sour crude.

Its high viscosity, or thickness, makes it difficult to handle as a liquid unless heated. After it's exposed to the atmosphere, the tar often is reduced from a flammable condition to a combustible material. This heavy crude can be processed into less viscous oil. This process prepares the oil for transport by pipeline or rail, and pre-conditions it for refining.

A less costly alternative is to dilute the heavy crude with a lighter petroleum crude or product. In the case of Alberta heavy oil production, the solution has been to transport light petroleum products into the area to use as a diluent. The resulting diluted bitumen has the necessary lower viscosity to be easily pumped at normal temperatures.¹⁵

Hazardous material categories

Bakken crude oil is considered highly flammable and volatile. The Pipeline and Hazardous Material Safety Administration (PHMSA) requires it to be categorized and placarded as “Flammable 3, Packing Group 1” – the most dangerous level of flammable ranking.

Canadian oil sands crude is considered flammable, but less volatile particularly due to the removal during refining of ethane, propane, and butane. It is normally categorized and placarded as “Flammable 3, Packing Group 2,” a less dangerous ranking.

Oil sands vs. tar sands

The terms “oil sands” and “tar sands” are used interchangeably to describe a type of nonconventional oil resource that is found throughout the world. The U.S. Geological Survey calls tar sands a “generic term that has been used for several decades to describe petroleum-bearing rock exposed on the Earth’s surface (USGS, Natural Bitumen Resources of the United States, 2006).” The natural bitumen in the oil sands is black and sticky like “tar”. Nevertheless, many government resources refer to the deposits as tar sand, oil sands, or both.

Oil Sands and the Keystone XL Pipeline: Background and Selected Environmental Issues. Congressional Research Service, February 2013.

¹⁵Basic recap by American Fuel & Petrochemical manufactures of a variety of refining and manufacturing methods for crude oil, specifications, handling, and other technical background information. Detailed technical papers available on site. www.afpm.org/industry101

Pipelines in Minnesota

Throughout Minnesota, there are 65,000 miles of pipeline moving natural gas, propane, anhydrous ammonia, crude oil, and refined petroleum products such as gasoline and diesel fuel.

Of the 65,000 miles of pipeline in Minnesota, nearly 5,000 miles of those miles are hazardous liquid pipelines. Pipelines carrying crude oil are a subset of the hazardous liquid pipelines and represent about half, 2,403 miles. However another 1,708 miles of hazardous pipelines carry refined products such as gasoline and diesel fuel. The remaining 825 miles of Minnesota hazardous liquid pipelines are used to transport highly volatile liquids such as propane and anhydrous ammonia.

Table 1 shows the miles of hazardous liquid pipelines in Minnesota as well as other infrastructure used for short term storage of the materials. This report will commonly refer to the approximately 4,100 miles of hazardous liquid pipelines carrying crude oil and refined products throughout the state.

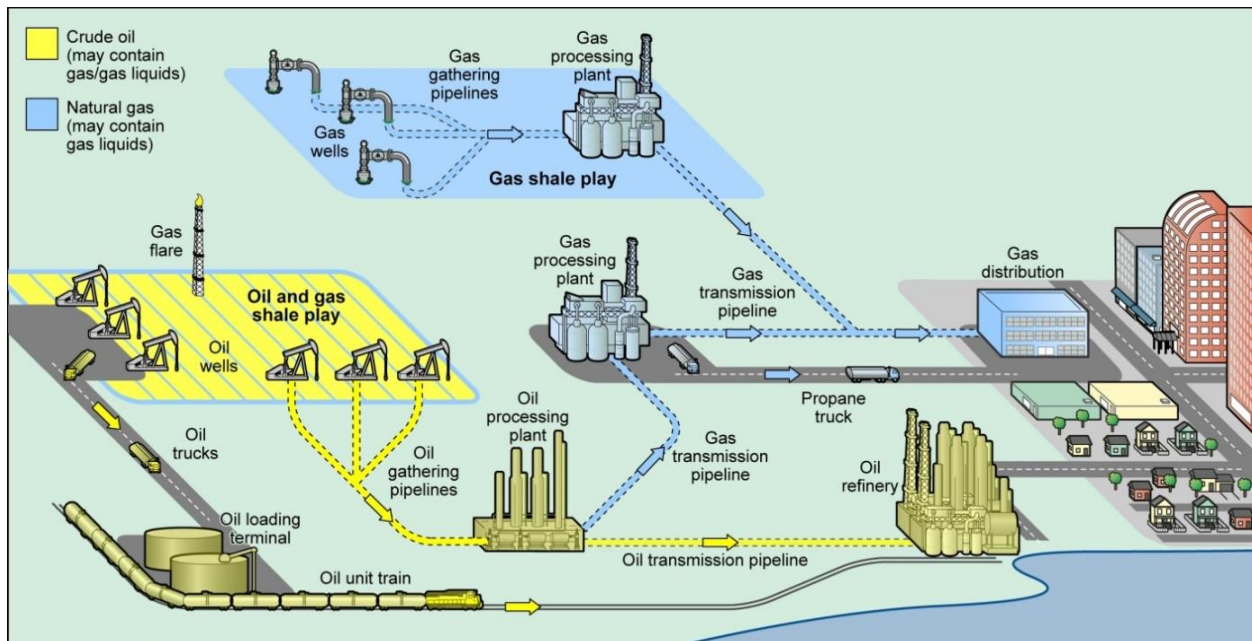
Table 1: Hazardous liquid pipelines and breakout tanks in Minnesota¹⁶

Commodity	Interstate miles	Intrastate miles	Total miles	Miles of gathering	Breakout tanks
Crude oil	2,403.2	4.7	2,407.9	0	32
Highly volatile liquids flammable / toxic	816.3	8.0	824.3	0	13
Refined petroleum products	1,708.8	12.9	1,721.7	0	88
Totals	4,928.3	25.6	4,953.9	0	133

¹⁶ U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. October 2014, <https://hip.phmsa.dot.gov/analyticsSOAP/saw.dll?Portalpages>

Crude oil extracted from oil fields and the products made from the oil are transported via Minnesota pipelines from production wells or refineries. Pipelines moving materials from the well head are transported via “gathering” pipelines to processing plants. There are currently no production fields or gathering lines in Minnesota, rather the pipelines moving oil across the state are larger-diameter transmission pipelines. Figure 2 demonstrates the different types of pipes and the materials they transport.

Figure 2: Oil and natural gas transportation – production to end user¹⁷



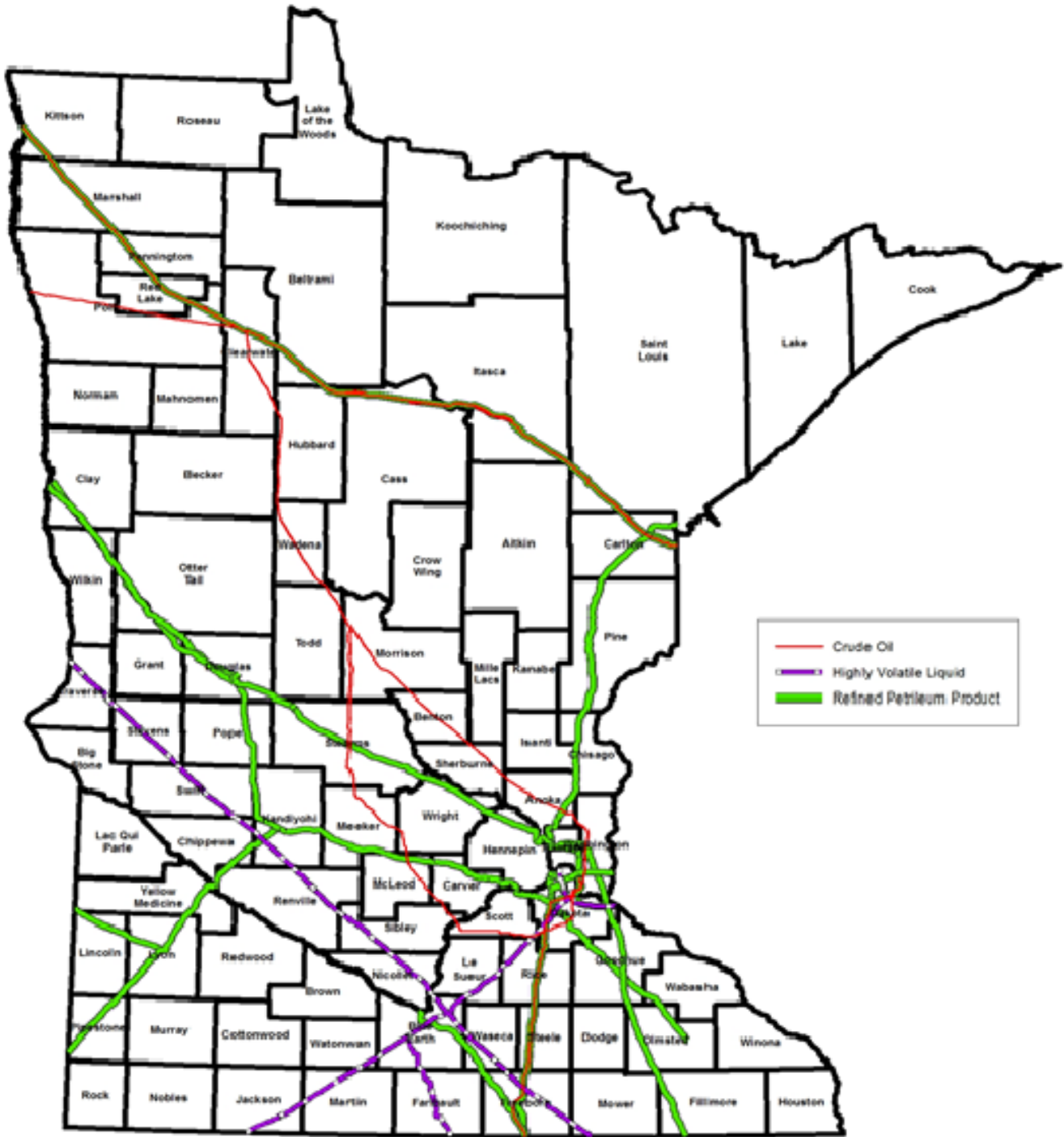
Crude oil is transported by larger-diameter transmission pipelines through Minnesota to either Minnesota refineries or refineries in other states. Minnesota has two refineries that refine crude oil into products such as gasoline and diesel fuel. Tank trucks or pipelines transport these products to their retail or storage destinations.

There are 133 “break-out” tanks included in Minnesota’s hazardous liquid pipeline system. These tanks are used to relieve product surges in pipelines, and to store products for reinjection into the pipeline for transportation.

Hazardous liquid pipelines traverse the state carrying crude oil, flammable liquids and petroleum products. Figure 3 shows the approximate locations of the pipelines and the materials they carry.

¹⁷ Oil and Gas Transportation. U.S. Government Accountability Office. August 2014, <http://www.gao.gov/products/GAO-14-667>

Figure 3: Minnesota hazardous liquid pipelines¹⁸



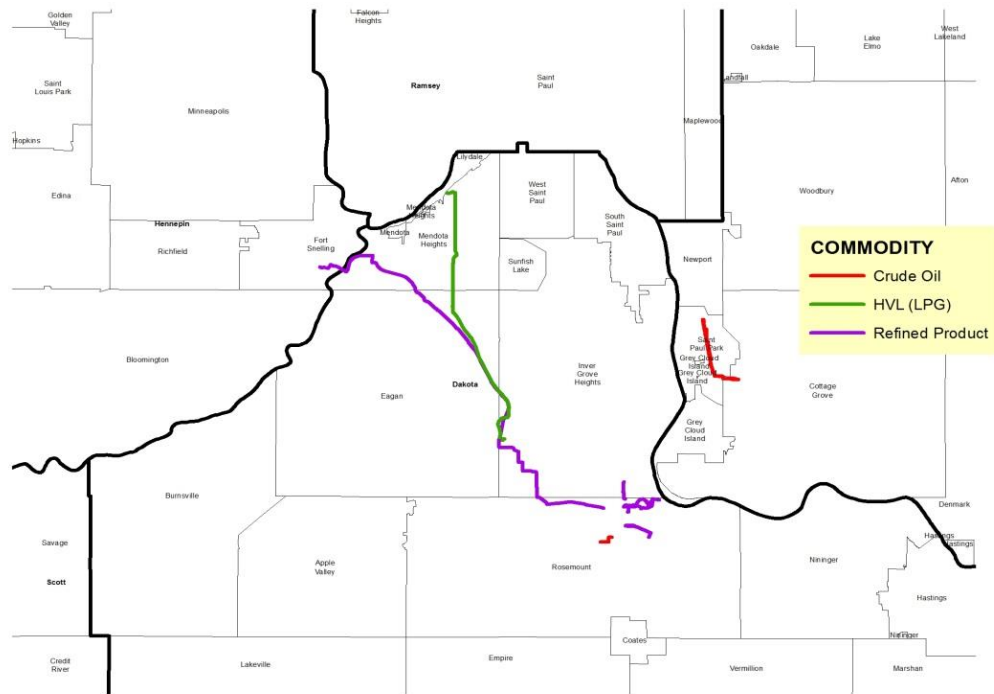
¹⁸ Prepared by the Minnesota Office of Pipeline Safety, October 2014.

Interstate and intrastate pipelines

Pipelines are categorized as *intrastate* or *interstate*.

- **Intrastate pipelines** – Pipelines that start and end within the state, such as those in Figure 4. Intrastate pipelines are typically jurisdictional to a state authority as permitted by law.

Figure 4: Intrastate hazardous liquid pipelines in Minnesota



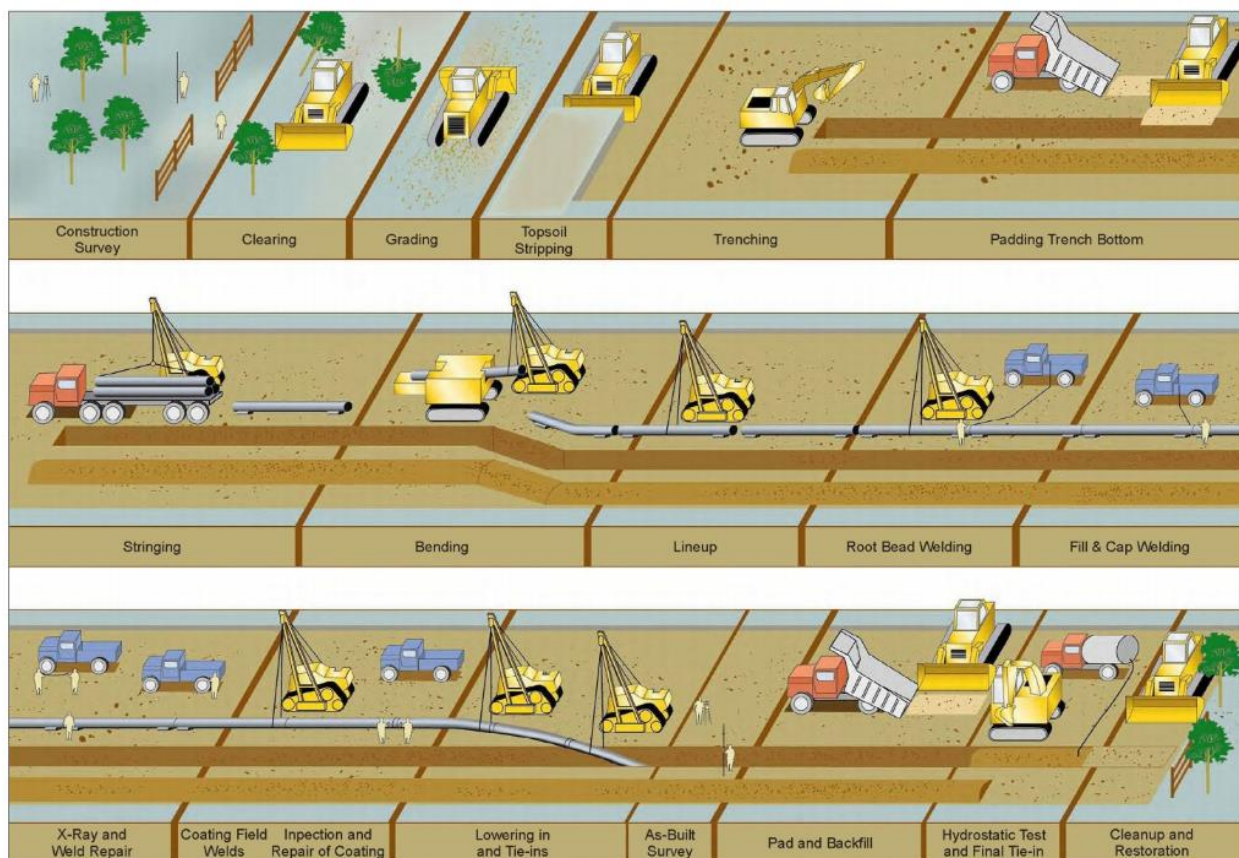
- **Interstate pipelines** – Pipelines that carry products across state lines. Interstate pipelines are jurisdictional to PHMSA, which is part of the Federal Department of Transportation.

Pipeline construction

Pipeline construction begins with the preparation of the rights-of-way (ROW) as illustrated in Figure 5. To clear the ROW trees, boulders, brush, and other objects are removed. The area is then graded, or in agricultural areas, topsoil may be stripped to a predetermined depth and stockpiled along the sides of the ROW. To prevent erosion of disturbed soils silt fences are erected along edges of streams and wetlands.¹⁹

Wheel trenchers or backhoes are used to dig and rock drilling and blasting can be used where required to break rock to make the trench where the pipeline will be laid.²⁰ The material that is excavated during trenching is temporarily stockpiled on the non-working side of the trench, and is later used to backfill the operation.

Figure 5: Typical pipeline construction sequence²¹



¹⁹ Pipeline Construction: Site Preparation, U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. <http://primis.phmsa.dot.gov/Comm/construction/index.htm#SitePrep> Accessed: January 21, 2015.

²⁰ Pipeline Construction: Trenching, U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. <http://primis.phmsa.dot.gov/Comm/construction/index.htm#SitePrep> Accessed January 21, 2015.

²¹ Executive Summary. Final Environmental Impact Statement for the Proposed Keystone XL Project. August 26, 2011. United State Department of State Bureau of Oceans and International Environmental and Scientific Affairs. <http://keystonepipeline-xl.state.gov/documents/organization/182010.pdf>

Trenches are dug deep enough to allow for an adequate amount of cover when the pipe is buried. The depth of burial of the line must be in accordance with Federal pipeline safety regulations.²² For instance, transmission pipelines are buried at least 30 inches below the surface in rural areas and deeper in more populated areas.²³ Pipelines that cross inland bodies of water must be buried at a depth of 48 inches. In agricultural areas, they must be buried below the level of cultivation. Burial depth requirements may change over time because farming and erosion and can increase risk of the pipeline being damaged during planting, tilling or drain tiling.

The pipe is strung in place and then a bending machine is used to make slight bends in individual sections of the pipe to account for changes in the pipeline route and to conform to the topography.²⁴ The pipe sections are then welded together into one continuous length. Special pipeline equipment called side booms are used to pick up, support and align each piece of pipe with the next piece to make the first pass of each weld.

After the pipe is welded, the welds are examined, usually by X-ray, and a coating is applied to the welded areas at the ends of the pipe sections to prevent corrosion.²⁵ Once the pipeline is welded and coated, it is lowered into the trench. Then the trench is carefully backfilled, to ensure that the pipe and its coating are not damaged. This is generally accomplished with either a backhoe or padding machine depending on the soil makeup.²⁶ The excavated material is returned to the trench in reverse order, with the subsoil put back first, followed by the topsoil.

All newly constructed hazardous liquid pipelines must be hydrostatically tested before they are used to transport materials. The purpose of a hydrostatic pressure test is to eliminate any defect that might threaten the pipeline's ability to sustain its maximum operating pressure, or to determine that no defects exist.²⁷ Finally, the construction right of way is restored as closely as possible to its original condition. In hilly areas, erosion-prevention measures such as interceptor dikes to divert water are installed.²⁸ Stone or timber materials are also sometimes installed along streams and wetlands to stabilize soils and retain habitat following construction.

More information on construction practices related to crossing water bodies is described in the Environment and Human Health Impacts section of this report.

²² Ibid.

²³ Ibid

²⁴ Pipeline Construction: Bending, U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. <http://primis.phmsa.dot.gov/Comm/construction/index.htm#Bending> Accessed January 21, 2015.

²⁵ Ibid.

²⁶ Pipeline Construction: Lowering and Backfilling, U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. <http://primis.phmsa.dot.gov/Comm/construction/index.htm#Lowering> Accessed January 21, 2015.

²⁷ Pipeline Construction: Testing, U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. <http://primis.phmsa.dot.gov/Comm/construction/index.htm#Lowering> Accessed January 21, 2015.

²⁸ Pipeline Construction: Site Restoration, U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. <http://primis.phmsa.dot.gov/Comm/construction/index.htm#Lowering> Accessed January 21, 2015.

Agency roles in pipeline oversight

Table 2: Minnesota agency roles in pipeline oversight

State board or agency	Description of role in oil pipeline oversight
Public Utilities Commission (Commission)	The Commission regulates three service industries in Minnesota, electricity, natural gas, and telephone. It is the Commission's responsibility to ensure that vendors of these services provide safe, adequate, and reliable service at fair, reasonable rates.
Department of Commerce (Commerce), Division of Energy Resources (Commerce-DER), and Energy Environmental Review and Analysis (Commerce-EERA)	This department is the chief regulator for the banking, energy, insurance, real estate, residential construction, securities, and telecommunications industries.
Environmental Quality Board (EQB)	The board develops policy, creates long-range plans and reviews proposed projects that would significantly influence Minnesota's environment.
Department of Natural Resources (DNR)	The department manages the state's natural resources.
Minnesota Pollution Control Agency (MPCA)	Responsible for administering environmental permitting, compliance/enforcement, remediation and outreach programs to help Minnesota protect its environment.
Department of Transportation (DOT)	Provides a balanced transportation system. Responsible areas include aeronautics, highways, motor carriers, ports, public transit, railroads and pipelines.
Minnesota Department of Health (MDH)	The department is the state's lead public health agency, responsible for protecting, maintaining and improving the health of all Minnesotans.
Minnesota Department of Agriculture (MDA)	The department protects the public health and safety regarding food and agricultural products.
Board of Water and Soil Resources (BWSR)	The board is to assist local governments and others to manage and conserve irreplaceable water and soil resources under their stewardship, with an emphasis on private lands. BWSR accomplishes this mission by providing financial, technical, and administrative assistance.
Department of Public Safety (DPS), Minnesota Office of Pipeline Safety (MNOPS)	The Office of Pipeline Safety is to ensure the safe operations and maintenance of natural gas and hazardous liquid pipeline systems and facilities in Minnesota through inspections, enforcement, education, and investigation of incidents/accidents.
Department of Revenue (DOR)	The department manages the states revenue system and administers state tax law.
Department of Employment and Economic Development (DEED)	To enhance the economic success of individuals, businesses and communities by improving opportunities for prosperity and independence.

Economics of oil transportation

This section addresses the interconnectedness of crude oil transportation with other industries and commodities, while exploring the economic impacts as a result of the North American oil boom and construction of new pipelines in Minnesota.

Regional overview

Currently, the Midwest (Petroleum Administration for Defense District (PADD) 2) seen in Figure 6, receives more crude oil from other regions in the U.S. than it exports, but forecasts in mid-2014 projected that by 2020 PADD 2 would be a net exporter of liquid hydrocarbons for the first time in history.

Figure 6: Petroleum Administration for Defense Districts (PADDs)²⁹



The increased oil production in North Dakota was driving this forecast. PADD 2 becoming a net exporter by 2020 assumes stable or increasing crude oil production from the Bakken region. However, rapidly declining global oil prices could undermine this assumption.

Market uncertainty

From June to December 2014, oversupplied markets and weakening demand caused global oil prices to plummet 40% to around \$60 a barrel.³⁰ Naturally, this fall raises questions about future North American shale production, which is often more expensive than conventional drilling.

Traditional oil reservoirs are made of porous rock that allows oil to flow relatively easily over a large area. As a result, yields from traditional wells decline slowly (around 6% per year).³¹ Shale oil sits in less permeable rock formations that do not allow for the same flows. Thus, production declines more rapidly

²⁹ U.S. Department of Energy. Energy Information Administration. 2014

³⁰ Associated Press. Plunging Oil Prices Take Wall St. Lower. December 2014. *The New York Times*. Retrieved from: http://www.nytimes.com/2014/12/11/business/daily-stock-market-activity.html?_r=0

³¹ The Economics of Shale Oil February 2014. *The Economist*. Retrieved from: <http://www.economist.com/news/united-states/21596553-benefits-shale-oil-are-bigger-many-americans-realise-policy-has-yet-catch>.

(30% per year) necessitating new wells.³² The International Energy Association estimates that maintaining one million barrels per day in a conventional oil field, such as in southern Iraq requires 60 new wells a year. In Bakken, it requires 2,500 new wells a year.

These additional costs result in a higher breakeven price for Bakken crude. IHS Global Insights estimates most tight oil additions have a breakeven between \$50 and \$69 a barrel³³. This average varies from region to region; data submitted to North Dakota's Department of Mineral Resources estimates breakeven points as low as \$27 a barrel in North Dakota's Dunn and McKenzie counties³⁴. While the exact breakeven is ambiguous, global oil prices of \$70 a barrel will certainly mean less long term production than prices above \$100.

On the other hand, many global forces affect Bakken's breakeven. New technologies and processes, such as multi-well pad drilling, are lowering the price of shale production. Congress could also stimulate the U.S. crude market by lifting the export ban – allowing producers to sell at higher global prices.³⁵ Moreover, an improvement of global market conditions would increase prices.

In the short term, price fluctuations have little impact on production – large capital investments by oil firms take time to wind down.³⁶ In the long term, however, declining prices would lead to declining production. This makes it harder to determine the proper level of infrastructure investment for Minnesota.

Regional interdependencies of crude oil and petroleum product flows

In addition to crude oil, pipelines transport petroleum products within the region. Transporting refined products can be done relatively cheaply and easily resulting in a competitive petroleum market within the region. This has the potential to put Minnesota consumers at a disadvantage if refiners choose not to sell products in Minnesota where prices are low and instead, sell their products in markets with higher prices.³⁷

Nevertheless, Minnesota is connected via direct-refined petroleum product pipelines to markets in the Gulf Coast, and indirectly to East Coast markets. This connection to the other regions pools risk and reduces price volatility in the state. More refined product pipelines will grow the pool, resulting in smaller price increases during supply disruptions. Construction of additional refined petroleum product pipelines would strengthen interregional market integration, increasing price correlations between the regions a new pipeline connects.

The construction of new crude oil pipelines would have more ambiguous effects. Refineries near the new pipelines would likely benefit from decreased crude oil costs, and regional refined product prices would decrease if refiners pass the savings on to consumers. However, a new pipeline would increase demand

³² Ibid.

³³ Impact of Lower Oil Price. December 2014. *IHS Global Insights*. Presentation to MN DEED.

³⁴ Ritter, A. (personal communication, December 10, 2014). Data submitted by operators to the ND DMR.

³⁵ The Economics of Shale Oil (2014, February 14). *The Economist*. Retrieved from:

<http://www.economist.com/news/united-states/21596553-benefits-shale-oil-are-bigger-many-americans-realise-policy-has-yet-catch>.

³⁶ Ibid.

³⁷ Refiners could divert petroleum product supplies from the Minnesota market to take advantage of higher prices in the Chicago market, thus decreasing supply available to Minnesotans. As a result, the market would adjust prices upward to keep supply and demand in balance. As a consequence of market interconnection, Minnesota has an interest in the adequacy of supply to other parts of PADD II with petroleum and petroleum pipeline connections to our area.

for crude oil sourced in the region where the line originates, increasing local refinery input prices, thereby increasing refined product prices there. This situation would increase petroleum product price convergence between the regions. The level of price convergence would depend on how much of the cost savings or increases refiners in both regions pass on to consumers.

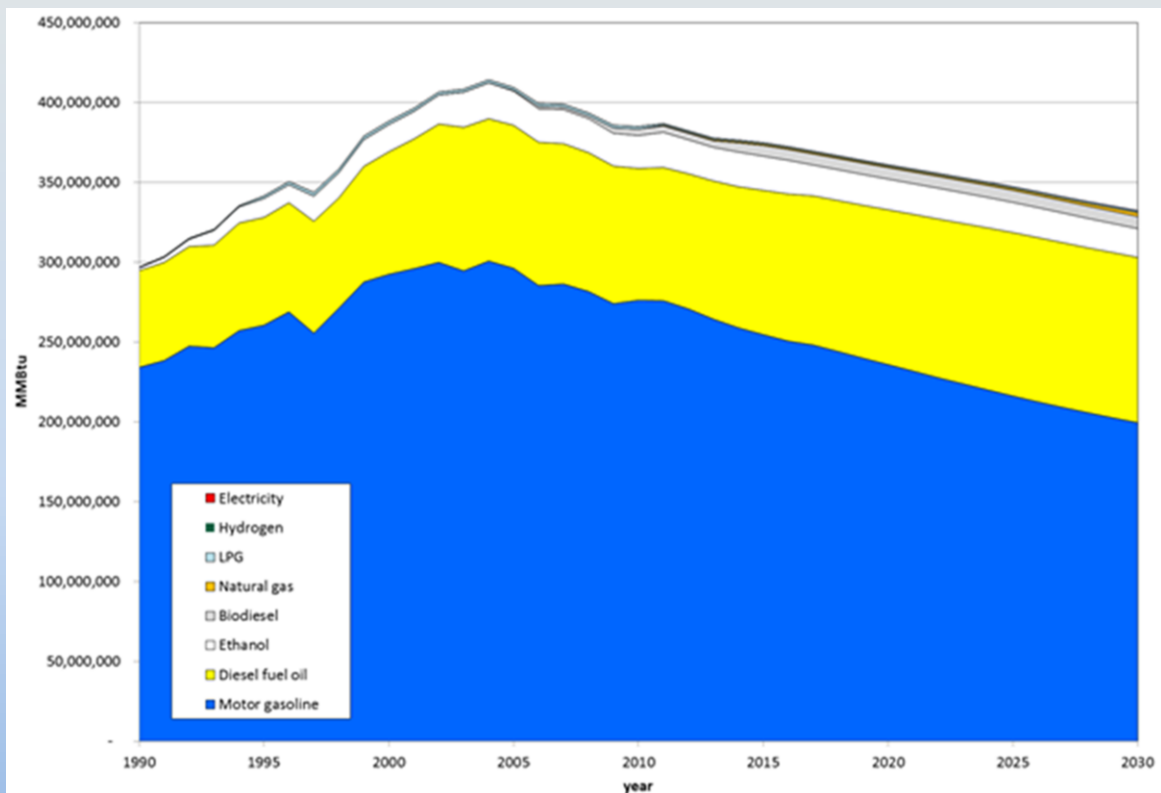
Petroleum product flows

Minnesota is a net importer of refined petroleum products, and ships petroleum products to other states in the region by way of several pipelines that cross through the state. There is a strong interdependence between Minnesota and other states in the region for refined petroleum, and specifically a high level of regional refined product market integration between the Midwest and Gulf Coast regions. The Midwest benefits from its connection to the Gulf Coast’s refined petroleum product markets, which act as a price-setting mechanism and reduce market volatility in the event of product supply disruptions. This insulates Midwestern consumers from large swings in the prices of refined products, such as gasoline.

Minnesota petroleum product use

Between 2011 and 2030, Minnesota is projected to use 28% less gasoline, despite increases in vehicle miles traveled. This reduction is predominantly a function of increased efficiency standards, but also includes petroleum replacement options such as ethanol and biodiesel.

Figure 7: Historic and forecasted highway energy use¹



¹Information provided by the Minnesota Pollution Control Agency.

Current and future transportation of Bakken and Canadian crude oil

The boom in domestic crude oil production has created logistical challenges for the nation's transportation infrastructure. Crude oil transportation in Minnesota impacts pipelines, rail, trucks, and water. While pipelines are traditionally the primary means for producers to ship oil from inland sources, such as the Bakken, to refineries, rail is taking an increasing share of oil shipments.³⁸

As of May 2014, Bakken crude production reached 1 million barrels per day, with an estimated 355,000 barrels per day shipped in pipelines. Of the up to 700,000 barrels per day moving by train (on nine trains per day) and any increase in Bakken production is expected to travel by rail – with 70% of that oil traveling through Minnesota.

In 2013, Canadian crude oil production was about 3.5 million barrels per day with expected growth of 6.4 million barrels per day by 2030. These supplies will primarily be used to meet stable or growing North American demand (40% of U.S. consumption is still from imports). Excess supply may be a candidate for export.

Transportation of crude oil by waterways and the Great Lakes

Currently, inland tank barges are not moving crude in Minnesota on the Mississippi River. However, Canadian crude oil is piped to Illinois where it is being loaded onto barges for shipment by way of the Mississippi River.³⁹ Crude oil is moved out of Canadian ports by ship on the St. Lawrence River to the Gulf of Mexico and Europe, though not yet on the Great Lakes. Recently, a petroleum refiner proposed construction of crude oil loading docks near its refinery in Superior, Wisconsin, but the permit was never issued.⁴⁰ Meanwhile, diluted tar from the Alberta oil sands began moving out of the port of Sorel-Tracy in Quebec in September 2014.⁴¹

The seasonality of waterway shipping and the potential for oil spills during inclement weather conditions complicate transport of crude oil on Minnesota's waterways. The shipping season on the Upper Mississippi River runs from about late March through the end of November. On the Great Lakes, shipping generally starts in late March and officially closes on January 15.

Current operations on the Great Lakes already include a wide variety of petroleum products, ranging from gasoline to asphalt. While few vessels trade in this product on Lake Superior, a number of Seaway-class tankers and barges handle significant volumes of light and heavy oils on the lower Great Lakes. Large operating terminals exist in a number of ports, including Green Bay, Milwaukee, and Chicago. There are currently proposals to move heavy crude oils on the lakes via existing, licensed terminals at Milwaukee, Wisconsin, and in new terminals in Thunder Bay, Ontario.

³⁸ A 110-car unit train of railroad tank cars has the capacity to carry approximately 78,500 barrels or 3.3 million gallons of crude at a time. By moving a single unit from the oil field to a refinery, then returning empty cars and repeating the trip, track and car utilization can be optimized and deliver a complete turn of the unit train every 12 days. That is three to five times faster than single cars can be turned.

³⁹ Rock the Boat Don't Rock the Board – The Inland Crude Tank Barge Fleet. RBN Energy LLC. March 10, 2014. Retrieved from: <https://rbnenergy.com/rock-the-boat-don-t-rock-the-boat-the-inland-crude-tank-barge-fleet>

⁴⁰ DNR Delays Upgrade for Superior Dock. *Journal Sentinel*. January 9, 2014. Retrieved from: <http://www.jsonline.com/news/wisconsin/dnr-delays-upgrade-for-superior-dock-b99180921z1-239517231.html>

⁴¹ First Oil Sands Bitumen Tanker Arrives in Sorel-Tracy Port. *CBC News*. September 22, 2014. Retrieved from: <http://www.cbc.ca/news/canada/montreal/first-oil-sands-bitumen-tanker-arrives-in-sorel-tracy-port-1.2774225>

Pipeline and rail comparisons

Pipelines are considered the most efficient way to ship oil, but face rising competition from the more agile rail industry. Shipping oil by pipeline is significantly cheaper than rail – around \$5 per barrel compared with \$10 to 15 on rail.⁴² Moreover, commodities shipped by pipeline, unlike other transit modes, are unaffected by weather or limited capacity during peak demand (such as harvest or retail holidays).

Historically, rail companies are able to compete by offering shorter contracts (1 to 2 years) than pipelines (10 to 15 years), which reduces risk for oil producers unsure of future prices, demand, or deposit longevity.⁴³ Moreover, rail transport is significantly faster than transport by pipeline. A trip from the Bakken to Gulf Coast refineries takes five to seven days by rail, compared to 40 days by pipeline.⁴⁴

The feature most important to growth in oil by rail is its ability to pivot quickly to meet demand. With nearly 140,000 miles of railroad compared with 57,000 miles of pipeline, existing lines are more likely to be near oil production.⁴⁵ Railroads merely have to lay a few extra miles of track and build a terminal to connect remote wells to a nationwide rail network.⁴⁶ New pipelines, on the other hand, cost billions of dollars and take years of planning and construction.

For these reasons, it is not surprising oil producers are shipping ever-larger volumes by rail. Industry analysts project rail revenues will grow to \$90.8 billion in 2017, representing a 5.1% annual growth rate from 2012.⁴⁷ A 2014 Congressional Research Service report notes, “U.S. freight railroads are estimated to have carried 434,000 carloads of crude oil in 2013, or roughly 300 million barrels, compared to 9,500 carloads in 2008.” In July 2014, North Dakota producers in the Williston Basin transported 60% of their oil out of the state by rail and only 33% by pipeline.⁴⁸

⁴² Frittelli, J., Parfomak, P. W., Ramseur, J. L., Andrews, A., Pirog, R., & Ratner, M. (2014, May 5). U.S. Rail Transportation of Crude Oil: Background and Issues for Congress. *Congressional Research Service*. Retrieved October 9, 2014 from <http://fas.org/sgp/crs/misc/R43390.pdf>

⁴³ Ibid.

⁴⁴ BB&T Capital Markets, Examining the Crude by Barge Opportunity, June 10, 2013, p. 15. As cited in U.S. Rail Transportation of Crude Oil: Background and Issues for Congress.

⁴⁵ Frittelli, J., Parfomak, P. W., Ramseur, J. L., Andrews, A., Pirog, R., & Ratner, M. (2014, May 5). U.S. Rail Transportation of Crude Oil: Background and Issues for Congress. *Congressional Research Service*. Retrieved from <http://fas.org/sgp/crs/misc/R43390.pdf>

⁴⁶ Philips, M. (2013, June 13). Amid U.S. Oil Boom, Railroads Are Beating Pipelines in Crude Transport. *Bloomberg*. Retrieved from: <http://www.businessweek.com/articles/2013-06-13/amid-u-dot-s-dot-oil-boom-railroads-are-beating-pipelines-in-crude-transport>

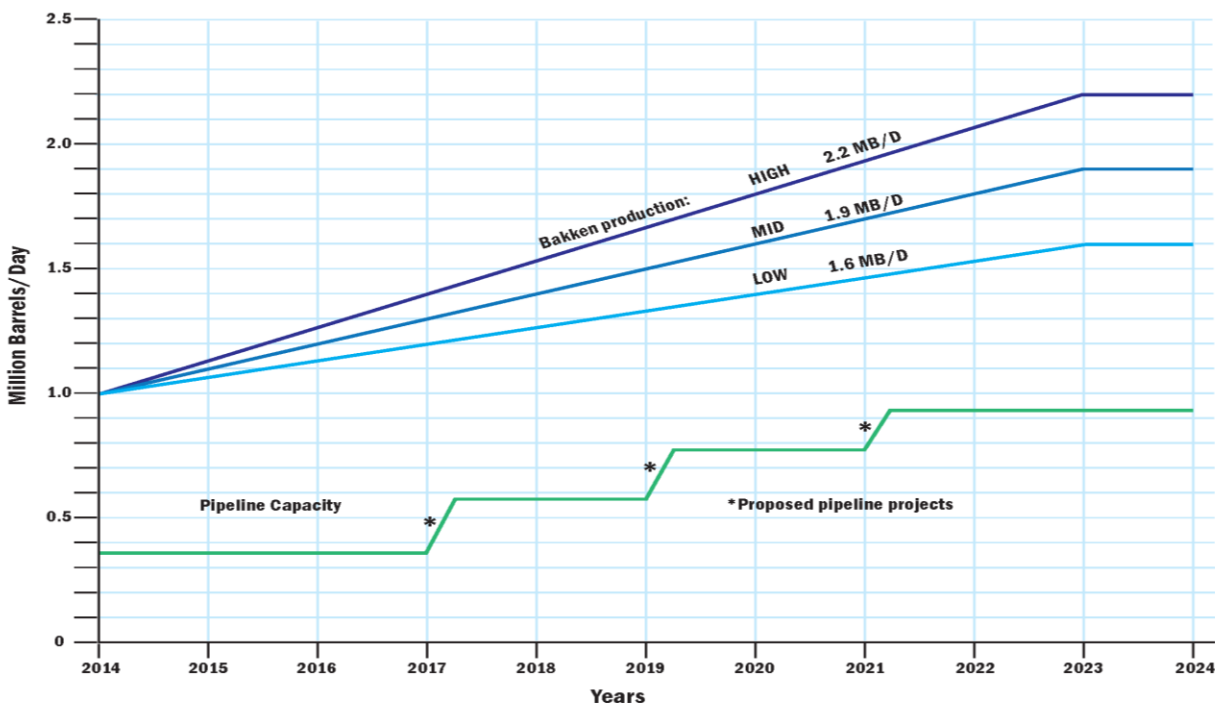
⁴⁷ Freight by Rail: United States. (April 2013). *Freedonia Focus Reports*.

⁴⁸ The remaining seven percent was trucked to Canadian pipelines or refined locally; North Dakota Pipeline Authority. (2014). Retrieved from <https://ndpipelines.files.wordpress.com/2012/04/ndpa-monthly-update-september-12-2014.pdf>.

Projected pipeline expansions

Figure 8 shows the projected low, middle, and high levels of Bakken growth in production with current and projected pipeline capacity increases⁴⁹. Three proposed Minnesota pipeline expansions projects may be dedicated all or in part to transporting Bakken crude oil in the next decade for a total of 735,000 barrels per day⁵⁰. Figure 9 includes projections for Canadian crude oil production.

Figure 8: Bakken production projections and pipeline capacities⁵¹

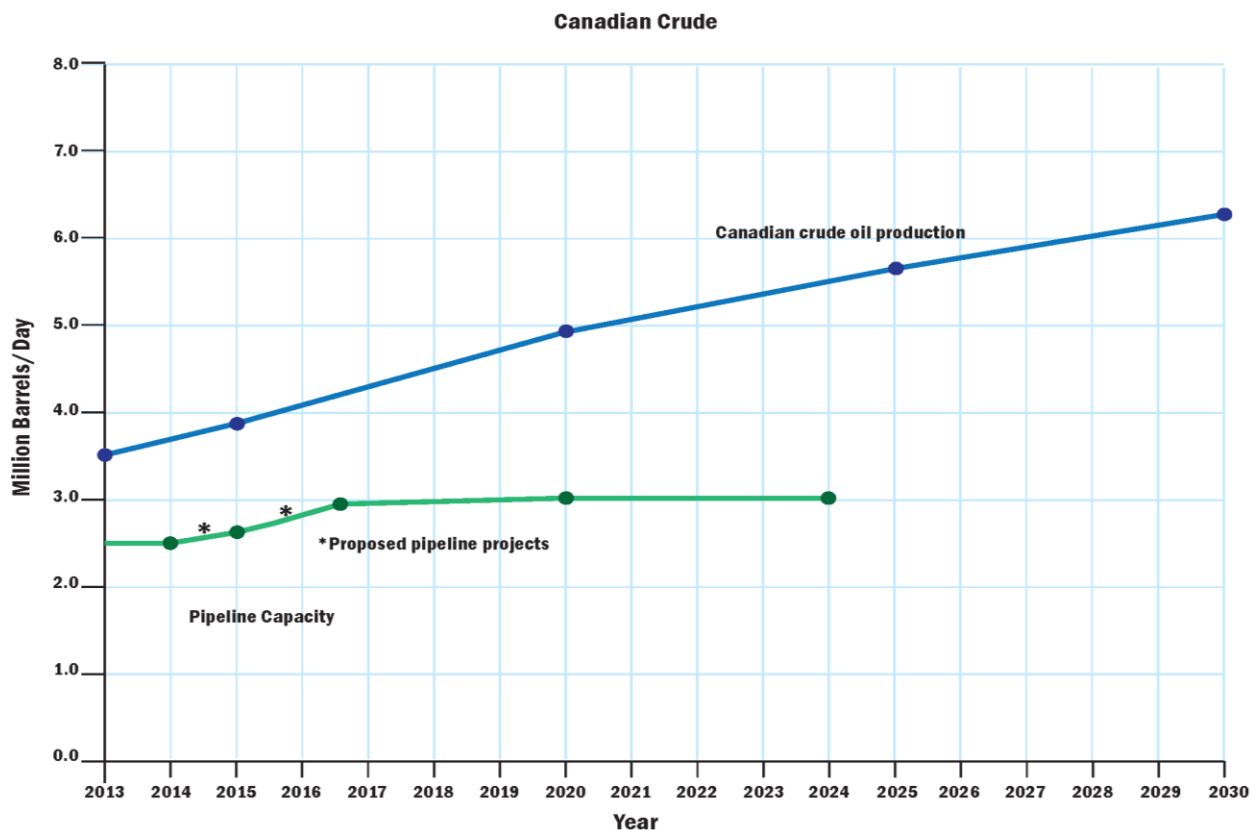


⁴⁹ For the purpose of the graph only, it is assumed that all three pipeline expansions through Minnesota would transport Bakken crude oil.

⁵⁰ This information assumes a largely uncontested permitting and environmental review process in each case. To the best of our knowledge, no other pipelines will come online during the next decade.

⁵¹ Analysis by Minnesota Department of Commerce and Department of Transportation. 2014.

Figure 9: Canadian crude projections and pipeline capacities⁵²



Assuming pipeline and railroads are directly substitutable would be a simplification. In many ways, they act like complements. Producers frequently transport oil by both modes on its way from well to refinery. As one BNSF vice president noted, “You might think of pipelines as our competitor, and they are, but they’re also becoming our customers.”⁵³

It also may be true that any increase in pipeline and rail access in the Bakken region would allow the industry to increase oil output. In this case, increased pipeline access may not lead to decreased rail congestion, as increased production would still meet capacity for all transport options.

To that point, Figure 10 shows the potential range of crude oil trains traveling daily across Minnesota railroads. This estimate reflects the difference between the capacity of pipelines described above and the range of increasing Bakken crude oil production achieved. The number of trains assumes 70% of this difference will move east and south through Minnesota. A single unit train of crude oil with 110 tank cars is calculated to carry 3.3 million gallons or 78,500 barrels on each loaded trip.

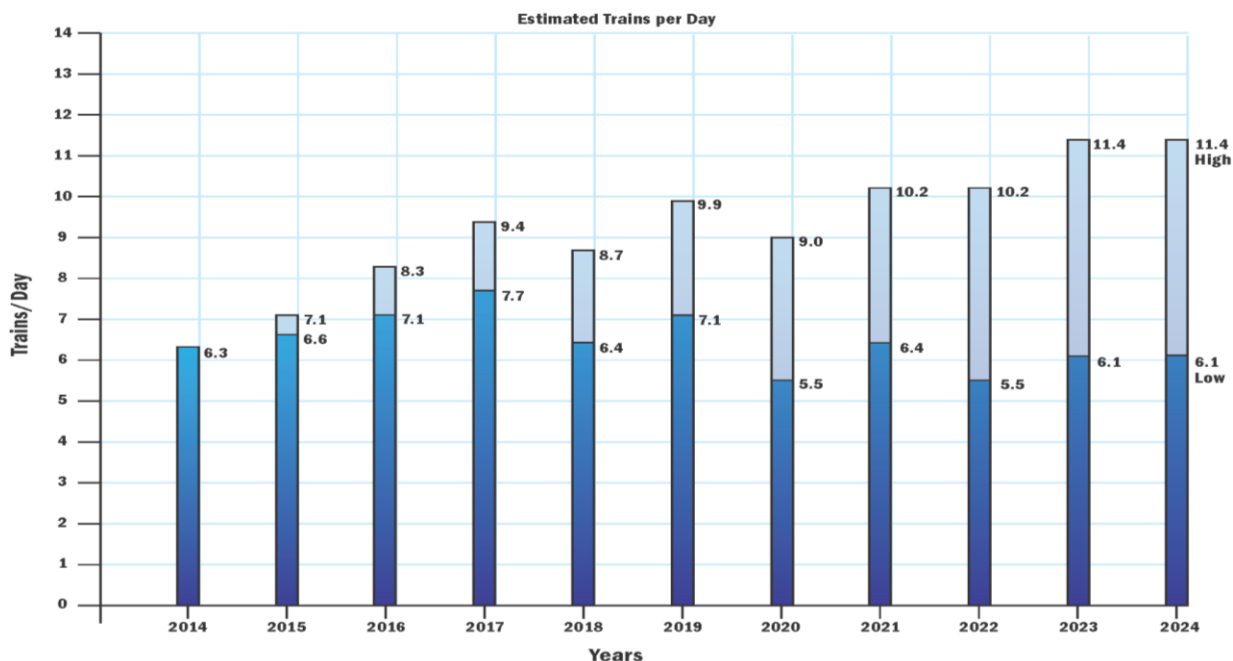
⁵² Analysis by Minnesota Department of Commerce and Department of Transportation. 2014.

⁵³ Philips, M. (2013, June 13). Amid U.S. Oil Boom, Railroads Are Beating Pipelines in Crude Transport. *Bloomberg*. Retrieved from: <http://www.businessweek.com/articles/2013-06-13/amid-u-dot-s-dot-oil-boom-railroads-are-beating-pipelines-in-crude-transport>

Figure 10: Estimated trains per day⁵⁴

Dark blue portion of bar represents number of unit trains needed to meet the low Bakken production projection shown on Figure 8.

Light blue portion of bar represents number of unit trains needed to meet the high Bakken production projection shown on Figure 8.



Downstream economic impacts

The increase in shipping of Bakken crude by rail and the resulting congestion has hurt Minnesota’s farming, mining, energy, retail, and manufacturing industries.⁵⁵ Increased prices and delays have made it more difficult for producers to get inputs to maintain operations or send goods to market.

Agricultural exports in Minnesota have nearly tripled in the last decade and accounted for \$8.2 billion in revenue in 2012.⁵⁶ This trend continues: In 2014 the U.S. Department of Agriculture announced record-setting values for U.S. agricultural export.⁵⁷ Unpredictable rail service jeopardizes Minnesota producers’ ability to stay competitive in overseas markets. This is especially true for soybeans, the state’s major agricultural export. Most soybeans are shipped between October and February, and any delay risks losing market access, particularly to South America. Brazil and Argentina, the second and third largest soybean producers, harvest and export their soybeans in late-February or March.

⁵⁴ Analysis by Minnesota Department of Commerce and Department of Transportation. 2014.

⁵⁵ Shaffer, D. (2014, March 21). Rail Delays Hurt Energy and Commodities. *Star Tribune*. Retrieved from: <http://www.startribune.com/business/251623281.html>

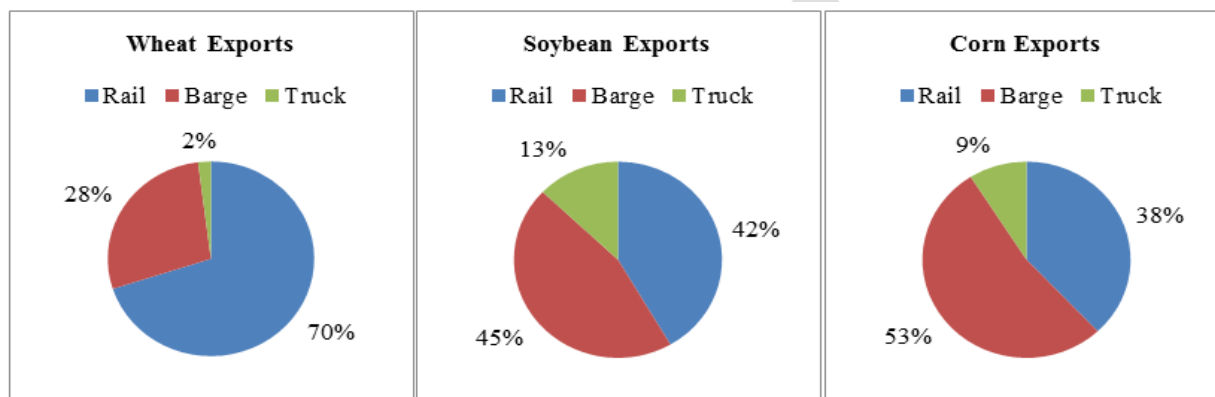
⁵⁶ U.S. Department of Agriculture, Economic Research Service. 2013. [U.S. Agricultural Exports, Commodity detail by State \[New series\]: CY2000-2012.](http://www.ers.usda.gov/data-products/state-export-data.aspx) <http://www.ers.usda.gov/data-products/state-export-data.aspx>

⁵⁷ U.S. Department of Agriculture, Office of Communications. (2014). Statement from Agriculture Secretary Tom Vilsack on 2014 U.S. Agricultural Exports Setting New Record, Press Release No. 0247.14. Retrieved November 2014, from <http://www.usda.gov/wps/portal/usda/usdahome?contentid=2014/11/0247.xml&contentidonly=true>

Grains and oilseeds are shipped by rail, barge, and truck. Major Minnesota agricultural commodity exports, like corn, soybeans, and wheat depend mostly on rail and barge services to move crops to ports; domestic movements are largely handled by trucks.

Figure 11 displays the transportation summaries for the major state exports.⁵⁸ As outbound logistics for Minnesota’s agricultural production become constrained, supply chain capacity constraints and delays weaken the basis price and reduce cash flow in agricultural areas.

Figure 11: U.S. modal share summary – 5-year average (2006–2011)⁵⁹



Additionally, there are increased carryover storage costs during the season. Producers and elevators in Minnesota and beyond have reached storage limits. Elevators have been unable to accept grain from producers as they have run out of storage, waiting for rail cars to haul existing grain.⁶⁰ The need for reliable transportation has intensified with predicted record-level corn and soybean harvests in Minnesota and the U.S.

Yet rail prices continue to rise. In a testimony to a joint Minnesota House and Senate panel, Department of Agriculture Commissioner Dave Frederickson said many farmers have been priced out of grain and soybean transport altogether. He noted oil companies are willing to pay up to 500% more for rail cars than in recent years.⁶¹ This price increase cost Minnesota farmers an estimated \$109 million between March and May 2014.

Oil by rail displaces more than just soybeans and corn, according to IMPLAN’s regional input-output table, other top spenders for rail transport are electric power generation, truck transport (via intermodal

⁵⁸ Sparger, A., and Marathon, N. *Transportation of U.S. Grains: A Modal Share Analysis*, May 2013. U.S. Department of Agriculture, Agricultural Marketing Service. <http://dx.doi.org/10.9752/TS049.05-2013>

⁵⁹ Sparger, A., and Marathon, N. *Transportation of U.S. Grains: A Modal Share Analysis*, May 2013. U.S. Department of Agriculture, Agricultural Marketing Service

⁶⁰ J. Wilson, L. Mulvany, and M. Durisin. (2014, August 22) *Too Much Corn With Nowhere to Go as U.S. Sees Record Crop* Retrieved December 2014 from Bloomberg: <http://www.bloomberg.com/news/2014-08-22/too-much-corn-with-nowhere-to-go-as-u-s-sees-record-crop.html>

⁶¹ Avise, J. (2014, September 30). Joint Committee Seeks Answer to Rail Congestion. *Minnesota House of Representatives Public Information Service*. Retrieved from: <http://www.house.leg.state.mn.us/sessiondaily/SDView.aspx?StoryID=5317>

operations), flour milling and malt manufacturing, mining iron ore, and animal food manufacturing.⁶² Paper mills and breakfast cereal manufacturing are also among the largest regional rail users.

Silica sand, another major commodity, is used in hydraulic fracturing of the shale oil beds of the Bakken and other fields to release oil and gas.⁶³ Natural sand with the specific qualities needed to be what is generically known as a proppant, exists in few places within the U.S., but most notably in Illinois, Wisconsin, and Minnesota. Silica sand has been in increasingly high demand since the start of intensive oil and gas shale development after 2000 and producers are shipping the material almost entirely by rail to these areas.

The movements involve 100 car unit trains of gondolas or covered hoppers, with Minnesota railroad lines seeing roughly two loaded trains moving over the rail system each day, plus the empty return movements. All four Class 1 railroads are involved in these moves. While only a small percentage of rail traffic involves this material shipment, it is a significant and growing addition to the existing mix of rail traffic. Moreover, the silica sand unit train movements tend to use the same main lines that handle the majority of crude oil and grain shipments, exacerbating the main points of congestion in the rail network.

In contrast to railroads, pipelines interact downstream with a narrower set of industries and commodities – mostly in the energy sector (electric power generation, petroleum refineries, natural gas distribution, and transport by air and truck). This means, rather obviously, a full rail system will directly affect a far wider range of industries than full pipelines.

Upstream economic impacts

Just as there are downstream effects to increased pipeline and rail use, upstream suppliers have demand increases. The top input industries for transport by rail include maintenance and repair construction, securities, commodity contracts, and investments, petroleum refineries, monetary authorities, accounting services, and wholesale trade.⁶⁴ For transport by pipeline, they include petroleum refineries, maintenance and repair construction, environmental and professional services, employment services, and monetary authorities.

In the IMPLAN model, upstream inputs include only management of these industries. There is no explicit category for pipeline and rail construction in the Bureau of Economic Analysis input-output table. Instead, the Bureau groups it in the broader “construction of other new nonresidential structures.” This level of aggregation makes it difficult to determine upstream suppliers. Nevertheless, some of the relevant

⁶² IMPLAN Group. (2012). IMPLAN System (data and software). Huntersville, North Carolina. IMPLAN (**IM** pact analysis for **PLAN**ning) is an economic impact modeling system used to create models of local economies. IMPLAN enables users to examine state, multi-county, county, and metropolitan regional economies. The model incorporates social accounting matrices (SAMs) – an extension of input-output accounts, and the resulting SAM multipliers.

⁶³ A proppant is a small particle of material that holds open the cracks forced into the underground rock formations by the hydraulic fracturing to let the oil flow freely to the collection pipe in the well bore. A proppant may be natural sand grains, a resin-coated sand, or a manufactured ceramic particle. In each case, the particle must be able to stand extreme pressure (14,000 PSI or more) without crushing, be smooth enough to easily penetrate the cracks during the water injection process, and be consistent in size and purity to allow easy management of the slurry and predictable performance during fracking operations.

⁶⁴ IMPLAN Group. (2012). IMPLAN System (data and software). Huntersville, North Carolina.

suppliers for this category include architecture and engineering services, petroleum refineries, wholesale trade, monetary authorities, concrete and asphalt manufacturing, and fabricated metals manufacturing.⁶⁵

Not highlighted in that grouping is the obvious need for steel products in pipeline construction. In the U.S. in 2012, there were 9.6 million metric tons of oil and gas pipe products demanded. Of that product demand, 42% was in welded steel and 49% was in seamless steel, with the rest in fittings and plastic products.⁶⁶ Demand for oil and gas piping is projected to expand 4.9% annually from 2012 to 2017.

The presence of these upstream effects means that the proliferation of pipelines and railroads will offer new sources of product demand for Minnesota industry suppliers.

Employment and wages in pipeline and railroads

It is difficult to evaluate the number of pipeline and railroad employees. No complete data exist to compare the two modes, but a variety of sources can give a sense of the scale of ongoing operations.

Data from the Bureau of Labor Statistics shows Minnesota had 525 jobs in pipeline transportation and 1,396 employees in oil and gas pipeline construction in 2013.⁶⁷ Support activities for rail transportation employed 1,252 Minnesotans in 2014. Unfortunately, direct comparison with ongoing rail transportation is not possible because of incomplete data. Another private data source, the National Establishment Time-Series Database, indicates that companies engaged in railroad line-haul operating and switching and terminal establishments employed 3,580 Minnesotans in 2012.⁶⁸

⁶⁵ Ibid

⁶⁶ Oil & Gas Pipe: United States. (2013, October). *Freedomia Focus Reports*.

⁶⁷ The BLS defines Pipeline and Rail Transportation and Oil and Gas Pipeline & Related Structures Construction as: Industries in the Rail Transportation subsector provide rail transportation of passengers and/or cargo using railroad rolling stock. The railroads in this subsector primarily either operate on networks, with physical facilities, labor force, and equipment spread over an extensive geographic area, or operate over a short distance on a local rail line. Industries in the Pipeline Transportation subsector use transmission pipelines to transport products, such as crude oil, natural gas, refined petroleum products, and slurry. Industries are identified based on the products transported. The oil and gas pipeline & related structures construction comprises establishments primarily engaged in the construction of oil and gas lines, mains, refineries, and storage tanks. The work performed may include new work, reconstruction, rehabilitation, and repairs. Specialty trade contractors are included in this group if they are engaged in activities primarily related to oil and gas pipeline and related structures construction.

⁶⁸ Walls, Donald W. (2014). National Establishment Time-Series Database, 1995-2012. Establishments with SIC 4011 or 4013 and FIPS 27; The Association of American Railroads reported 4,095 railroad employees in Minnesota in 2010 (<http://bit.ly/1rMUso>).

Table 3: Private Minnesota employment in pipeline and rail industries (2013)⁶⁹

NAICS	Industry	2008	2009	2010	2011	2012	2013
486	Pipeline transportation	356	367	372	378	413	525
23712	Oil and gas pipeline and related Structures Construction	1,107	1,869	1,302	933	1,075	1,396
488210	Support activities for rail transportation	860	885	931	1,006	1,108	1,252
N/A	Railroad transportation*	4,517	3,817	3,626	3,559	3,580	N/A

The top three pipeline transportation (NAICS 486) occupations related to ongoing operations in Minnesota employed over 6,000 individuals (Table 4). The top four-rail transportation industry (NAICS 482) related occupations employed nearly 2,700 Minnesotans. Industry wages generally exceed the average state wage of \$50,100 in 2013.

Table 4: Occupational employment for pipeline and rail related industries (May 2013)⁷⁰

Mode	Occupation	Employment	Annual mean wage
Pipeline	Industrial Machinery Mechanics	5,890	\$50,940
Pipeline	Control and Valve Installers and Repairers, Except Mechanical Door	460	\$61,360
Pipeline	Gas Plant Operators	220	\$63,820
Pipeline	Petroleum Pump System Operators, Refinery Operators, and Gaugers	Not available	\$54,560
Rail	Railroad Conductors and Yardmasters	810	\$55,520
Rail	Rail-Track Laying and Maintenance Equipment Operators	790	\$32,470
Rail	Locomotive Engineers	740	\$52,110
Rail	Rail Car Repairers	320	\$52,870
Rail	Railroad Brake, Signal, and Switch Operators	Not available	\$51,120

⁶⁹ First three in list: QCEW, BLS, 2014. Last from NETS, Walls & Associates, 2014.

⁷⁰ OES, BLS, 2014. This table does not include construction related occupations.

Multiplier effects of pipeline and rail industries

Economic impact from increased investment in pipeline and rail ripples beyond direct industry employment. Indirect jobs arise from the industry purchasing inputs and workers spending wages in the community.

Construction phase

New construction of either pipeline or railroads boosts demand for labor in construction occupations and for products in related industries (for example, metal suppliers, compressors/pumps, digging equipment, and monitoring systems). The IMPLAN model classifies construction of railroads and pipelines in the non-descript “construction of other new nonresidential structures.” For this industry, every \$1 million in spending will create nearly 12 jobs in the Minnesota economy.⁷¹ In employment multiplier terms, every job created results in 2 total jobs added to the broader economy.⁷²

This construction multiplier has particular relevance as both rail and pipeline companies are making major state investments in the coming years. In 2014, Minnesota’s railroads were spending more than \$100 million in capital expenditures and maintenance activity. They expect to spend more than \$250 million annually over the next three years to address capacity shortfalls.⁷³ Exact spending on capital expenditures and maintenance by pipeline companies during the same period is unknown. For comparison, Enbridge anticipates the Sandpiper pipeline project would require a \$2.6 billion investment over a three-year period. The proposed pipeline would carry light crude across Minnesota, North Dakota, and Wisconsin. While these initial construction impacts are meaningful, it is important to remember that they are predominantly one-time effects that dissipate shortly after construction is complete.

Operations phase

As new railroads and pipelines are constructed, industries hire additional workers to manage the expanded operations. Every \$1 million increase in rail and pipeline industry sales in Minnesota will lead to the hiring of approximately 7.5 Minnesotans. In employment multiplier terms, every job in rail and pipeline transport means 3.7 and 3.4 total state jobs, respectively.⁷⁴ Put another way, one job in pipeline or rail translates to approximately 2.5 additional jobs in other Minnesota industries. However, ongoing operations in rail and especially pipelines require few employees. For example, a 2014 State Department report anticipates that the northern leg of the Keystone XL project will only support 35 permanent and 15 temporary operations jobs across the four states the pipeline travels.⁷⁵

⁷¹ IMPLAN Group. (2012). IMPLAN System (data and software). Huntersville, North Carolina. Jobs are specified in “job years.” E.g., if \$1 million in spending occurs in a year, we expect that number of jobs for the one year of the spending. We expect ongoing year-to-year spending and jobs for the operations phase, but construction spending is expected to last only a short period.

⁷² The multiplier is equal (direct effect + indirect effect (from supplier) + induced effect (from wages)) / (direct effect). For rail transport (2.05 direct jobs + 2.90 indirect jobs + 2.59 induced jobs) / (2.05 direct) = multiplier of 3.67.

⁷³ Proceedings from Minnesota Rail Summit. (2014, November 17). St. Paul, Minnesota.

⁷⁴ IMPLAN Group. (2012). IMPLAN System (data and software). Huntersville, North Carolina.

⁷⁵ Final Supplemental Environmental Impact Statement for the Keystone XL Project. (2014, January). U.S. Department of State. Retrieved from: <http://keystonepipeline-xl.state.gov/documents/organization/221135.pdf>

Impact on other industries from ongoing operations

Though pipeline and rails have similar multiplier effects, they interact differently with Minnesota industries. The top five industries affected by increases in pipeline transportation are in the service and repair sectors. The rail transportation industry has some similar impacts (services and repair), but also significant effects on banking and wholesale trade. The benefits of these vary based on the nature of the relationships, the amount of industry demand that Minnesota companies handle, and the ripples these suppliers create in their own networks. The tables below demonstrate the economic response for every \$1 million increase in industry sales.⁷⁶ Labor income represents wages paid to workers. Value added is the impact on state gross domestic product (GDP).

Table 5: Top five industries affected by \$1M increase in pipeline transportation sales (\$2014)⁷⁷

IMPLAN sector	Description	Employment	Labor income	Value added
337	Transport by pipeline	2.2	\$276,444	\$418,033
382	Employment services	0.6	\$18,289	\$20,472
39	Maintenance and repair construction of nonresidential structures	0.5	\$29,872	\$36,156
413	Food services and drinking places	0.3	\$7,165	\$11,052
375	Environmental and other technical consulting services	0.2	\$13,284	\$14,198

Table 6: Top five industries affected by \$1M increase in railroad transportation sales (\$2014)⁷⁸

333	Transport by rail	2.0	\$223,952	\$506,284
39	Maintenance and repair construction of nonresidential structures	0.6	\$35,614	\$43,106
356	Securities, investments, and related activities	0.4	\$27,105	\$23,609
413	Food services and drinking places	0.3	\$6,656	\$10,267
319	Wholesale trade businesses	0.2	\$14,724	\$23,083

⁷⁶ The IMPLAN model assumes an economy will react to new demand in a “normal” way. In other words, industries will fill demand for labor and supplies with local products in line with historical rates. In the case of a large project, local supplies of labor, capital or other inputs may not be able to meet that demand and producers will import supplies. If this occurs, the estimates may be overstated.

⁷⁷ IMPLAN Group, 2014; Analysis by DEED Economic Analysis Unit. Enbridge completed an economic impact analysis for the Sandpiper project. The summary is located here: <http://bit.ly/1tw0iL9>.

⁷⁸ Ibid.

Economic impact summary

The construction and management of pipelines and railroads has ramifications on the broader Minnesota economy. Jobs in these areas tend to produce above-average wages and have strong multiplier effects. Results from our IMPLAN model found a \$1 million investment in construction of pipelines results in about 12 direct and indirect jobs. One direct job in rail and pipeline operations means approximately 2.5 additional jobs throughout the state. While these represent good jobs for Minnesotans, many of them are temporary, and the scale is small relative to the overall state economy.

Employment gains are only one portion of the economic narrative. Minnesota must also weigh the ability of additional rail and pipeline construction to relieve congestion on transportation networks with the risk of negative side effects (for example, personal, environmental, and economic damage related to construction and spills).

Taxes

This section reviews tax laws that govern pipelines transporting crude oil and refined petroleum products in and through Minnesota. The discussion is broken down into three parts – property tax, sales tax, and corporate franchise tax.

Property taxes

Property tax is a levy-based, “ad valorem” tax. This means that property is taxed according to its estimated market value. Property tax is a source of revenue for local taxing jurisdictions as well as the state general fund.

A levy-based property tax system starts with local taxing jurisdictions determining the amount of revenue needed from the property tax levy. The levy is then spread among all taxable properties in the jurisdiction. The state general property tax works in the same way with the state general levy being set by legislature. Because the property tax levy is a set amount, if one property or type of property pays more in tax, other properties or property types will pay less. The addition of new property does not generate any new local or state property tax revenue.

Local taxing jurisdictions impose property tax on that portion of the pipeline’s taxable market value attributable to the portion of the pipeline located within the local jurisdiction. The state imposes property tax on that portion of the pipeline’s taxable market value attributable to the portion of the pipeline within the state.

Determining taxable market value for pipelines

Pipelines are valued under a “dual” property tax system:

- The Department of Revenue values the pipeline’s operating property, which includes items like pipes and pumping stations.
- Land or other real property owned by pipeline companies that is not part of the operating property is assessed locally by a city or county assessor.

To value the pipeline’s operating property, the Department of Revenue uses the “unit value” method.

First, the unit value is determined. This value includes the entire system, which may be spread over many counties, states, or even countries. A variety of models, such as the depreciated original cost model, market data of equity and debt models, and anticipated income-based valuation models are completed. Then the results of these different models are compared and reconciled to determine the unit value.

Next, the portion of the unit value attributed to Minnesota is calculated based on percentages of cost and income within Minnesota as compared to the entire system. The value of property that is exempt or locally assessed is removed. The remaining statewide value is spread out among all of the different parcels in all of the local jurisdictions where the property is located.

Finally, these values may be equalized with other property in each county that is classified as Commercial/Industrial, which is the same classification for pipeline property. The Department of Revenue certifies these equalized values for each parcel to the counties, where they are combined with the locally assessed values to determine the taxable market value for each parcel.

Using taxable market values to calculate property tax

After each parcel's taxable value is established, pipeline property is treated like other business property for property tax purposes. There are three components to the parcel's tax: 1) the state property tax, 2) the local jurisdiction net tax capacity taxes, and 3) local jurisdiction referendum market value taxes (Table 7).

The parcel's taxable market value is multiplied by its classification rate to determine its net tax capacity. The classification rate for pipeline property, as well as for most other business property, is 2% of market value.⁷⁹

A parcel's net tax capacity is multiplied by the state property tax rate to determine the parcel's state property tax. The state property tax rate is based on the legislatively mandated state general levy divided by the net tax capacity of the affected properties. Revenue from this tax goes to the state general fund.

A parcel's net tax capacity is multiplied by the local tax rate to determine the parcel's local jurisdiction net tax capacity tax. The local tax rate is based on the property tax revenue needed, divided by the total tax capacity.⁸⁰ This tax is distributed to the city, county, school, and special taxing districts that contain the parcel.

Finally, the parcel's taxable market value is multiplied by the local jurisdiction's referendum market value rates to determine the parcel's referendum market value taxes. Most referendum taxes go to school districts, with a small portion for cities and counties.

⁷⁹ Per M.S. 273.13, subdivision 24, most commercial, industrial, and utility property is classified as 3a and has a classification rate of 1.5% on the combined real and personal property on the first \$150,000 of value of each entity in each county, then 2% on the remaining value. However, personal property that is tools, implements, and machinery has a classification rate of 2% on its entire market value.

⁸⁰ The total property tax revenue needed for a local jurisdiction equals the total proposed local budget minus all non-property tax revenue (state aid and fees). The total tax capacity for a local jurisdiction equals the total taxable market value in that jurisdiction multiplied by the classification rate.

Table 7: A parcel's total property tax equals the sum of the following three taxes

State property tax	=	parcel taxable market value × classification rate (2%) × state tax rate (52.16% for 2014)
Local jurisdiction net tax capacity	=	parcel taxable market value × classification rate (2%) × local net tax capacity rate (rates vary by jurisdiction ⁸¹)
Market value tax	=	parcel taxable market value × local referendum rates (rates vary by location ⁸²)

Property tax paid by pipeline companies

There are two main types of transportation pipeline in Minnesota – petroleum and natural gas. There are about 4,100 miles of petroleum pipeline in Minnesota. There are about 5,500 miles of natural gas pipeline. Table 8 identifies the estimated 2014 taxable market value of and property taxes paid by petroleum and natural gas pipeline.

Table 8: Estimated 2014 taxable value and property taxes paid (\$ millions)

Property type	Miles	Taxable market value	State tax	Local taxes	Total taxes	Effective tax rate
Petroleum	4,100	\$2,139	\$20	\$52	\$72	3.3%
Natural gas	5,500	\$960	\$9	\$23	\$32	3.3%
Overall commercial and industrial		\$68,795	\$687	\$2,001	\$2,688	3.9%

Sales and use tax

Sales tax is a transactional tax that applies to Minnesota retail sales of taxable services and tangible personal property. A “retail sale” means any sale, lease, or rental of tangible personal property for any purpose other than resale, the sale of certain services, and the sale of specified digital goods. Businesses collect sales tax on goods and services sold at retail and remit the sales tax on behalf of the purchaser to the state.

Use tax is due on taxable goods and services used in Minnesota if no sales tax was paid at the time of purchase. If an out-of-state seller does not collect any sales tax on taxable goods, or collects tax at a lower rate, then the purchaser must pay use tax directly to the state.

The Minnesota state sales and use tax rate is 6.875%. A portion of the state sales and use tax equal to 6.5% is deposited in the state’s general fund. The remainder, equal to 0.375%, is deposited in the state’s legacy funds to benefit Minnesota’s natural and cultural resources. Some local governments impose a

⁸¹ In 2013, this rate ranged from 34% to 406%, with a mean of 98% and median of 92%.

⁸² In 2013, this rate ranged from 0% to 0.87%, with a mean of 0.21% and median of 0.18%.

local general sales tax, usually to fund a specific capital project. The current rates for these local taxes range from 0.15% to 1.0%.

Generally, pipeline companies are considered to be in the “midstream” portion of the energy sector. They do not usually own the products they are transporting. They are transportation intermediaries that move the product from the producers and shippers to the marketplace. Producers and shippers pay pipeline companies to transport their product. Transportation services are not subject to sales tax under current law. Thus, pipeline companies do not collect sales tax from their customers that purchase transportation services.

Pipeline companies do, however, pay sales or use tax on purchases of pipeline materials. These materials include things like pipe, fittings, valves, nuts, bolts, and tools used in construction. The materials do not qualify for any exemption in Minnesota because the pipeline company is not considered to be engaged in industrial production. Similarly, the purchase of gas as compressor fuel to be used by the pipeline companies in their compressors within the pipeline system is subject to sales or use tax.

Sales and use tax exemptions

Minnesota has three categories of exemptions:

- user exemptions such as resale and industrial production
- product exemptions such as food and food ingredients, and clothing
- entity exemptions such as federal government and certain nonprofit organizations

In general, sales of tangible personal property are subject to sales and use tax in Minnesota unless there is an exemption. Sales of services, including transportation services, are generally not subject to sales and use tax unless explicitly made taxable by Minnesota statute.

Sales and use tax paid by pipeline companies

For new pipelines in 2013, taxable pipeline materials accounted for approximately 42% of construction expenditures. These taxable pipeline materials are subject to the sales and use tax rate of 6.875%. Labor accounted for about 50% of construction expenditures, with land and right-of-way expenses making up much of the rest. Labor and these other expenses are not subject to sales and use tax. The materials cost for each mile of new pipeline construction was reported to cost between \$100,000 and \$1.2 million nationally (\$6,875 to \$82,500 in sales and use tax per mile at the Minnesota rate) in 2013.⁸³ New pipeline construction in Minnesota would have been expected to generate about \$20,000 to \$40,000 in sales and use tax revenue per mile in 2013.

For existing pipelines, sales or use tax is paid on most materials purchased for ongoing maintenance and repair. In 2012, when there was no significant new construction, pipeline companies in Minnesota (including crude oil, refined products, and natural gas) remitted approximately \$2.2 million in use tax. Additionally, sales tax was likely collected and remitted by other businesses for taxable maintenance and repair materials those suppliers sold to the pipeline companies. The fiscal year 2012 statewide total sales and use tax remitted for all taxable transactions was about \$5 billion.

⁸³ Oil & Gas Journal, 9/1/2014 “Crude oil pipeline growth, revenues surge; construction cost mount.” In 2013, the range of costs for industry reported national pipeline construction was large and depends on a variety of factors, including pipeline diameter, year to year materials cost changes, geographic location, terrain, and population density. In addition, the cost appears to be increasing faster than inflation over time.

Corporate franchise tax

Corporations that operate in Minnesota are subject to Minnesota’s corporate franchise tax. The tax base begins with federal taxable income with some state modifications. For Minnesota purposes, this is known as net income. Corporations that have a common owner and operate together in a manner that provides a flow of value between them are known as unitary groups and are required to report the income of all member corporations on a combined return.

Many corporations operate in more than one state. Under the U.S. Constitution, a state can tax only the income of a business that is “fairly apportioned” to its activity in the state. Starting in tax year 2014, Minnesota’s formula apportionment is determined by calculating a percentage equal to a corporation’s sales to Minnesota customers, divided by all of the corporation’s sales. This is referred to as the sales factor. Taxable net income is determined by multiplying net income by the sales factor:

$$\text{Net Income} \times \frac{\text{Sales to MN Customers}}{\text{Sales to All Customers}} = \text{Taxable Net Income}$$

After a corporation’s taxable net income is determined, it is reduced by loss carryovers and certain other modifications to arrive at taxable income, which is multiplied by the corporate income tax rate of 9.8% to determine the corporation’s tax. The tax may then be reduced by various tax credits.

In addition to the corporate franchise tax, a minimum fee based on the sum of the corporation’s Minnesota property, payroll, and sales is also imposed. The schedule for the fee, indexed for inflation each year, is shown to the right.

Revenues from the corporate franchise tax and the minimum fee are deposited in the state general fund.

Table 9: Minimum fee schedule

Value of Minnesota property, payroll and sales	Minimum fee amount
Less than \$930,000	\$0
\$930,000 - \$1,869,999	\$190
\$1,870,000 - \$9,339,999	\$560
\$9,340,000 - \$18,679,999	\$1,870
\$18,680,000 - \$37,359,999	\$3,740
\$37,360,000 or more	\$9,340

Corporate franchise tax applicability

If a pipeline company is organized as a corporation and operates a pipeline in Minnesota, then the company is subject to the corporate franchise tax.

For apportionment purposes, sales from providing transportation services are attributed to where the product is delivered. In other words, taxable net income is determined by multiplying net income by the sales factor:

$$\text{Net Income} \times \frac{\text{Sales for Product Delivered to MN Destinations}}{\text{Sales for Product Delievered to All Destinations}} = \text{Taxable Net Income}$$

A pipeline that runs through Minnesota and has destination terminals in Minnesota will have sales for product delivered to a Minnesota destination. As a result, the sales factor will be greater than 0 % and results in some Minnesota corporate franchise tax. A pipeline that runs through Minnesota, but does not have a destination terminal in Minnesota will have no sales for product delivered to a Minnesota

destination. As a result, the sales factor will be 0% and results in no corporate franchise tax. There are about 14 unitary groups filing Minnesota corporate franchise tax returns that include pipeline activity within Minnesota. Of these, the amount of corporate franchise tax has varied over the past three years, ranging between \$500,000 and \$1.3 million, while over the same timeframe, the total corporate tax paid in Minnesota averaged about \$1.2 billion per year.

Constitutional provisions

Minnesota, like all states, needs to consider constitutional provisions, including the commerce clause and foreign commerce clause, when developing tax policy and law.

The commerce clause grants Congress the power to regulate commerce among the states.⁸⁴ The United States Supreme Court has long held that a negative implication of this grant of power is that states may not adopt regulations or taxes that place an “undue burden” on interstate commerce, even if Congress has taken no action. The most obvious discriminatory taxes explicitly tax out-of-state parties while not taxing in-state parties. Taxes that are facially neutral, but have a disparate impact on out-of-state parties are similarly invalid under the dormant commerce clause.

The foreign commerce clause grants Congress the power to regulate commerce with foreign nations.⁸⁵ When evaluating the foreign commerce clause, a two-prong test is considered: 1) whether the tax, notwithstanding apportionment, creates a substantial risk of international multiple taxation; and 2) whether the tax may impair federal uniformity and prevent the federal government from speaking with one voice when regulating commercial relations with foreign governments.

⁸⁴ U.S. Const. art. II, § 8.

⁸⁵ U.S. Const. art. I, § 8, cl. 3

Findings and considerations

Market uncertainty and oil production

- In the short term, oil price fluctuations have little impact on production in North Dakota – large capital investments by oil firms take time to wind down. In the long term, declining prices would lead to declining production.
- North Dakota’s Department of Mineral Resources estimates breakeven points as low as \$27 a barrel in North Dakota’s Dunn and McKenzie counties.

Transportation

- The continuing growth of Canadian and Bakken crude oil production will ensure full use of all existing and proposed pipeline capacity. Railroads will continue to serve as the main transport option for any oil that cannot be shipped by pipeline.
- Assuming pipeline and railroads are directly substitutable would be a simplification. In many ways, they act like complements. Producers frequently transport oil by both modes on its way from well to refinery.
- The high degree of product pipeline interconnection between the Midwest and the Gulf and East Coasts, reduces price volatility for consumers in the Midwest. Increased pipelines can connect regions, pooling risk and insulating regions when they experience a supply disruption.
- Additional rail and pipeline construction should decrease present system congestion, but state must still continue to weigh the relative merits and impacts of each mode to determine the amount and mix of transport.

Jobs

- The construction and management of transportation by pipelines and railroads add valuable jobs to the Minnesota economy. These jobs, however, represent only a small portion of overall state employment.
- Every \$1 million in rail or pipeline construction spending creates 12 direct and indirect jobs in the broader Minnesota economy. In employment multiplier terms, one construction job results in 2.2 total employees in the state.
- On the ongoing operations side, every \$1 million increase in rail and pipeline industry sales by Minnesotan firms leads to approximately 7.5 jobs in the state. Pipeline and rail transport jobs have an employment multiplier of 3.7 and 3.4, respectively. Moreover, these jobs tend to pay above average wages.

Taxes

- Property tax is levy-based and is imposed on that portion of the pipeline’s taxable market value attributable to the portion of the pipeline located within the local jurisdiction. Pipelines are valued under a “dual” property tax system:
 - The Department of Revenue values the pipeline’s operating property, which includes items like pipes and pumping stations.
 - Land or other real property owned by pipeline companies that is not part of the operating property is assessed locally by a city or county assessor.
- Sales tax is a transactional tax that applies to Minnesota retail sales of taxable services and tangible personal property. Regarding pipelines, sales and use tax is generated primarily during the construction phase when the tangible personal property is purchased. For every \$1 million

of new pipeline construction expenditures, the taxable pipeline materials would be approximately \$420,000, which could generate around \$28,875 in sales and use tax revenue.

- Corporations that operate in Minnesota are subject to Minnesota's corporate franchise tax. There are about 14 unitary groups filing Minnesota corporate franchise tax returns that include pipeline activity within Minnesota.

DRAFT

Environmental and human health impacts

This section does not represent an exhaustive list of the environmental and human health risk associated with pipeline construction and operation; rather it is a high-level review of the potential impacts. In instances where there is a proposed pipeline route, the site specific concerns may be different and individually evaluated and addressed during the approvals process. The environmental and human health concerns raised by state agencies cover a wide range – some of which involve both local concerns and some national and global concerns.

The environmental resources potentially impacted by pipelines can be summarized in the following groups:

- **Soils and agricultural resources**
- **Public lands**
- **Vegetation**
- **Wildlife and fisheries**
- **Surface and groundwater**
- **Climate change – environmental impacts**

The human health concerns associated with pipelines can be summarized in the following groups:

- **Environmental justice and health equity**
- **Social determinants of health**
- **Potential hazardous materials**
- **Climate change – human health impacts**
- **Worker influx**

Potential environmental resource impacts

Soils and agricultural resources

Pipelines traversing Minnesota cross through different soil types and varied topography. Potential impacts include soil erosion, loss of topsoil, soil compaction, an increase in the proportion of large rocks in the topsoil, soil mixing, soil contamination, and related reductions. Water quality can be impacted by erosion and sedimentation caused by construction and other pipeline related operations. Pipelines can adversely impact farms by interfering with agricultural operations, damaging crops, and damaging structures and other land improvements on the farm.

- **Soil mixing** – A potential impacts of pipeline construction is the mixing of topsoil and subsoil in construction of the pipeline trench. Soil can be mixed together from the digging of the pipeline trench and the subsequent burial of the pipeline with stockpiled soil. By mixing topsoil and subsoil, the organic matter and nutrients contained in the topsoil are diluted, which impacts agricultural productivity. Once mixing has occurred, it is very difficult and costly to mitigate. Rocks may also be brought to the surface during construction and their removal can be costly to farmers.
- **Soil compaction** – The pressing together of soil particles such that the pore space between the particles is reduced, thereby reduces water, nutrients, and the exchange of gases for plant roots. In pipeline construction, the biggest culprit in compaction is often the “stringing truck” that delivers pipe to the construction site. Compaction and mixing from construction can be made worse by wet soils or fine-textured soils.
- **Subsidence** – A nearly opposite issue to compaction is overly loose soils over the pipeline immediately after backfilling the trench. Over time, the soil settles, resulting in a dip in the field over the pipeline.
- **Drainage** – Pipeline construction or large pipeline installation in crop fields can damage or obstruct drainage systems. Agricultural water management is critical for productive agriculture. Subsurface drainage and drainage ditches are installed below the surface of fields to maintain drainage. Pipeline construction is often at a depth greater than the depth of subsurface drain tile, and so drain tile is often severed, and repair is required. In addition, when pipelines are of a large diameter, they can create an obstacle to drainage if they are at the same depths required for installation of drain tile.
- **Impacts to organic farms** – In contrast to conventional farms, organic agriculture poses a special set of issues. Because organic farming operations are unable to use synthetic pesticides and fertilizers, soil tilth, the combination of soil structure, organic matter, nutrients, and other factors important to plant growth, is especially important for an organic farm to maintain. The high level of soil tilth for an organic farm requires a considerable investment of effort and years to achieve. Standard mitigation and restoration required of pipeline projects will not prevent loss of soil tilth, and the time required to restore it can also take years, with the potential for considerable economic loss.

In addition to the importance of maintaining soil tilth is the risk of loss of organic certification. The U.S. Department of Agriculture organic certification prohibits most synthetic herbicides and pesticides, and requires a transition period of 36 months prior to certification during which no synthetic inputs are used. The potential introduction of prohibited substances, such as leaked fluids from construction equipment, or pesticides in water flowing in the pipeline trench from a neighboring farm, can threaten an organic farm’s certification.

Public lands

The crossing of public lands can affect natural communities, habitat, and the quality of recreational experiences and in some cases it conflicts with the purposes for which certain areas were established. Some public lands, such as wildlife management areas and waterfowl production areas, are of a particular high risk, while in scientific and natural areas,⁸⁶ and state parks, large petroleum pipeline construction not usually authorized. The following areas may or may not have existing protections from pipeline construction, but all areas have valuable resources and ecological communities that are put at risk with pipeline development:

- **Aquatic management areas** – These areas are established, “to protect, develop, and manage lakes, rivers, streams, and adjacent wetlands and lands that are critical for fish and other aquatic life, for water quality, and for their intrinsic biological value, public fishing, or other compatible outdoor recreational uses.”⁸⁷
- **Wildlife management areas** – Wildlife management areas are established, “to protect those lands and waters that have a high potential for wildlife production and to develop and manage these lands and waters for the production of wildlife, for public hunting, fishing, and trapping, and for other compatible outdoor recreational uses.”⁸⁸
- **State conservation easements** – Conservation easements⁸⁹ refer to, “nonpossessory interest of a holder in real property imposing limitations or affirmative obligations the purposes of which include retaining or protecting natural, scenic, or open-space values of real property, assuring its availability for agricultural, forest, recreational, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural, archaeological, or cultural aspects of real property.”⁹⁰
- **Prairie bank easements** – A native prairie bank easement is a voluntary agreement between a landowner and the Department of Natural Resources. The landowner agrees to manage the land under an easement in ways that protect the native prairie in exchange for payment. Each easement is tailored to the unique character of the land and desires of the landowner, with common protection features such as no plowing or building on the native prairie.
- **State parks** – State parks are established, “to protect and perpetuate extensive areas of the state possessing resources which illustrate and exemplify Minnesota's natural phenomena and to provide for the use, enjoyment, and understanding of such resources without impairment for the enjoyment and recreation of future generations.”⁹¹
- **State recreation areas** – Recreation areas are established, “to provide a broad selection of outdoor recreation opportunities in a natural setting which may be used by large numbers of people.”⁹²
- **State forests** – State forests are established, “...for growing, managing, and harvesting timber and other forest crops and for the establishment and development of recreational areas and for the

⁸⁶ Minn. Stat. Section 86A.05, subd. 5; Minn. Rules Chapter 6136

⁸⁷ Minn. Stat. § 86A.05

⁸⁸ Ibid.

⁸⁹ Minn. Stat. Chapter 84C

⁹⁰ Minn. Stat. § 86C.01

⁹¹ Minn. Stat. § 86A.05

⁹² Ibid.

protection of watershed areas, and the preservation and development of rare and distinctive species of flora native to such areas.”⁹³

- **DNR Division of Forestry administered lands and School Trust Fund lands** – Pipeline construction and maintenance through these lands might be detrimental to future revenues. Encumbrance of land affects economic value of parcel, limiting economic uses for the right of way and possibly in the vicinity of the right of way. Examples of effects are loss of future timber harvest or encumbrance of minerals or aggregate. Routes passing through School Trust Lands must produce maximum long-term economic return for the trust. Normal reimbursement for existing timber would be common to all forest lands, but land types will impact specific compensation, and there may be variability in required compensation.
- **State trails** – State trails are established “to provide a recreational travel route which connects units of the outdoor recreation system or the national trail system, provides access to or passage through other areas which have significant scenic, historic, scientific, or recreational qualities or reestablishes or permits travel along a historically prominent travel route or which provides commuter transportation.”⁹⁴ Minnesota also has a network of state water trails, providing recreational opportunities such as canoeing and boating. Pipeline projects crossing rivers might require use of temporary bridges, and crossings of trails require detours. Temporary bridges and other trail obstacles that are kept in place during the construction period will be obstacles to such traffic, and perhaps at times involve safety issues.
- **Other public and nonprofit lands** – Other public and non-profit lands such as the U.S. Fish and Wildlife waterfowl productions areas, national wildlife refuges, and the Nature Conservancy lands can also be affected by pipeline construction and operation.

⁹³ Ibid.

⁹⁴ Ibid.

Vegetation

Potential construction and operations related impacts to general terrestrial vegetation resources associated with the pipelines can have short term and long term consequences, including habitat loss, degradation, and fragmentation. High quality, high value natural communities, wetlands, and other large blocks of habitats are put at risk particularly during pipeline construction. Some of the following landscapes and ecosystems are afforded protections under state and federal law, while others are not and therefore at greater risk:

- **Peatland scientific and natural areas** – There are approximately 6 million acres of peat organic soils and native plant populations of spruce, tamarack, and sedges exist in Minnesota. Peatlands serve as important water reservoirs, the significance of which has yet to be fully understood. Construction of new corridors of disturbance associated with pipelines through peatlands is a prohibited activity.⁹⁵
- **Calcareous fens** – Many of the unique characteristics of calcareous fens⁹⁶ result from the upwelling of groundwater through calcareous substrates making them rare and distinctive wetlands. Fens are highly dependent on delicate groundwater hydrology and can be indirectly affected by activities several miles away from the fen.
- **Native prairie** – Native prairie once abundant, is now a rare ecosystem with more than one-third of Minnesota’s endangered, threatened, and special concern species are dependent on the remaining small fragments of Minnesota’s prairie ecosystem. These lands include grassland that has never been plowed and contains floristic qualities representative of prairie habitats.⁹⁷ Given the rarity of native prairies and the potential for state-listed species to occur within native prairie habitat, it is ideal to avoid all native prairie remnants. If avoidance is not feasible, rare species surveys may be required.
- **Areas of biodiversity significance and native plant communities** – A site’s biodiversity significance rank is based on the presence of rare species populations, the size and condition of native plant communities within the site, and the landscape context of the site. These ranks are used to communicate the statewide native biological diversity significance of each site to natural resource professionals, state and local government officials, and the public. The biodiversity ranks help to guide conservation and management.
- **Rare natural plant communities** – Permanent impacts to rare natural communities are not allowed by the Wetland Conservation Act.⁹⁸ Rare natural communities under the act are have a prescribed conservation status, are mapped or determined by the Department of Natural Resources to be eligible for mapping by the Natural Heritage Information System,⁹⁹¹⁰⁰ while local government units are responsible for determining whether permanent impacts to rare natural communities will occur.
- **Old growth forests, ecologically important lowland conifers, representative sample areas, and high conservation value forests** – In accordance with the Department of Natural Resources forest management policy the avoidance of all old growth special management zones (330 feet surrounding the old growth perimeter) is necessary to maintain statewide forest certification. The department’s

⁹⁵ Minn. Stat. § 84.035 Subd. 5(a)5

⁹⁶ The DNR maintains a list of known calcareous fens, which is available at the DNR’s website at: <http://www.dnr.state.mn.us/eco/wetlands.html>.

⁹⁷ See the remaining prairie map at the following site: http://files.dnr.state.mn.us/eco/mcbs/prairie_map.pdf

⁹⁸ Minn. Rules. 8420.0515 Subp. 3

⁹⁹ See http://www.bwsr.state.mn.us/wetlands/wca/guidance/Rare_natural_communities.pdf.

¹⁰⁰ A crosswalk between NPCs and associated conservation status ranks is available at: http://files.dnr.state.mn.us/natural_resources/npc/s_ranks_npc_types_&_subtypes.pdf.

land management policies provide guidance for License to Cross Public Lands and Waters conditions when a utility crosses public lands and may be required by license conditions. For similar reasons, the department encourages the avoidance of all ecologically important lowland conifers, representative sample areas.

Wildlife and fisheries

Pipeline construction results in the loss and fragmentation of wildlife habitat. The pipelines themselves do not impair the movement of species along migration corridors. However, cleared and maintained right of way creates barriers to movement for many species, give advantage to predators, and encouraging the spread of invasive species. Special wildlife areas, such as rookeries, wildlife management areas, scientific and natural areas, prairie bank easements, areas of biodiversity significance, and key habitats for species of greatest conservation are valuable wildlife habitat.

- **Large block habitats** – Large blocks of habitat and habitat complexes such as grassland, wetlands, or forest can provide an increased diversity and abundance of wildlife. Larger, rounder, or square blocks of habitat provide interior habitat that is more isolated from noise, pollution, parasitic birds, and predators associated with edges of fragmented habitat. Direct habitat loss, habitat degradation, and fragmentation can occur when locating pipelines across large blocks of habitat and habitat complexes.
- **Rare species** – Minnesota endangered species law¹⁰¹ and associated rules¹⁰² prohibit the taking of endangered or threatened species without a permit. Surveys may be required in order to determine if takings may occur. Project planning must take into account that some species can only be surveyed at specific times of the year.
- **Species of greatest conservation need and key habitats** – Wildlife that have been identified as rare, declining or vulnerable in Minnesota are directly affected by pipeline construction and ongoing maintenance. Habitat degradation and loss are the two greatest risks to these species. Consequently, pipeline activities have the potential to directly and indirectly affect key habitats and the species that use them.¹⁰³

Similarly, crossing perennial and intermittent streams, cold water and warm water streams, may affect high quality or high value fisheries, such as trout streams. The greatest threat to these habitats occur during construction and would be temporary and include increased siltation, sedimentation, bank erosion, sediment deposition, short-term delays in movements of fish, and the potential for the transport and spread of aquatic invasive animals and plants. Additional impacts include water quality impairments and channel instability.

¹⁰¹ Minn. Stat. § 84.0895

¹⁰² Minn. Rules 6212.1800 to 6212.2300 and 6134

¹⁰³ Subsection profiles (which includes conservation actions and priorities) are available at: <http://www.dnr.state.mn.us/ecs/index.html>

Surface and groundwater

During operation, the primary impact of pipelines on surface water and groundwater are the potential release of petroleum during pipeline operation and, to a lesser extent, from fuel spills from equipment. The pipeline will remain a potential hazard to both surface water and groundwater while it is in operation and until it is properly decommissioned. Out of sight leaks can go unnoticed until material emerges in waterways or at the soil surface. Any petroleum releases from construction or operation could potentially impact groundwater where the overlying soils are permeable and/or the depth to groundwater is shallow. Public waters and wetlands are of particular concern.

During construction the potential risks to surface waters such as rivers, streams, wetlands and ditches includes sediment transport, which can structurally and biologically affect the stream; bank slumping, flowing soils, and frac-outs are also potential environmental risks. The possibility of impacts depends on site-specific crossing characteristics and the type of crossing method used.

- **Public waters** – When constructing large linear projects, crossings of public waters in Minnesota will likely be unavoidable. Various impacts can occur during construction, as discussed below. Pre- and post-construction surveys, restoration requirements, construction monitoring, and potential mitigation measures for where there are greater-than-anticipated impacts can help address these issues. In order to maximize habitat function and to help maintain the natural character, natural restoration methods are best. In order to inform specific crossing requirements and minimize the potential impacts for impacts to public waters, the Department of Natural Resources may require more detailed geological and waters survey information in proximity to more sensitive public water crossings.
- **Wetlands** – A common alternation encountered with pipelines is disturbance to wetlands. Concerns with the disturbance of wetlands include re-establishing pre-existing wetland vegetation, and potential conversion in wetland type to deeper water habitat. For example, as an area becomes wetter, the first effects on vegetation of increased saturation may include the invasion of species more characteristic of marshes. Invasive species such as hybrid cattail may become established, forming monotypic stands with more limited habitat value. The result can be a modification or loss of ecological function and biodiversity. Impacts can be reduced by avoiding and minimizing crossings. Where crossings are needed, winter construction is preferred to minimize wetland impacts due to construction. This is especially important in sensitive and difficult to restore wetlands such as bogs and fens

The following are construction methods and the environmental risk associated with their implementation:

- **Open cut** - This involves digging an open trench across the water body, side casting the spoil material, laying the pipe into the trench, and then backfilling the excavated material. Open cuts are normally used in low flow or intermittent flow situations, and are completed quickly. Impacts to surface waters as a result of the open cut method may be increased sedimentation transport which has the potential to harm fish and other organisms; physical changes to the banks of streams and rivers and alterations of substrates, including vegetation all of which may alter stream geomorphology.
- **Guided bores and horizontal directional drilling** – These two methods for crossing surface waters require drilling a tunnel beneath a water body from an upland location on one side of the water body to the other. Then, the pipe is pushed through the tunnel. Guided bores are typically shallower in depth than horizontal directional drilling operations, but both are dependent site conditions such as on soil types.

Horizontal directional drilling requires drilling mud, which is typically bentonite clay or a mixture of bentonite clay with a variety of chemical additives. The mud is used to lubricate the drill as it bores through the earth. The chemical additives in drilling mud can reduce the likelihood of a frac-out during a drilling operation. A frac-out is a surface release of drilling mud through fractured bedrock or sand. When drilling mud is released in aquatic systems, it has adverse impacts on fish and aquatic organisms, such as altering pH and changing the substrate especially in rivers and streams. When frac-outs occur in rivers or streams, the drilling mud can be carried downstream increasing the affected area. Frac-outs do not always show up on the surface immediately during a drilling operation, rather they have been observed days after a drilling operation takes place and often dozens of feet from the location of the pipeline.

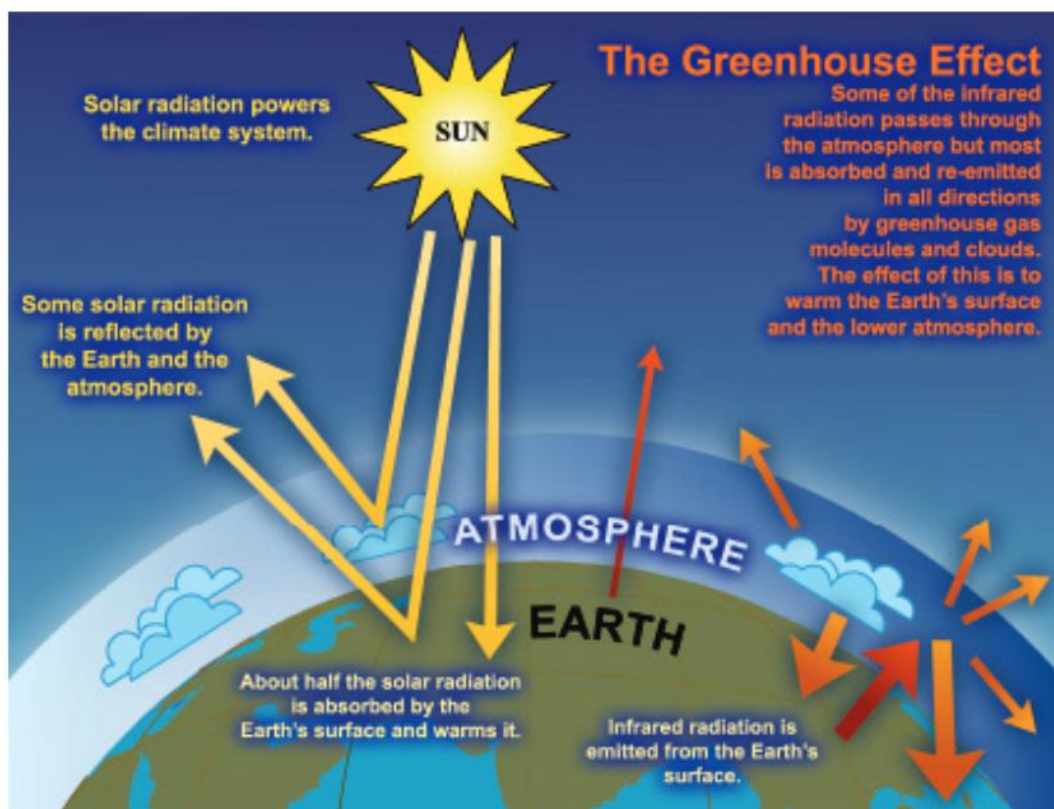
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Climate change – environmental impacts

Development of infrastructure to support the extraction, transportation, refinement, and combustion of oil has the potential to release additional carbon into the atmosphere and may perpetuate a carbon-based economic structure that contributes to climate change.¹⁰⁴ Minnesota has a state goal to reduce greenhouse gas emissions 80% below 2005 levels by 2050, building infrastructure for fossil fuels and making capital investments in this infrastructure is directly at odds with state statute.

Burning fossil fuels such as oil, coal and natural gas, produces carbon dioxide, the most predominant greenhouse gas (GHG). GHG emissions, contributing to the greenhouse effect seen in Figure 12, need to be brought under control, particularly in the next 15 years, to forestall the worst effects of climate change. In Minnesota, climate changes has hit home with three 1,000-year floods since 2004 and dozens of intense weather events – from hailstorms to tornadoes to droughts.¹⁰⁵ Moreover, predictions of extreme heat, poor air and water quality and sweeping changes to Minnesota’s wildlife and fish habitats foreshadow significant changes.¹⁰⁶

Figure 12: The greenhouse effect¹⁰⁷



¹⁰⁴ The White House; U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation (November 2014); retrieved on November 17, 2014 from www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c

¹⁰⁵ Minnesota and Climate Change: Our Tomorrow Starts Today. Minnesota Environmental Quality Board. 2014.

¹⁰⁶ Ibid.

¹⁰⁷ Oil Sand and the Keystone XL Pipeline: Background and Selected Environmental Issues. Congressional Research Service. February 2013.

Air pollutant emission inventory

While transporting oil through pipelines is considered to have negligible emissions of pollutants by the Environmental Protection Agency, the ultimate use of that oil contributes significant air pollution, including greenhouse gases that contribute to climate change. Air pollutant emissions in Minnesota are inventoried by the Minnesota Pollution Control Agency¹⁰⁸ and used to determine the type and quantity of pollutants being emitted into the atmosphere. The data is then used to calculate an emission fee for each facility. Pipelines are not included in this inventory as they are not considered to have significant emissions. Emissions do occur in Minnesota at refineries as the refining of oil is energy intensive. The increased volume of Canadian oil sands crude oil has made refining more energy intensive, leading to higher greenhouse gas emissions associated with production.

While most emissions from crude oil production and transportation do not occur in Minnesota, Minnesota plays a role in the approval of the development of infrastructure to support the extraction, refinement, and combustion of oil, gas, and coal reserves in neighboring states and Canada.

The 2013 U.S. Environmental Protection Agency Inventory of U.S. Greenhouse Gas Emissions and Sinks found that transportation accounts for about 0.4% of oil industry emissions and refining accounts for about 1.3%. Within transportation of crude oil, the majority come from loading operations and the rest from venting and fugitive emission. It was beyond the scope of this report to compare the emissions associated with alternative modes of oil transportation. Further study could be done to look at emissions associated with transportation of crude oil by way of rail versus pipeline versus truck.

Life cycle emissions

Different crude oils have different greenhouse gas intensities based upon their properties, method of extraction, and refinery process. Life-cycle assessment is an analytic method used for evaluating and comparing the environmental impacts of various products (in this case, the climate change implications of hydrocarbon resources). Life-cycle assessments can be used to identify, quantify, and track emissions of carbon dioxide and other greenhouse gas emissions arising from the development of hydrocarbon resources, and to express them in a single, universal metric of carbon dioxide equivalent (CO₂e) greenhouse gas emissions per unit of fuel or fuel use. Such comparisons allow for evaluation of the greenhouse gas emissions intensity of various stages of the fuel's life cycle, as well as to compare the emissions intensity of one type of fuel or method of production to another.

The Congressional Research Service conducted¹⁰⁹ a life-cycle assessment that showed Canadian oil sands crudes are generally more greenhouse gas emission-intensive than other crudes and emit an estimated 17% more GHGs on a life-cycle basis than the average barrel of crude oil. A life cycle emissions analysis could be done for proposed projects in Minnesota.¹¹⁰

¹⁰⁸ More information is available at: <http://www.pca.state.mn.us/index.php/air/air-monitoring-and-reporting/air-emissions-and-modeling/emissions-overview.html>

¹⁰⁹ Lattanzio, Richard; Congressional Research Service; Canadian Oil Sands: Life-Cycle Assessments of Greenhouse Gases. March 2014. Retrieved from <http://fas.org/sgp/crs/misc/R42537.pdf>

¹¹⁰ US Department of State; Keystone XL Final SEIS. January 2014. Retrieved from <http://keystonepipeline-xl.state.gov/finalseis/index.htm>

Potential human health impacts

Pipelines have the potential to impact the health of Minnesotans in many ways, both positive and negative. They have the potential to contaminate groundwater and drinking water in the event of spills or leaks, to impact community resources (housing, infrastructure) and cohesion. However, they may also provide employment which can have positive impacts on health by providing resources to purchase health care and nutritious foods.

Environmental justice and health equity

A statewide assessment, “Advancing Health Equity in Minnesota”,¹¹¹ has found that not all Minnesotans have the same chances to be healthy. Some Minnesota citizens are not as healthy as they could be and the health disparities that exist are significant, persistent, and cannot be explained by bio-genetic factors. Those with less money and populations of color (especially American Indians) consistently have less opportunity for health and experience worse health outcomes.

Everyone should have the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, play, and work. No group of people should bear a disproportionate share of negative environmental impacts, and all people should have an opportunity to inform and affect the decision-making process. These are important principles of environmental justice and important considerations for the transportation of crude and refined oil products through Minnesota.

The transportation of crude and refined oil products within and through the state, and the refining and storage of these products in Minnesota have the potential to have a greater negative health and quality of life impacts on lower income Minnesotans and residents of color. For example:

- **Vehicle and rail transportation** – Areas around high volume traffic and rail corridors, especially in urban areas, are often populated with higher concentrations of low-income and minority groups than found in other areas. Consequently, these groups are exposed to greater amounts of air and noise pollution from transportation sources. Recent increases in crude oil rail shipments exacerbate these concerns as well as risks from potential spills.
- **Refining and storage** – Areas surrounding large industrial facilities such as refineries and storage terminals are often inhabited by lower-income residents. Releases to air, water, and land may disproportionately affect nearby residents.
- **Pipeline transportation** – Leaks in petroleum pipelines have significant potential to directly affect human health and safety, and lead to surface and groundwater pollution. If on or near Indian lands, this can affect tribal members or resources of importance to tribal members.

When considering pipeline projects within the state, the potential for impacts to minority and low-income populations should be assessed and described. For example, the Keystone XL environmental impact statement identified impacts to minority and low-income populations within a 4 mile corridor as well as 10 miles down rivers and creeks that would be crossed by the pipeline.

¹¹¹ MDH, Advancing Health Equity in Minnesota (February 2014); retrieved from www.health.state.mn.us/divs/chs/healthequity/ahe_leg_report_020414.pdf

Social determinants of health

The social determinants of health are the conditions in which people are born, grow, live, work, and age and are mostly responsible for health inequities – the unfair and avoidable differences in health status seen within and between communities. Life expectancy, maternal and child health, violence, oral health, suicide rates, and substance dependence are health outcomes commonly used as general indicators of physical and social wellness. Family structure, economic status, educational attainment, family stability, and cultural continuity are health determinants that are associated with positive and negative health outcomes.

When a pipeline project is proposed in the state, available data¹¹² can be used to identify areas of vulnerability and areas of resilience within communities. If areas of vulnerability are identified that could be exacerbated by a project, these areas may require monitoring to ensure that the project does not make conditions worse. Alternatively, a project could provide a beneficial component to community. This analysis could be completed during environmental review or could be completed as part of a Health Impact Assessment. For example, a pipeline might have the potential to disrupt subsistence activities of a native population. Alternatively, increased household income from employment provides opportunities to purchase nutritious foods such as fresh fruits and vegetables. The magnitude of the impact should also be described, i.e. a temporary increase in household income from a short-term construction job.

Exposure to potentially hazardous materials

Drinking water contamination

Contamination is a serious risk, should a spill, leak, or rupture occur. Pipeline projects proposed in Minnesota must identify within their environmental review documentation whether the project will be located within any source water protection areas, including designated wellhead protection areas. Pipelines sited within wellhead protection areas must adhere to the requirements of the wellhead protection plan approved for each public water supplier to ensure that groundwater contamination does not occur and that drinking water is not impacted by pipeline leaks or spills. Each plan may have different requirements depending on the geologic conditions of that area.

Development of pipelines within or in the vicinity of public drinking water sources, whether surface water or groundwater wells, results in the potential for contamination of that supply if a leak occurs. Approximately 400 of 554 Drinking Water Supply Management Areas (DWSMAs) statewide are within 2 miles (4 mile total buffer) or less of a crude oil pipeline.¹¹³ Current monitoring of public water systems is typically on a scheduled, but infrequent basis for compliant water systems. As such, typical monitoring might not be sufficient to detect contamination of drinking water from leaking pipelines. Pipelines constructed in or near drinking water supplies should include a monitoring plan with monitoring frequencies that would detect contamination in drinking water supplies so that exposure to those drinking the water would be minimized.¹¹⁴

Air quality

In addition to drinking water impacts, there is potential for air quality impacts in the event of a spill, leak, or explosion. Air quality contaminants of concern include volatile organic compounds, hydrogen sulfide,

¹¹² <https://apps.health.state.mn.us/mndata/>

¹¹³ DWSMA boundaries may change and new crude oil pipelines may be constructed, therefore this number is subject to change and is only accurate as of December 2014.

¹¹⁴ MDH Emergency Response Guidance for Community PWSs (August 2010); retrieved November 17, 2014 from www.health.state.mn.us/divs/eh/water/factsheet/emergency/response.pdf

and benzene. Of these, benzene, a human carcinogen, presents the biggest health concern.¹¹⁵ The risk of health effects from inhaling any chemical depends on how much is in the air, and how long and how often a person breathes it in. Scientists look at short term exposures as hours to days or long term exposures as years to even a lifetime. The Minnesota Department of Health has developed both a chronic (less than 5 ppb) and acute (1,000 ppb) health risk value for benzene in ambient air.¹¹⁶ The department's assessment indicates a potential for developmental and reproductive health concerns from short-term exposures of 1,000 ppb.

In July 2010, after the largest oil spill on land occurred in Michigan's Kalamazoo River, benzene was measured at concentrations over the U.S. Environmental Protection Agency's 8-hour acute exposure guideline levels of 9,000 ppb. That was 9 times higher than the department's acute value of 1,000 ppb. In addition, these levels were measured 3 days following the spill, and therefore levels immediately following the spill can be assumed to have been even higher. People living in areas with these concentrations were recommended to evacuate and temporary health effects (primarily headaches, nausea, respiratory discomfort, and eye irritation) were reported up to over three weeks following the spill.¹¹⁷

Volatile organic compounds evaporating from polluted soil and groundwater rise toward the ground surface. These vapors may enter homes through cracks in the foundation, around pipes, or through a sump or drain system. In this way, the VOC vapors enter buildings and contaminate indoor air. This process, when pollution moves from air spaces in soil to indoor air, is called vapor intrusion.¹¹⁸ The potential for impacts related to vapor intrusion from crude oil that remains in soil after a leak or spill are currently unknown. Research to evaluate the potential for health impacts is needed. In addition, health care provider training in conjunction with other emergency and spill response training and planning was identified as a future preventative measure.

Health and public services infrastructure and capacity

The project proposer when assessing the impacts of a project should identify medical facilities in the vicinity of the project. These facilities have been identified for other pipeline projects as locations that could provide emergency medical care and, in some cases, serve as the base for local emergency medical response and transport services for accidents that might occur during project construction or operation. Police and fire departments should be identified and assessed for capacity to respond during emergency situations. Furthermore, in Minnesota communities that are bifurcated by railroad tracks, there is potential for decreased emergency response time due to increased rail traffic. This should be factored into the emergency response capabilities of these areas.

Health Professional Shortage Areas (HPSAs) and Medically Underserved Areas/Populations (MUAs/MUPs)¹¹⁹ should also be identified. HPSAs may be designated as having a shortage of primary

¹¹⁵ Michigan Department of Health; Public Health Assessment, Evaluation of Air Contamination; August 2014; retrieved from www.michigan.gov/documents/mdch/Enbridge_Oil_Spill_Air_PHA_-_PC_08-26-2014_466005_7.pdf

¹¹⁶ MDH Health Risk Values Rule for Ambient Air; retrieved December 8, 2014 from www.health.state.mn.us/divs/eh/risk/rules/air/index.html

¹¹⁷ Michigan Department of Health; Public Health Assessment, Evaluation of Air Contamination; August 2014; retrieved from www.michigan.gov/documents/mdch/Enbridge_Oil_Spill_Air_PHA_-_PC_08-26-2014_466005_7.pdf

¹¹⁸ MDH Vapor Intrusion; retrieved December 8, 2014 from www.health.state.mn.us/divs/eh/hazardous/topics/vaporintrusion.html

¹¹⁹ Health Professional Shortage Areas (HPSAs) & Medically Underserved Areas/Populations (MUAs/MUPs); retrieved from www.hrsa.gov/shortage/

medical care, dental, or mental health providers. They may be urban or rural areas, population groups, or medical or other public facilities. MUAs may be a whole county or a group of contiguous counties, a group of county or civil divisions, or a group of urban census tracts in which residents have a shortage of personal health services. MUPs may include groups of persons who face economic, cultural or linguistic barriers to health care. These areas and populations are already vulnerable based on this designation and an influx of workers or environmental health impacts from spills or leaks could exacerbate this vulnerability. As of 2011, there were six hospitals and 145 other facilities that would require specialty evacuation in the event of an emergency within 2 miles (4 mile total buffer) or less of a crude oil pipeline.

Workforce influx

Construction projects that require a large workforce have had numerous issues and impacts to the public health and welfare of communities. While communities can benefit economically from an increased workforce, the influx of long-term workers (primarily during construction) into local communities is likely to generate demands on local housing stock and public services such as emergency response, medical, police, and fire protection services. These increased demands can potentially overwhelm the ability of a community to provide public services which would have negative impacts on public health. The extent of impacts would depend upon the composition of the workforce in terms of local versus non-local workers and the size of the existing population of the area as well as the size and duration of the construction project.

Larger, long-term duration projects, which hire mostly non-local workers, are of greatest concern for workforce influx related impacts to the health and welfare of a community because a smaller community's infrastructure may be unable to handle sudden increases in population. Issues such as food shortages, increases in crime, and increased automobile accidents among others have been seen in North Dakota where there has been a tremendous surge in workforce population.¹²⁰¹²¹ Workforce influx can certainly have positive impacts for a community, but the potential negative impacts are often overlooked and can lead to harmful effects on public health.

In order for local units of government and the communities along the route to assess potential impacts from worker influx, the anticipated number of workers should be described for each pipeline segments of a project as well the length of construction time at each segment. Additionally, whether segment construction would occur simultaneously or in phases should be clarified. Because of the specialized nature of pipeline construction, employment opportunities for area residents may be limited depending on skill set of the local workforce.

Climate change - human health impacts

Weather and climate play a significant role in people's health. Changes occurring in Minnesota's climate are affecting our health and wellbeing and will have even greater impacts in the future. Warmer average temperatures lead to hotter days and more frequent and longer heat waves which can increase the number of heat-related illnesses and deaths. Warmer temperatures can increase the concentrations of unhealthy air and water pollutants. Increases in the frequency or severity of extreme weather events can increase the

¹²⁰ Ellis, Blake; CNN Money (October 2011); Six Figure salaries, but homeless; retrieved from http://money.cnn.com/2011/10/21/pf/america_boomtown_housing/index.htm?iid=EL

¹²¹ Sheerin, Jude and Anna Bressanin; BBC News (March 2014); North Dakota oil boom: American Dream on Ice; retrieved from <http://www.bbc.com/news/magazine-25983917>

risk of flooding, high winds, and other direct threats to people and property. Changes in temperature, precipitation patterns, and extreme events can increase the spread of some diseases. The Minnesota Department of Health's Climate and Health Program¹²² is helping to understand health impacts and prepare local public health and the public for the health risks from changes in Minnesota's climate. Whether oil transported in pipelines through Minnesota is burned in Minnesota or elsewhere in the globe, the greenhouse gas contribution from combustion will contribute to climate change, impacting the entire world's pollution, including Minnesotans.

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¹²² MDH Minn. Climate and Health Program; retrieved from www.health.state.mn.us/divs/climatechange/

Findings and considerations

Environmental impacts

Vegetation and wildlife

- Pipeline construction and ongoing maintenance has the potential to directly and indirectly affect key habitats and the species that use them.¹²³ While the avoiding all key habitats is not realistic, minimizing the fragmentation and disturbance of these key areas to the extent practicable should be considered. Minnesota recently completed a State Wildlife Action Plan¹²⁴ identifies conservation needs, actions, and priorities for species of concern, including threatened and endangered wildlife and other important wildlife species. The results of the species analysis indicated that habitat loss and degradation are the most significant challenges facing Minnesota's rare species. This information can provide a basis for identifying key habitats that should be avoided for pipeline routing.
- Direct habitat loss, habitat degradation, and fragmentation can occur when locating pipelines across large blocks of habitat and habitat complexes. To the extent feasible, avoiding the fragmentation of large contiguous blocks of habitat of 40 or more acres can help minimize wildlife impacts.

Surface water

- When constructing large linear projects, crossings of public waters will likely be unavoidable. However, minimizing the number and/or length of crossings is possible. Avoiding and The DNR recommends avoiding and minimizing crossings. Where crossings are needed, winter construction is preferred to minimize wetland impacts due to construction. This is especially important in sensitive and difficult to restore wetlands such as bogs and fens.
- To mitigate adverse effects to surface waters, crossing techniques should minimize vehicle contact with surface waters and equipment should be cleaned to prevent transportation of aquatic invasive animals and plants. Other considerations include minimizing grading and disturbance to waterbody banks and crossings be timed to avoid sensitive spawning periods, such that resulting stream bed disturbance and sediment impacts would be temporary and minimized. The Minnesota Department of Natural Resources utility licenses to cross public waters may require specific crossing methods to reduce the potential for adverse impacts.
- Due to the sensitive nature of fisheries and sensitive areas such as trout streams, these areas should be avoided when practical. In addition, during permitting, assessing the feasibility of incorporating shut-off valves in close proximity to trout stream crossings to minimize impacts in the event of a failure is advised.

¹²³ Subsection profiles (which includes conservation actions and priorities) are available at: <http://www.dnr.state.mn.us/ecs/index.html>

¹²⁴ Minnesota's SWAP is available online at: http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/chapters_appendix/tomorrows_habitat_toc.pdf. Minnesota's SWAP, "Tomorrow's Habitat for the Wild and Rare", describes conservation concerns for species whose populations are rare, declining or vulnerable to decline and are below levels desirable to ensure long-term health and stability and their key habitats within various landscape settings. The DNR and the U.S. Forest Service developed ecological mapping and landscape classification following the National Hierarchical Framework of Ecological Units (Ecomap 1993).

Climate change

- Whether oil transported in pipelines through Minnesota is burned in Minnesota or elsewhere in the globe, the greenhouse gas contribution from combustion will contribute to climate change, impacting the entire world's pollution, including Minnesotans. While most emissions from crude oil production and transportation do not occur in Minnesota, Minnesota plays a role in the approval of the development of infrastructure to support the extraction, refinement, and combustion of oil, gas, and coal reserves in neighboring states and Canada.

Human health impacts

Environmental justice

- The potential for impacts to minority and low-income populations should be assessed and described. The transportation of crude and refined oil products within and through the state, and the refining and storage of these products in Minnesota have the potential to have a greater negative health and quality of life impacts on lower income Minnesotans and residents of color. The Keystone XL environmental impact statement identified impacts to minority and low-income populations within a 4 mile corridor as well as 10 miles down rivers and creeks that would be crossed by the pipeline. Project proposers in Minnesota can achieved this type of analysis by reviewing census data,¹²⁵ American Community Survey data,¹²⁶ and data available on Minnesota Department of Health's Minnesota Public Health Data Access Portal.¹²⁷ If populations are identified, and there is potential for disproportionate impacts, mitigation should be developed to minimize these impacts. Projects that would impact tribal lands and communities should also specifically engage tribal communities in comprehensive consultation.

Exposure to potentially hazardous materials

- Pipeline spills and leaks can impact air and water quality and be hazardous to human health.
- Approximately 400 of 554 Drinking Water Supply Management Areas (DWSMAs) in Minnesota are within 2 miles (4 mile total buffer) or less of a crude oil pipeline.
- The project proposer when assessing the impacts of a project should identify medical facilities in the vicinity of the project that could provide emergency medical care and serve as the base for local emergency medical. This is valuable because these areas and populations are already vulnerable based on this designation and an influx of workers or environmental health impacts from spills or leaks could exacerbate this vulnerability. As of 2011, there were six hospitals and 145 other facilities that would require specialty evacuation in the event of an emergency within 2 miles (4 mile total buffer) or less of a crude oil pipeline.

¹²⁵ www.census.gov/data/data-tools.html

¹²⁶ www.census.gov/acs/www/

¹²⁷ <https://apps.health.state.mn.us/mndata/>

Pipeline permitting process

This section outlines the procedures and approvals such as a certificate of need, environmental review and necessary permits for oil pipeline construction and operation.

Certificate of need

The certificate of need (CN) process under the Public Utilities Commission (Commission) is designed to evaluate whether there is need for a large energy project in Minnesota. If a need exists, the CN evaluates the proposal, as well as alternatives to the project, including a no-build alternative that may satisfy the claimed need for the project. More specifically, the need analysis is meant to determine whether the proposal will meet an identified need consistent with various Minnesota policies, including reliability, reasonable costs, and environmental protection. This analysis is described in greater detail in this section. Ultimately, in the need process, the Commission determines the basic types of facility such as new pipe, pump stations and storage tanks to be constructed, the size of the facility and when the project must be in service. The process typically takes 12 months, once the applicant provides a complete application. In its role as public advocate in Commission proceedings, the Division of Energy Resources of the Minnesota Department of Commerce (Commerce-DER) evaluates all petroleum projects requiring a CN according to Minnesota statutes and rules.¹²⁸

The Energy Environmental Review and Analysis (Commerce-EERA) unit within the department conducts any environmental analysis requested by the Commission for pipeline projects requiring a CN. Minnesota law¹²⁹ prohibits siting or construction of a large energy facility without a CN by the Commission. New large petroleum pipeline facilities and any project that, within a period of two years, would expand an existing large petroleum pipeline¹³⁰ in excess of either 20% of its rated capacity or 10,000 barrels per day, whichever is greater, require a CN. The construction or expansions of petroleum refineries do not require a CN.

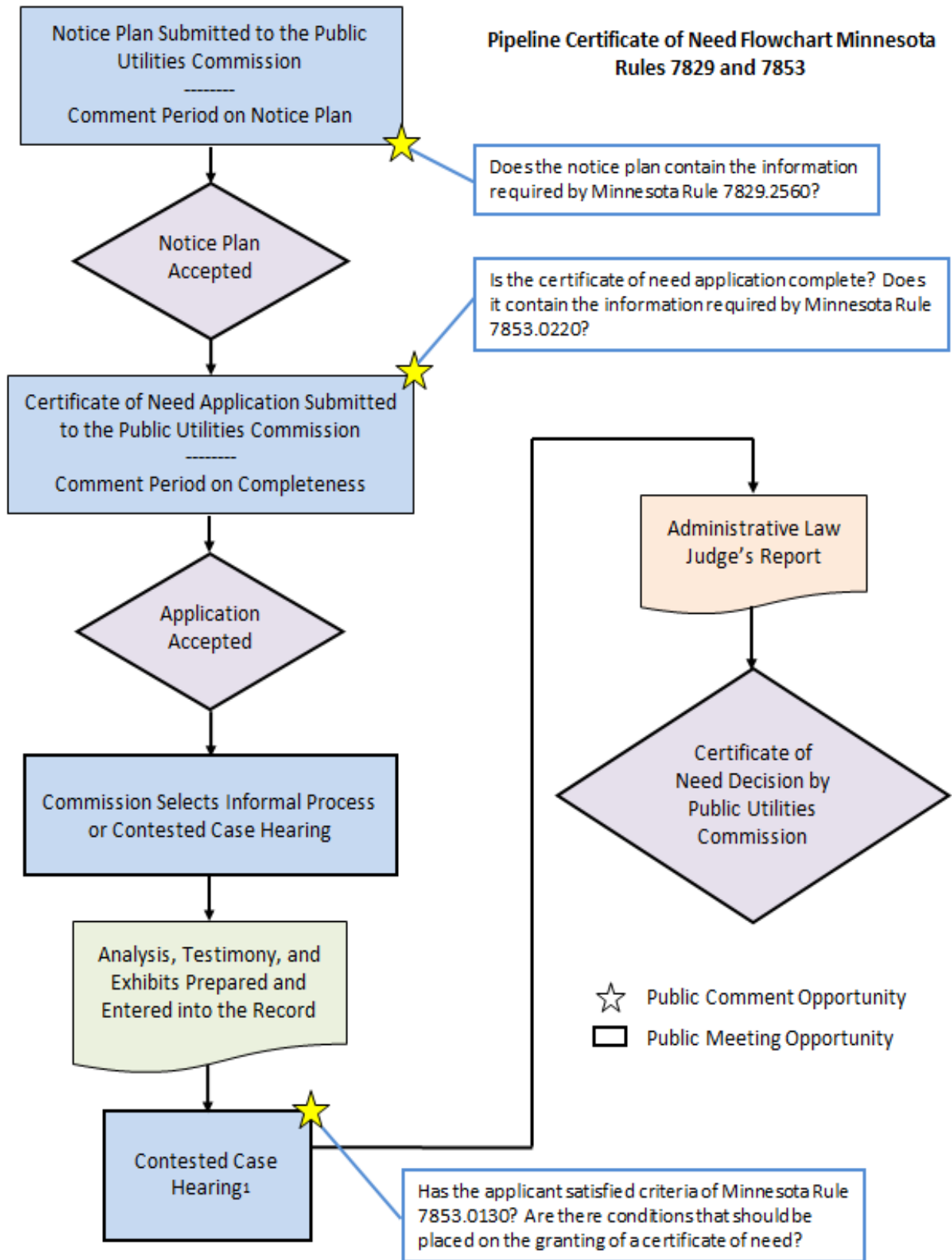
The process also includes the notice plan, application completeness, an environmental analysis, building the record, and a Commission decision (Figure 13).

¹²⁸ Minn. Stat. 216B.2421 and Minnesota Rules Chapters 7851 and 7853.

¹²⁹ Minn. Stat. 216B.243, subd. 2

¹³⁰ Minn. Rules 7853.0030 identifies that large energy facilities require a CN; Minn. Rules 7853.0010 defines a large petroleum pipeline in Minnesota as a pipeline greater than six inches in diameter and having more than 50 miles of its length in the state used to transport crude petroleum or petroleum fuels or oil or their derivatives.

Figure 13: Pipeline certificate of need flowchart



¹ If a contested case hearing has been selected by the Commission.

Notice plan

Minnesota rules require an applicant for a pipeline certificate of need to file a notice plan proposal at least three months before filing the application.¹³¹ Commerce-DER reviews the notice plan to ensure that all required information about public notices is included and is correct. Commerce-DER also makes recommendations for additions or clarifications to enhance public understanding and awareness of project scope and design. Once satisfied with the notice plan, Commerce-DER submits to the Commission a letter recommending approval of the plan with modifications, if needed. The Commission uses this and other information to decide whether to approve, approve as modified, or deny the notice plan.

Application completeness

Once the CN application has been filed with the Commission, the Commission issues a notice of comment period on completeness of the application. The Commission, through the public comment period, requests agencies and the public to comment on the completeness of a CN application. Members of the public, government agencies, and other interested parties may submit comments.

Minnesota Rule 7853.0220 identifies the required data and information that an applicant must provide. Commerce-DER evaluates whether the information provided in the application meets the rule requirements. If the information provided is inadequate, the applicant can respond by supplementing the application with additional data or by clarifying where the data in question can be located in their initial filing. Commerce-DER then files comments recommending that the Commission find the application complete, complete upon receipt of additional data, or incomplete. The Commission uses Commerce-DER's comments, other agency and public comments received, and other relevant information in making the determination. Once the Commission determines that the application is complete, the 12-month CN process officially begins.

Environmental analysis

In determining whether a certificate of need should be granted, consideration must be paid to the “natural and socioeconomic environments compared to the effects of reasonable alternatives,”¹³² and “the effect of the proposed facility, or a suitable modification of it, upon the natural and socioeconomic environments compared to the effect of not building the facility.”¹³³ Consequently, an applicant for a CN must submit to the Commission, in its CN application, information on the potential environmental impacts of a proposed pipeline. Information and analysis on potential environmental impacts is also provided by parties and entered into the record as testimony and exhibits. Citizens and agencies that are not parties can also submit environmental impact information into the record through the public hearing or through the informal public comment process (discussed below)¹³⁴. The Commission has discretion to request environmental analysis as part of the proceedings.¹³⁵ If requested by the Commission, environmental analysis is prepared by EERA and is entered into the record as an exhibit. Citizens, agencies, and the Commission can use the analysis in analyzing an application.

¹³¹ Minn. Rule 7829.2560

¹³² Minn. Rule 7853.0130.B.3

¹³³ Minn. Rule 7853.0130.C.2

¹³⁴ Minn. Rule 7853 does not call for the preparation of a separate environmental analysis document as part of CN proceedings.

¹³⁵ Minn. Stat. 116D.03.

Building the record

The Commission has two options for evaluating an application. In deciding which process to use, the Commission typically requests comments from the public and parties including Commerce-DER indicating whether it appears that informal or contested case proceedings would be appropriate for evaluating a certificate of need application.¹³⁶

Informal proceedings

The first option for evaluating a certificate of need is through an informal public comment process that typically does not require an administrative law judge (ALJ). The comment process allows Commerce-DER, the applicant, state agencies and members of the public to submit comments on the application for consideration by the Commission once the final comment period closes. The proceeding also includes a public hearing to solicit public input. The Commission generally uses this process when no material facts are in dispute, all parties and the Commission have agreed to informal proceedings, or when informal or expedited proceedings are required by statute. In informal proceedings, facts are generally submitted into the record via written comments.

Contested case proceedings

The second option for evaluating a certificate of need application is through a contested case proceeding. This proceeding is moderated by an ALJ, assigned through the Office of Administrative Hearings (OAH). Once the case has been referred to this office, the judge assigned will issue an order with a deadline to apply for intervention (party status), and with a schedule that includes dates for applicant and intervener testimonies to be filed and sets the public comment period. In such proceedings, facts are submitted into the record through several rounds of written testimony and from witnesses at an evidentiary hearing conducted by the administrative law judge. The judge also conducts hearings to solicit public input, all of which is added to the record. The judge then drafts and submits recommendations based on all of the information in the record in a “Proposed Findings of Fact, Conclusions of Law and Order.” The Commission subsequently decides on the matter.

¹³⁶The Commission often issues a joint request for comments on completeness and for comments on whether an application should be evaluated informally or through a contested case.

Evaluating the certificate of need application

Regardless of whether an application is evaluated under informal or contested case proceedings, the Commission uses, and the Commerce-DER evaluates an application for a certificate of need for a pipeline in Minnesota by assessing the following, in accordance with Minnesota statutes and rules:

Criteria used by the Commission and evaluated by Commerce-DER for a pipeline certificate of need¹³⁷

Under Minnesota Statute 216B.243, Subd. 3, the Commission must evaluate the following in assessing need:

- The accuracy of the long-range energy demand forecasts on which the necessity for the facility is based;
- The effect of existing or possible energy conservation programs on long term energy demand;
- The relationship of the proposed facility to overall state energy needs;
- Promotional activities that may have given rise to the demand for this facility;
- Benefits of this facility, including its uses to protect or enhance environmental quality, and to increase reliability of energy supply in Minnesota and the region;
- Possible alternatives for satisfying the energy demand, including but not limited to potential for increased efficiency;
- The policies, rules, and regulations of other state and federal agencies and local governments; and
- Any feasible combination of energy conservation improvements that can (i) replace part or all of the energy to be provided by the proposed facility, and (ii) compete with it economically; and,

Pursuant to Subd. 1 of Minnesota Statute 216B.243, the commission has adopted additional criteria for the assessment of need, which are listed under Minnesota Rules 7853.0130:

- The probable result of denial would adversely affect the future adequacy, reliability, or efficiency of energy supply to the applicant, their customers, or the people of Minnesota and neighboring states;
- A more reasonable and prudent alternative to the facility has not been demonstrated by evidence in the record;
- The consequences to society of granting the certificate of need are more favorable than the consequences of denial; and
- It has not been demonstrated in the record that the design, construction, or operation of the proposed facility will fail to comply with those relevant policies, rules, and regulations of other state and federal agencies and local governments.

¹³⁷ Minn. Stat. 216B.243, Minn. Rule 7853.0130

An applicant is required to address all of these criteria and provide corroborating data or information in their application to support their assertions.¹³⁸ Commerce-DER evaluates the information provided and supplements it by requesting additional or more specific data. Commerce-DER often performs research to locate reliable, corroborating sources for claims made by the applicant. For example, an applicant may make claims regarding supply or demand of crude oil in a specific region, but be unable to provide data sufficient for forecast replication. In that case, the department would attempt to compare the applicant's forecast to forecasts from reputable sources such as the Energy Information Agency (EIA) or Canada's National Energy Board. These comparisons allow Commerce-DER to assess whether the statements and conclusions made in the application are supported and reasonable.

Commerce-DER may also perform its own economic analysis, such as analyses of data provided by the applicant or mined from publicly available sources such as EIA databases. For crude oil pipelines, this type of analysis is typically performed to gain contextual understanding for the impact that a proposed project in Minnesota may have on regional petroleum markets.

Commission decision

Once the record has been closed at the end of the informal or contested case proceedings, the Commission will take up the matter of whether to grant the certificate of need at a Commission meeting. If the proceeding was contested, the Commission will have the administrative law judge's proposed findings, conclusions and recommendations, which the Commission will consider in reaching its own findings and conclusions of law, and in issuing an order identifying the Commission's decisions. Commerce-DER staff and other parties attend the meeting, provide oral arguments, and are available to answer any questions that commissioners may have during their deliberations. At the conclusion of deliberations, the commissioners vote on whether to issue an order approving, approving as modified, or denying the application for a certificate of need.

Once the Commission's order has been issued, Commerce-DER involvement in the petroleum pipeline process is largely concluded, with the exception of monitoring applicable regulatory filings for compliance with the Commission's order.

Federal approval

The rates and terms of service of oil pipelines are regulated by the Federal Energy Regulatory Commission (FERC) as common carriers under the Interstate Commerce Act. FERC has "exclusive jurisdiction to determine whether a pipeline's rates and terms of service are just, reasonable, and not unduly discriminatory." FERC requires oil pipeline companies to publish tariffs, and collects information from them as necessary for its ratemaking responsibilities. FERC does not determine whether an oil pipeline is needed, nor does it regulate the routing, construction, or expansion of oil pipelines.

States may regulate the routing, construction, and expansion of oil pipelines and may have a variety of approvals, permits, and licenses to effect this regulation.

¹³⁸ Minn. Rule 7853.0220.

Subsequent modifications to certificate of needs

If the project is not in service within two years of the certified date, the project owner must request recertification of the project. However, the project owner could add or subtract up to 10% of the capacity or length of the project without recertification by the Commission.¹³⁹

Evolution and improvement of the certificate of need process

The Commission, through several recent orders, has established various requirements, conditions, or procedures that have refined the CN process on a case by case basis. These include:

- Stipulations that approved pipeline projects obtain offsetting renewable energy credits for all energy used for operating the pipeline.
- A recent preference for evaluating all pipeline CNs, even upgrade projects, through the more thorough contested case procedure.
- Requests that EERA conduct analysis of potential environmental impacts of pipeline projects, with such analysis being entered into the record.

Pipeline route permit

A pipeline route permit from the Commission is required for the construction of pipelines with a diameter of six inches or more that are designed to transport hazardous liquids, and those that are designed to carry natural gas and be operated at a pressure of more than 275 pounds per square inch.¹⁴⁰ Hazardous liquids are defined by federal regulation and include crude oil, refined petroleum products, highly volatile liquids (propane, butane), carbon dioxide, and anhydrous ammonia.

Pipeline route permit proceedings are governed by Minnesota Rules Chapter 7852. Applicants for a pipeline are required to submit to the Commission a route permit application, including an environmental assessment supplement.¹⁴¹ The Commission initiates a comment period and solicits comments on the completeness of the route permit application. In its application, the applicant must identify its preferred route for the project and discuss all other route alternatives considered by the applicant.¹⁴² Applicants for a pipeline route permit can apply to have their application reviewed under the partial exemption process or the full review process.¹⁴³ The partial exemption process, similar to an environmental assessment worksheet, is intended for projects that are not anticipated to have a significant impact on humans or the environment.¹⁴⁴ The full review process is intended for projects that will have a significant impact on humans or the environment. The Commission has 90 days after application acceptance to make a route permit decision under the partial exemption process.¹⁴⁵ The Commission has nine months to make a route permit decision under the full review process, unless the Commission extends this deadline for cause.¹⁴⁶

¹³⁹ Minn. Rule 7853.0800, subp. 2.

¹⁴⁰ Minn.Stat. § 216G

¹⁴¹ Minn. Rule 7852.2700

¹⁴² Minn. Rule 7852.2600.

¹⁴³ Minn. Rule 7852.0600.

¹⁴⁴ Minn. Rule 7852.0700.

¹⁴⁵ Minn.Stat. § 216G.02, Subd. 3, Minn. Rule 7852.0600.

¹⁴⁶ Minn.Stat. § 216G.02, Subd. 3, Minn. Rule 7852.0800.

Partial exemption process

For the partial exemption process, when the application is complete, Commission and Commerce-EERA staff conduct public information meetings in each county the pipeline crosses. The Commission initiates a comment period and solicits comments on the potential impacts of the pipeline project and whether to issue a pipeline route permit through the partial exemption process. If the Commission determines that the project will not have a significant impact on humans or the environment, the Commission will issue a route permit for the project.¹⁴⁷ If the Commission determines that the project will have a significant impact on humans or the environment, the Commission will deny a route permit for the project under the partial exemption process.¹⁴⁸ The applicant may then request that their application be considered under the full review process.

Full review process

For the full review process, when the routing application is complete, the Commission authorizes staff to proceed with the route permitting process and refers the docket to the Office of Administrative Hearings (OAH) for a contested case hearing. The full review route permitting process is illustrated in Figure 14.

Staff conduct public information and scoping meetings in each county crossed by the applicant's preferred pipeline route to explain the route permitting process, to respond to questions raised by the public, and to solicit comments on issues and mitigation measures and alternative routes and route segments that should be examined in greater detail in the environmental review of the project.

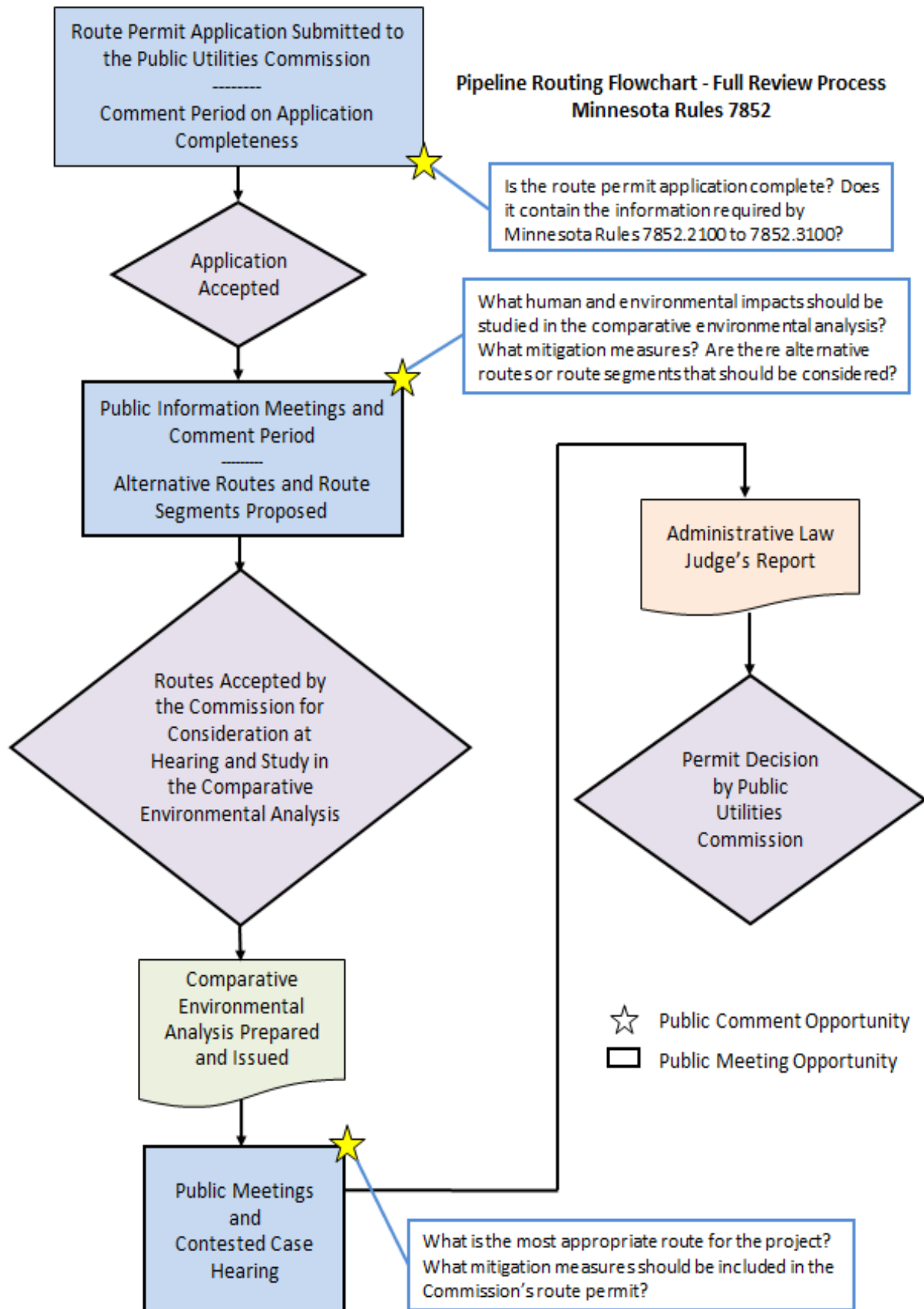
After the public information meetings and close of the public comment period, the Commission determines the routes and route segments that will be evaluated in the environmental review and considered in the contested case hearing.¹⁴⁹

¹⁴⁷ Minn. Rule 7852.0600, Subp. 5.

¹⁴⁸ Minn. Rule 7852.0600, Subp. 6.

¹⁴⁹ Minn. Rule 7852.1400

Figure 14: Pipeline routing flowchart



Environmental review

The Minnesota Environmental Policy Act (MEPA) of 1973 authorizes the EQB to establish “categories of actions” for which environmental review is required.¹⁵⁰ The purpose of the environmental review is to provide information about a project’s environmental impacts before approvals or necessary permits are issued. Under this authority, the Minnesota Environmental Quality Board (EQB) has rules requiring environmental review for the routing of pipelines that are “subject to the full route selection procedures”¹⁵¹ of Minnesota Statute 216G.02. These rules authorize a mandatory environmental review with the Public Utilities Commission as the responsible governmental unit (RGU). Additionally, MEPA provides the authority to conduct environmental review under special procedures as alternative forms of environmental review.¹⁵²

The EQB may approve “an alternative form of environmental review for categories of projects which undergo environmental review under other governmental processes.”¹⁵³ The intent of alternative review is expediency – providing for the equivalent of an environmental impact statement in a “more timely or more efficient manner.”¹⁵⁴ In 1989, the EQB approved the pipeline routing rules¹⁵⁵ as an alternative form of environmental review. During the route permitting process established by the pipeline routing rules, the alternative review must “address the same issues and utilize similar procedures as an environmental impact statement.”¹⁵⁶ Because the pipeline routing rules are an alternative form of environmental review, pipeline projects in the routing process are not reviewed through environmental assessment worksheets (EAW) or environmental impact statements (EIS) and are exempt from other forms of environmental review¹⁵⁷.

EQB has the ability to review the approved alternative process at any time when “procedure[s] no longer fulfill the intent and requirements of the Minnesota Environmental Policy Act.”¹⁵⁸ Any such review cannot affect projects currently in the approved alternative review process.¹⁵⁹ Periodic EQB reviews are built into MEPA and are critical to retaining the administrative procedures and civic engagement necessary to carry out its purpose.

The approved environmental review for pipelines includes the environmental assessment supplement as part of the pipeline route permit application, a scoping process, and the preparation of an environmental review document known as a comparative environmental analysis (CEA). This type of analysis evaluates the natural and socioeconomic impacts of the routes and route segments authorized by the Commission for consideration in the contested case hearing, and the means by which these impacts might be avoided, minimized, and mitigated.¹⁶⁰ The Commission may authorize the analysis be prepared by the applicant or by Commerce-EERA.¹⁶¹

¹⁵⁰ Minn. Stat. § 116D.04, subd. 2a(a)

¹⁵¹ Minn. Rule 4410.4400, subp. 24

¹⁵² *Ibid.*

¹⁵³ Minn. Rule 4410.3600

¹⁵⁴ Minn. Stat. § 116D.03, subd.1, Minn. Rule 4410.3600

¹⁵⁵ Minn. Rule 4415 (1989), Minn. Rule 7852 (2007)

¹⁵⁶ Minn. Stat. § 116D.04, subd. 4a.

¹⁵⁷ Minn. Rule 4410.3600, subp. 2, Minn. Rule 4410.4600, subp. 2(E)

¹⁵⁸ Minn. R. 4410.3600, subp. 2

¹⁵⁹ *Ibid.*

¹⁶⁰ Minn. Rule 7852.1500

¹⁶¹ *Ibid.*

Contested case hearing – pipeline routing

Based on comments received during the public information and scoping meetings, the Commission determines the routes and route segments that will be considered in the contested case hearing and evaluated in the comparative environmental analysis. The Commission must accept all route and route segments proposed by the applicant for consideration in the hearing and evaluation in the CEA. The Commission may accept other routes or route segments that it “considers appropriate for further consideration.”¹⁶² The CEA is completed prior to the hearing and is submitted into the hearing as an exhibit. Contested case hearings conducted by an ALJ are held throughout the project area where citizens can present oral and written testimony, ask questions about the project, and ask questions of witnesses. Citizens can advocate for the route(s) that are most appropriate for the project and conditions that should be included in the Commission’s pipeline route permit that would mitigate potential impacts of the project. Those people who have proposed a route or route segment that the Commission has accepted for consideration at the hearing are required to make an “affirmative presentation of facts on the merits of the route proposal at the public hearing.”¹⁶³

Based on the hearing and the record, the administrative law judge submits a report to the Commission with findings of fact, conclusions of law, and recommendations regarding a route permit for the project. The Commission uses the report in selecting a route for the project and for determining appropriate conditions. The Commission is charged with considering the “characteristics, the potential impacts, and methods to minimize potential impacts” of the routes evaluated so that it may select “a route that minimizes human and environmental impact.”¹⁶⁴

Minnesota Rule 7852.1900 lists 10 criteria the Commission must consider in making a pipeline route permit decision, including impacts on human settlement, the natural environmental and local economies.

¹⁶² Minn. Rule 7852.1400, subp 1.

¹⁶³ Ibid.

¹⁶⁴ Minn. Rule 7852.1900, subp. 2

Criteria considered by the Commission for pipeline route permits¹⁶⁵

- A. Human settlement, existence and density of populated areas, existing and planned future land use, and management plans.
- B. The natural environment, public and designated lands, including but not limited to natural areas, wildlife habitat, water, and recreational lands.
- C. Lands of historical, archaeological, and cultural significance.
- D. Economies with the route, including agricultural, commercial or industrial, forestry, recreational, and mining operations.
- E. Pipeline cost and accessibility.
- F. Use of existing rights-of-way and right-of-way sharing or paralleling.
- G. Natural resources and features.
- H. The extent to which human or environmental effects are subject to mitigation by regulatory control and by application of permit conditions contained in part 7852.3400 for pipeline right-of-way preparation, construction, cleanup, and restoration practices.
- I. Cumulative potential effects of related or anticipated future pipeline construction. The relevant applicant policies, rules and regulations of other state and federal agencies, and local government land use laws including ordinances adopted under Minnesota Statutes, section 299J.05, relating to the location, design, construction, or operation of the proposed pipeline and associated facilities.

Additional permits and approvals

A pipeline route permit from the Commission which determines where the pipeline will be located is the only state permit required for the routing of a pipeline. It is important that state agencies participate in the permitting process since the Commission's permit binds these state agencies. Agency participation can aid the Commission by indicating routes that are not permissible and route permit conditions that are appropriate for mitigating impacts of the pipeline.

The Commission's route permit does not preempt other state or federal permits for the construction and operation of the project (commonly referred to as "downstream permits" because they are subsequent to and dependent upon the Commission's routing decision). Downstream permits commonly required for a pipeline project are noted in Table 10.

¹⁶⁵ Minn. Rule 7852.1900

Table 10. Downstream permits and approvals commonly required for a pipeline project

Responsible agency	Permit and approvals
Federal permits and approvals	
U.S. Army Corps of Engineers	Clean Water Act Section 404 Permit (Wetlands) Navigable Water Crossing Permit
U.S. Fish and Wildlife Service	Section 7 Consultation (Endangered Species)
Minnesota permits and approvals	
Minnesota Pollution Control Agency	Section 401 Water Quality Certification National Pollutant Discharge Elimination System (NPDES/SDS) Construction Stormwater Permit and Construction Dewatering NPDES/SDS Wastewater Permit Environmental Spill Response Plan Stormwater Pollution Prevention Plan (SWPPP) Aboveground Storage Tank Permit Air Permit
Minnesota Department of Natural Resources	License to Cross Public Waters / Public Lands Water Appropriations Permit State Endangered / Threatened Species Consultation and Taking Permit Calcareous Fen Management Plan
Minnesota Department of Transportation	Road Crossing Permit Oversize/Overweight Load Permits
Minnesota Department of Agriculture	Agricultural Impact Mitigation Plan ¹⁶⁶
State Historic Preservation Office	Minnesota Historic Sites / Minnesota Field Archaeology
Local government permits and approvals	
County, Township, Soil and Water Conservation District	Wetland Conservation Act Approvals and Compliance
County Township, City	Road Crossing Permit

¹⁶⁶Though included here as a downstream permit, the Agricultural Impact Mitigation Plan is developed concurrently with the Commission’s pipeline route permit and has no effect until enforced through the Commission’s permit.

Select downstream permits from state agencies

Minnesota Pollution Control Agency permitting

The construction, installation and operation of pipelines, tank terminals and refineries may require MPCA permits for air quality,¹⁶⁷ above-ground storage tanks,¹⁶⁸ wastewater,¹⁶⁹ industrial stormwater,¹⁷⁰ construction stormwater,¹⁷¹ emergency spill response plan,¹⁷² and Section 401 Water Quality Certification.¹⁷³

- **Air permit** – An air emissions permit may be required for a storage facility that has a potential to emit any regulated pollutant in greater than specific threshold amounts, or is subject to a rule such as a new source performance standard that specifically requires a permit. If an air emissions permit is required, it must be obtained before construction or operation of that facility can begin.
- **Environmental Spill Response Plan** – Pipeline operators are required to submit a response plan to the Pipeline and Hazardous Materials Safety Administration. The response plan must address a worst-case discharge, identify environmentally and economically sensitive areas, and describe the responsibilities of the operator and others in removing such a discharge.
- **Above-ground Storage Tank Permit** – Facilities that have the capacity to store 1 million gallons or greater of any liquid substance that could cause water pollution must apply to the MPCA for a major facility permit following procedures outlined in Minnesota Rules 7001.4200 -.4300. The goal of this permit is to prevent pollution of waters of the state. However, these permits are not required for break-out tanks. Above-ground storage tanks with the capacity to store less than 1 million gallons must comply with the requirements in Minn. Rules chapter 7151.
- **Section 401 Water Quality Certification** – Projects that require federal permits also are subject to the review requirements of the MPCA’s Water Quality Certification program, to ensure that the projects will meet state water quality standards. This includes review of pipeline projects that require individual permits from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act (discharge of dredge and fill material) or under Section 10 of the Rivers and Harbors Act (construction of structure in or over navigable waters), and hydropower projects licensed by the Federal Energy Regulatory Commission.
- **NPDES/SDS General Construction Stormwater Permit** – A permit is required when a project disturbs one or more acres of land. The general permit requires 1) use of best management practices; 2) a sediment and erosion control plan that details the specific measures to be implemented, phasing of construction, timeframes for implementing erosion controls, and inspection of erosion control measures after implementation; and 3) adequate stormwater treatment capacity to mitigate water quality impacts from runoff once the project is constructed.
- **NPDES/SDS Industrial Stormwater Permit** – The permit requires that specific conditions be adhered to for construction and operation based on the type of facility, and for overall compliance with water quality requirements. A Stormwater Pollution Prevention Plan, including benchmark monitoring is required.

¹⁶⁷ Minn. R. 7007.0150

¹⁶⁸ Minn. R. 7001.0020.H

¹⁶⁹ Minn. Rule 7001.1030

¹⁷⁰ Ibid.

¹⁷¹ Ibid.

¹⁷² Minn. Stat. Chapter 115E

¹⁷³ Minn. Rule 7001.1420

- **NPDES/SDS Wastewater Permit** – A permit is required to discharge hydrostatic test waters used to test new and existing pipelines and trench waters. Provisions of this permit may also address the storage and maintenance of material handling equipment, and for storage areas for raw materials such as tank farms. The permit authorizes a discharge flow and assigns effluent water and waste loading limits to protect receiving waters.

The owner of the pipeline applies for an individual permit that covers construction stormwater, trench dewatering, and hydrostatic testing. The individual permit requires the permittee to request a letter of authorization for each small project covered under the individual permit. The permit does not allow for a discharge without seeking authorization for each individual project’s discharge.

Department of Natural Resources permitting

The DNR permits activities associated with pipeline development as a substantial landowner and land administrator along pipeline routes, and reviews pipeline projects for impacts to natural resources. The DNR reviews and comments on projects in order to meet statutory obligations developed to ensure natural, recreational, and cultural resources are protected. The DNR has jurisdiction over wildlife in Minnesota and administers the Minnesota Outdoor Recreation System.¹⁷⁴ This includes wildlife management areas, scientific and natural areas, state parks, state forests, state recreation areas, and other DNR managed lands.

Project developers intending to cross over, under, or across any state land or public water with any utility need to first secure a DNR license to cross¹⁷⁵ and other applicable permits.

- **License to Cross Public Lands and Waters** – The focus of this license is to minimize impacts on public waters and state land during pipeline construction, and to restore those sites after construction. The DNR land and water crossing licenses promote the use of bioengineering methods in stream crossing restoration, use of native species in re-vegetation, and monitoring and control of invasive species on the pipeline right-of-ways. The DNR Lands and Minerals Division coordinates license reviews and issues utility licenses to cross public waters and state lands managed by the DNR. Crossing of state lands that were acquired with funding restrictions usually requires additional review.
- **Water Appropriations Permit** – Many times, pipeline projects require dewatering during construction or during hydrostatic testing, which require a water appropriations¹⁷⁶ permit from the DNR Ecological and Water Resources Division. This is required when users are withdrawing more than 10,000 gallons of water per day or one million gallons per year.
- **Threatened and Endangered Species Taking Permit** – Minnesota’s endangered species law¹⁷⁷ and associated rules parts 6212.1800 to 6212.2300 and 6134, prohibit the taking of state-listed endangered or threatened species without a permit.¹⁷⁸ Surveys for rare species may be required in order to determine if the proposed project would result in a taking. Some species can only be surveyed at specific times of the year.

¹⁷⁴ Minn. Stat. § 86A and § 84.027, subd. 2

¹⁷⁵ Minn. Stat. § 84.415. *Information about the License for Utility Crossings can be found at:*
http://www.dnr.state.mn.us/permits/utility_crossing/index.html.

¹⁷⁶ Minn. Stat. § 103G.271; 6115.0710. Additional information about DNR water use permits is available at:
http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html

¹⁷⁷ Minn. Stat. § 84.0895

¹⁷⁸ Additional information about the DNR Threatened and Endangered Species Taking Permit:
http://www.dnr.state.mn.us/nhnrp/endangered_permits.html

- **Calcareous Fen Management Plan** – Calcareous fens are rare and distinctive peat-accumulating wetlands, which have additional legal protection in Minnesota. They are designated as “outstanding resource value waters¹⁷⁹” in water quality regulations¹⁸⁰ and the Wetlands Conservation Act¹⁸¹, states that calcareous fens may not be filled, drained, or otherwise degraded, wholly or partially, by any activity, except as provided for in a management plan. In addition, destruction of any state-threatened or endangered plants in a calcareous fen would also be regulated under Minnesota’s endangered species law.

Board of Water and Soil Resources and local government units permitting

- **Wetland Conservation Act (WCA)** –BWSR is the state agency responsible for promulgating WCA rules and oversight of local government unit’s implementation activities. Projects associated with pipelines often cross multiple local government boundaries. In these instances, BWSR staff will typically coordinate the review of submitted materials and decisions on applications among the affected governments. The WCA regulates activities that result in impacts to wetlands. A wetland impact is a loss of wetland quantity, quality, or biological diversity caused by draining, filling, or in some cases excavation. The WCA requires anyone proposing to impact a wetland to first try to avoid the impact; second, to try to minimize unavoidable impacts; and, finally, to replace any lost wetlands. Since the WCA is based solely on state law, connectivity to navigable waters or federal jurisdiction does not affect this program. Certain activities are exempt from the WCA, allowing projects with minimal impact or projects on land where specific pre-established land uses are present to proceed without avoidance, minimization, or replacement. The WCA has jurisdiction over wetlands on privately-owned land and land owned by the state or a local government. Tribal land and land owned by the federal government doesn’t generally fall under the jurisdiction of the WCA.

Local zoning and land use rules

The Commission’s pipeline route permit supersedes local planning and land use regulations and ordinances.¹⁸² As with state agencies, the

Rights-of-way and easements for pipeline construction and operation

The construction and operation of an oil pipeline will impact multiple landowners. In order to ensure that the particular lands and rights-of-way required for a project can be obtained, pipeline route permits issued by the Commission grant permittees the power of eminent domain to acquire or "take" property interests (generally easements) for a project (Minnesota Rule 7852.3200).

“Eminent domain” is the power to take privately owned property and convert it to public use, subject to just compensation for the taking (Minnesota Statute 117). Despite good faith negotiations, it’s possible that a landowner and a pipeline permittee will not be able to reach agreement on the terms of an easement for a project. Under these circumstances, and through the condemnation process, three Court-appointed impartial commissioners determine the amount of compensation due to the landowner for the taking of the land.

For additional information, see the DOC right-of-way and easement fact sheet:

http://mn.gov/commerce/energyfacilities/documents/Easements%20Fact%20Sheet_08.05.14.pdf

¹⁷⁹ Minn. Rule 7050.0180

¹⁸⁰ Minn. Rules Chapter 8420.1010 - 8240.1060

¹⁸¹ Minn. Stat. 103G.223

¹⁸² Minn. Stat. 216G.02, Subd. 4.

Commission’s permit binds local government units with respect to the location of the pipeline. However, permittees must obtain all local approvals for a pipeline to ensure proper local government functioning. Local governments cannot deny routing of a pipeline, but may place conditions on such approvals. Typical local approvals include pipeline road crossing permits and utility permits.

Mitigation of human and environmental impacts

The Commission is charged with issuing a pipeline route permit that minimizes human and environmental impacts.¹⁸³ In addition to selecting a route that avoids impacts to the extent practicable, pipeline route permits contain measures to mitigate pipeline impacts. These measures address such topics as agricultural mitigation, environmental mitigation, construction practices, and compliance with federal, state, and local permits.¹⁸⁴ Mitigation plans that are commonly required for a pipeline project are noted in Table 11. All pipeline projects must comply with the conditions for right-of-way preparation, construction, cleanup, and restoration found in Minnesota Rule 7852.3600.

The Commission route permit may also contain special permit conditions. These special conditions are conditions that flow from the record into the permit and reflect project-specific measures to avoid, minimize, and mitigate potential pipeline impacts. Though special permit conditions are project specific, there are several common types of special permit conditions:¹⁸⁵

- **Avoidance of impacts** - Special conditions describing areas of the project where the permitted route avoids certain features or is narrowed to avoid certain features. The features can be manmade features (homes, infrastructure) or natural features (areas of outstanding biodiversity).
- **Environmental monitors** – Requirement for independent environmental monitors that report to specific state agencies on the implementation of mitigation measures called for in the route permit and in agency approvals.
- **Construction environmental control plan** – Permittees prepare a construction

Table 11: Mitigation plans commonly required for a pipeline project¹

Spill Prevention, Containment, and Control Plan
Pipeline Integrity and Emergency Response Plan
Petroleum Contaminated Soil Management Plan
Plan for the Discovery of Cultural or Historic Resources During Construction
Drilling Mud Containment, Response, and Notification Plan
Agricultural Impact Mitigation Plan
Stormwater Pollution Prevention Plan
Spill Response Plan
Construction Environmental Control Plan
Environmental Mitigation Plan
Protected Species Plan
Noxious Weeds and Invasive Weed Plan
Revegetation and Restoration Monitoring Plans
Environmental Clearance Plan for Access Roads
Anthrax Mitigation Plan
Botrychium Avoidance and Monitoring Plan
Complaint Receipt and Response Procedures
Wetland Replacement Plan

¹⁸³ Minn. Rule 7852.1900, subp. 2

¹⁸⁴ See, e.g., Pipeline Routing Permit for Construction of the Alberta Clipper Pipeline, December 29, 2008, PL-9/PPL-07-361, eDockets Number [5679213](#).

¹⁸⁵ The common types of special permit conditions listed here are examples; they may or may not be included in a specific Commission pipeline route permit. Whether a special permit condition, or any permit condition, appears in a Commission route permit depends on the record developed during the permitting process. Conditions flow from the record into the permit.

Evolution of agricultural impact mitigation plans

The plans have evolved over time, and issues have arisen and been addressed. Some of these issues include:

Compliance. Limited state resources have led to the creation of “agricultural monitors”. The monitor is a third-party retained by the pipeline proposer responsible for reporting to the Minnesota Department of Agriculture. The monitor tracks the proposer’s environmental inspectors, identifies issues that occur during construction, and reports and discusses these issues with the department.

Management of change. Experience has shown that there are unanticipated issues that arise during construction that were not in the plan. This has resulted in provisions relating to the management of change, which specify when and how provisions of the plan can be modified, and what levels of approval are required.

Organic farms and the development of the organic agriculture appendix. In review of a pipeline in 2006, the proposed crossing of a prominent organic farm prompted development of provisions specific to organic agriculture, including recognizing and using practices that conform to the organic system plan for the farm (a requirement of organic certification), and measures to prevent introduction of substances prohibited by the organic certification.

Extent of topsoil stripping. How much of the right-of-way should be stripped of topsoil has evolved over time. The thickness of topsoil can vary along the length of a pipeline. Ultimately, it is advantageous to vary the width of topsoil stripping according to topsoil depth.

environmental control plan for their projects. This plan spells out the processes and procedures by which mitigation measures for all permits and approvals for the project will be implemented. The plan is reviewed and approved by the Commission.

- **Agricultural impact mitigation plan –**

Permittees develop and implement an agricultural impact mitigation plan¹⁸⁶ that addresses topsoil separation and management, soil compaction, tile line avoidance and repair, and organic agriculture.

Conditions in a Commission pipeline route permit are administered and enforced through the Commission’s permit. However, there is overlap and coordination between the Commission’s permit and downstream agency permits. For example, the agricultural impact mitigation plan is approved by the Department of Agriculture but is administered and enforced through the Commission’s permit. Likewise, environmental monitors required under the Commission’s permit and downstream agency permits.

Restoration and certification

After pipeline construction and all restoration measures, permittees must file with the Commission a certification that the pipeline has been constructed in compliance with all pipeline route permit conditions.¹⁸⁷ The Commission reviews the certification and informs the permittee of any deficiencies which, if corrected, would allow the certification to be accepted. Once the certification is accepted by the Commission, the Commission’s jurisdiction over the pipeline route permit is terminated.

¹⁸⁶ Minn. Stat. § 216E.10, Subd. 3(b).

¹⁸⁷ Minn. Rule 7852.3900

Evolution and improvement of the pipeline route permitting process

Over the past 10 years, the pipeline route permitting process has addressed potential impacts to be avoided or mitigated and they fall into three categories: 1) mitigation plans, 2) environmental monitors, and 3) permitting process improvements.

Mitigation plans

Mitigation plans included in recent Commission's pipeline route permits – specifically, the agricultural impact mitigation plans and the construction environmental control plan, have improved the efficacy of mitigation measures and coordination between the Commission's route permit and downstream agency permits.

In 2005, the Minnesota Legislature incorporated into statute the role of the MDA in advising the Commission on potential impacts to agricultural lands due to pipeline projects and made the MDA the lead agency for the development of agricultural impact mitigation plans.¹⁸⁸ As a result, agricultural impact mitigation plans are now developed jointly by the MDA and pipeline permit applicants on a project-by-project basis, approved by the MDA, and included in Commission route permits as a special permit condition (discussed above).

The requirement for a construction environmental control plan imposes a discipline on permittees to organize their environmental controls and processes and provide a means for the Commission and agencies to more easily review compliance with their permits.

Environmental monitors

Recent Commission permits require the use of third-party environmental monitors to review and report on the implementation of mitigation measures called for in the Commission's route permit and in agency approvals. Monitors are typically dedicated to and report to specific agencies. Monitors are paid for by the permittee.

Related to the use of environmental monitors is the use of electronic communications to share monitoring and construction information. Permitting agencies are now able to view monitoring reports, photographs, and construction plans in near real time. This form of monitoring allows agencies to quickly review monitoring data and to share data among agency staff that have expertise regarding the resource(s) at issue but who are geographically distant from the project.

Permitting process improvements

Three process steps included in recent Commission pipeline route permitting processes have improved the environmental review and hearing process, and thus the record the Commission bases its a permit decision on: improved notice to agencies, use of a generic route permit template, and environmental review conducted by Commerce-EERA.

Notice to agencies regarding participation in the pipeline route permitting process is provided by Commerce-EERA and the Commission. Commerce-EERA provides notice to agency staff regarding opportunities to participate in the route permitting process, and provides copies of applications and environmental review documents. Commerce-EERA also coordinates with agency staff on questions and comments throughout the permitting process. For more recent pipeline projects, the Commission has

¹⁸⁸ Minn. Session Laws 2005, Chapter 97, article 3, section 10(b).

requested agency participation in the development of the record during the environmental review and hearing process.

For more recent pipeline projects, the Commission has issued a generic pipeline route permit template in advance of the environmental review and hearing process. This template provides citizens and agencies an early opportunity to review the Commission's standard permit language for pipelines and to suggest additional language and/or permit conditions for the proposed project.

In developing the comparative environmental analysis for a project the Commission may authorize the analysis be prepared by the applicant or by Commerce-EERA.¹⁸⁹ For more recent projects, the Commission has authorized Commerce-EERA to prepare the analysis. This change likely improves public confidence in the objectivity of the comparative environmental analysis. Additionally, it likely improves the visibility and usefulness of the document, by making it a single document entered as an exhibit of Commerce-EERA, rather than a document that is entered into the record in several parts by various applicant witnesses.

¹⁸⁹ Minn. Rule 7852.1500.

Findings and considerations

Federal approvals

- The state of Minnesota has regulatory authority to determine if an oil pipeline is needed (certificate of need) and, if so, where it should be routed (route permit). When determining whether a specific pipeline is needed, the Commission considers, among other record evidence, FERC-approved rates and terms of service. These rates and terms of service inform the costs of a proposed pipeline project and may inform delivery points and other terms of service. This information is valuable to the Commission in determining whether there are reasonable and prudent alternatives to a proposed project. FERC proceedings that determine rates and terms of service can occur before or simultaneously with Commission dockets. The state of Minnesota should consider studying the feasibility of participating in FERC proceedings where rates and terms of service for oil pipelines that would enter the State of Minnesota.

Public participation

- The commission relies on public participation to develop a robust and comprehensive record upon which it can make certificate of need and route permit decisions. This participation includes participation by citizens, local governments, and state agencies. The commission's certificate of need and route permit proceedings provide multiple opportunities for public participation. The state of Minnesota's electronic docketing system used for certificate of need and route permit proceeding makes all documents in these records easily available to citizens, local governments, and state agencies.

Certificate of need

- In determining whether a certificate of need should be approved, conditioned, or modified, the commission considers the natural and socioeconomic impacts of system alternatives. The applicant, parties, agencies, and citizens can submit information and analysis regarding these potential impacts into the certificate of need record. While Minnesota Rule 7853 does not call for a separate environmental analysis document as part of certificate of need proceedings, the commission may request environmental analysis documents as part of the need proceedings.

Discretion regarding the development of environmental analysis documents aids the commission's tailoring of the certificate of need process to best fit the scope and complexity of the project at hand. This discretion, however, may make it relatively more difficult for the public to determine when and how they can participate in the need proceedings. When the Commission does not request that Commerce-EERA prepare environmental analysis for a project, it may place greater responsibility on the public to provide such analysis or portions of this analysis and enter it into the certificate of need record.

For high voltage transmission lines that require a certificate of need, Commerce-EERA is required to prepare an environmental review document known as an environmental report.¹⁹⁰ The report addresses the potential human and environmental impacts of the project and of alternatives to the project.¹⁹¹ The scope of the environmental report is informed by a public scoping process.¹⁹² The

¹⁹⁰ Minn. Rule 7849.1200.

¹⁹¹ Ibid.

report is issued in a final form – there is not a draft issued for comment and a final document.¹⁹³ If a certificate of need process and a transmission line routing process are proceeding concurrently, Commerce-EERA can elect to develop one environmental review document that addresses both need (system alternatives) and routing (routing alternatives).¹⁹⁴

If the pipeline certificate of need proceeding rules were amended to incorporate an environmental report-like process and analysis, it could broaden opportunities for public participation and could limit any burdens placed on the public to provide environmental analysis into the certificate of need record. An environmental report-like process and analysis would likely limit the discretion of the Commission to tailor its certificate of need process and would likely lengthen the process to accommodate preparation of an environmental report, or an environmental report-like, document.

- The Commission, through several recent orders, has established various requirements, conditions, or procedures that have refined the certificate of need process on a case-by-case basis, such as stipulations that approved pipeline projects obtain offsetting renewable energy credits for all energy used for operating the pipeline. These actions are supported by many state agencies and recommended to continue as the Commission sees fit.

Route permit proceedings

Environmental review

- Pipeline route permit proceedings are governed by Minnesota Rules Chapter 7852. The EQB developed and approved these rules as an alternative form of environmental review pursuant to Minnesota Rules 4410.3600. The pipeline routing rules require the preparation of a comparative environmental analysis. The scope of the analysis is developed through a public scoping process. The comparative environmental analysis is issued in a final form. There is not a draft analysis issued and no opportunity for comment on the draft analysis to inform the final comparative environmental analysis. The Commission may authorize the analysis be prepared by the applicant or by Commerce-EERA.

Revising the pipeline routing rules to provide for issuance of the comparative environmental analysis in a draft form, with comments and responses integrated into a final document, could improve the record for the Commission's decision. However, such a change would lengthen the routing process and would be inconsistent with the statutory timeline for the pipeline routing approvals.

As discussed above in this section, preparation of the comparative environmental analysis by Commerce-EERA, rather than the applicant, likely improves public confidence in the objectivity of the analysis and the usefulness of the document.

Lifecycle assessment of oil production, transportation and use

- Minnesota's approval process for oil pipelines examines the potential impacts of a pipeline. These approvals typically do not address other process steps necessary for the use of oil products, for example, production, refining, and end uses. In general, this is because these other process steps have approvals and environmental analyses, whether state, local, or federal, dedicated to these process steps. For example, if oil is produced in the Bakken, production is regulated through approval

¹⁹² Minn. Rule 7849.1400.

¹⁹³ Ibid.

¹⁹⁴ Minn. Rule 7849.1900.

processes in North Dakota. Likewise, oil production in Canada is regulated through Canadian approval processes.

What is not well captured by this system are impacts that emerge from the steps as a whole – impacts that emerge from the systematic production, transport, refining, and use of oil products. Climate change due to greenhouse gases is one such impact; there may be others. A holistic review and analysis of the potential impacts of oil production, transport, refining, and use, including but not limited to the impact of greenhouse gases, may be benefit Minnesota decision-makers.

- A holistic analysis of the potential impacts of oil production, transportation, refining, and use (at most any scale – Minnesota, Upper Midwest, U.S.) would be challenging. Additionally, the reliability and usefulness of models to perform such an analysis are uncertain.¹⁹⁵

Route permit

- In making a pipeline routing decision, the Commission is guided by the pipeline routing criteria of Minnesota Rule 7852.1900. There are likely several indicators that could be used to evaluate potential impacts of a project relative to these criteria. Coordination among state agencies as to the indicators and data sets that are best suited for informing the pipeline routing criteria would likely improve the comparative environmental analysis. Such coordination would ensure that the most appropriate indicators are being used for environmental review and would aid agency comments during the route permitting process.
- Conditions in a Commission pipeline route permit are administered and enforced through the Commission's permit. However, there is overlap and coordination between the Commission's permit and downstream agency permits. For example, the AIMP is an MDA approval that is administered and enforced through the Commission's permit. Likewise, environmental monitors required under the Commission's permit and downstream agency permits.

Downstream permits and early notification

- Downstream permits for a pipeline project are informed by the Commission's route permitting process. Participation by state agencies and local governments in the Commission's process is key to developing a record that supports downstream permitting.

In addition to participation in the Commission's process after a route permit application is accepted, agencies and local governments may benefit from communication with prospective pipeline route permit applicants before an application is submitted. Through early consultation, agencies and local governments will likely be better prepared for the Commission's routing process. Agencies and local governments may also be able to work with applicants to address areas of concern before an application is submitted.

Pre-application coordination and consultation between applicants and agencies and local governments could be accomplished by a voluntary joint agreement or a guidance document. For example, Commerce-EERA provides application guidance to wind farm proposers, to guide their development of site permits for wind farms.¹⁹⁶

¹⁹⁵ Lightfoot, Thaddeus R. (2010) *Climate Change and the Environmental Review: Addressing the Impacts of GHG Emissions Under the Minnesota Environmental Policy Act*, 36:3 William Mitchel Law Review.

¹⁹⁶ Application Guidance for Site Permitting of Large Wind Energy Conversion Systems (LWECS) in Minnesota, August 2010, http://mn.gov/commerce/energyfacilities/documents/LWECS_APP_Guide_AUG2010.pdf.

Consultation could also be done through revisions to statute or rule. For example, the Legislature added pre-application consultation with local governments to the Power Plant Siting Act in 2008.¹⁹⁷ With the addition, prospective applicants for a route permit for a high voltage transmission line must, 90-days before filing an application with the Commission, provide notice to local governments along the proposed route and provide an opportunity for a consultation meeting before the application is submitted.¹⁹⁸

- The jurisdiction of the Commission over oil pipelines, as exercised through a pipeline route permit, ends when a permittee demonstrates that all pipeline permit conditions, including restoration, have been accomplished. The Commission’s permit is a “construct-and-restore” permit; it is not an operational permit – in other words, other agencies, such as the Minnesota Office of Pipeline Safety, and Minnesota Pollution Control Agency, have jurisdiction over the operation of oil pipelines.

In contrast to pipelines, the Commission issues an operational permit for wind farms, typically 30-years long, that requires a permittee to describe how the wind project will be decommissioned and how funds will be ensured for decommissioning and restoration.¹⁹⁹ Moreover, other state agencies also issue operational permits that require financial assurance for certain projects to ensure that neither the state nor the environment is left compromised in the event of an accident or at the end of life of the project. For example, the DNR requires that permittees engaged in nonferrous mineral mining ensure funds for reclamation activities, including mine closure, and for any corrective actions necessary to comply with design and operation criteria.²⁰⁰ The MPCA requires that permittees operating landfills ensure funds for closing the landfill, post-closure care, and any corrective actions.²⁰¹

Large crude oil pipelines arguably have some of the same environmental and financial risks and may benefit from some form of financial assurance for pipeline construction, operation and maintenance, spill response, and decommissioning. There are likely several ways to ensure that such funds are available. Financial assurance may be raised and explored in the record during the Commission’s pipeline proceedings.

Land owner considerations

- The pipeline routing rules require that the Commission consider the use of existing rights-of-way and right-of-way sharing when issuing a pipeline route permit. As a result, and because many potential pipeline impacts can be avoided by routing a pipeline where there is existing infrastructure, it is not uncommon for landowners who have a pipeline crossing their property to have several pipelines crossing their property, with several associated pipeline easements. This use and sharing of existing right-of-way mitigates potential pipeline impacts but does so at the risk of creating “route fatigue” for those landowners who live alongside existing infrastructure.

As discussed in this section, pipeline route permits issued by the Commission grant permittees the power of eminent domain to acquire or “take” property interests to construct a pipeline. Pipeline permittees typically acquire easements from landowners for pipeline projects.

¹⁹⁷ Minnesota Session Laws 2008, Chapter 296, article 1, sections 15 and 16; Minnesota Statute 216E.03, Subds. 3A and 3B.

¹⁹⁸ Minn. Stat. 216E.03, Subds. 3a and 3b.

¹⁹⁹ Minn. Rule 7854.0500.

²⁰⁰ Minn. Rule 6132.1200.

²⁰¹ Minn. Rule 7035.2695.

Under Minnesota Statute section 216E.12, sometimes referred to as the “Buy the Farm” statute, for certain high voltage transmission lines landowners may elect for a permittee to purchase their property rather than acquiring an easement. The statute applies only to transmission facilities that operate at 200 kV or more and to properties that meet certain other criteria. If all criteria are met, a landowner may elect for a permittee to purchase “any amount of contiguous, commercially viable land” owned by the landowner in lieu of an easement.²⁰²

The landowner protections of Minnesota Statute section 216E.12 are not available to landowners whose property is crossed by an oil pipeline pursuant to a Commission pipeline route permit. Extension of “Buy the Farm” protections to oil pipelines would help mitigate impacts to landowners, particularly those landowners whose land is crossed by multiple pipelines. Extending these protections would likely increase the costs associated with property acquisitions for pipeline projects.

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²⁰² Minn. Statute 216E.12, Subd. 4

Spill prevention, preparedness, emergency response and safety

This section reviews the laws, regulations, and policies governing different modes of transporting crude oil by way of pipeline across Minnesota. The discussion can be broken down into three parts—prevention of accidents and spills related to oil pipelines, company preparedness, and emergency response.

Pipelines in Minnesota

Minnesota pipelines, including those carrying crude oil or petroleum products are categorized as *intrastate* or *interstate*. Intrastate pipelines start and end within the state, while interstate pipelines carry products across state lines. These are valuable distinctions because the two pipeline categories operate under different requirements and oversight. Minnesota Office of Pipeline Safety (MNOPS) inspects both categories of pipelines under authority of the U.S. Department of Transportation – Pipeline and Hazardous Materials Safety Administration (PHMSA), and submits an application for certification annually to the federal government to carry out its pipeline safety and damage prevention roles.²⁰³ The state may adopt additional or more stringent safety standards for *intrastate* pipelines²⁰⁴, but the state is prevented by this law from adopting additional or more stringent safety standards for *interstate* pipelines.²⁰⁵

The following table shows that the vast majority of the pipelines carrying crude oil or petroleum products are categorized as *interstate* and regulated by federal government through the certification of a state agency, MNOPS.

Table 12: Minnesota hazardous liquid pipelines and breakout tanks²⁰⁶

Commodity	Interstate miles	Intrastate miles	Total miles	Miles of gathering	Breakout tanks
Crude oil	2,403.2	4.7	2,407.9	0.0	32
Highly volatile liquids flammable / toxic	816.3	8.0	824.3	0.0	13
Refined petroleum products	1,708.8	12.9	1,721.7	0.0	88
Totals	4,928.3	25.6	4,953.9	0.0	133

²⁰³ As noted in Title 49 United States Code § 60105

²⁰⁴ Title 49 U.S. Code § 60104

²⁰⁵ Minn. Stat. 299J provides MNOPS with statutory authority for inspection and investigation of interstate pipelines.

²⁰⁶ U.S. DOT Pipeline and Hazardous Materials Safety Administration 10/30/2014, <https://hip.phmsa.dot.gov/analyticsSOAP/saw.dll?Portalpages>

Spill prevention

A spill is the unintended loss of oil from the pipeline system and a rupture is a sudden and catastrophic loss and leak. The hazards and damage and cleanup of each pipeline spill, leak, or rupture depends entirely on incident-specific factors. The eventual hazard and damage depends on the spill's place, oil, quantity, topography, soils, hydrology, adjacent and downstream land type and use, weather, luck, and response by the spiller. Prevention is one measure to mitigate the impacts of either a spill or a rupture.

Inspections conducted by state agencies and companies and the repercussions that may follow such as modifying operation and maintenance plans, corrective action or even enforcement to prevent and mitigate harm to human health and the environment. Safety regulations and education are also important components of prevention and an obligation of the state and companies.

Safety

Pipeline operators are required to comply with federal pipeline safety regulations specified in Title 49 CFR Part 195.²⁰⁷ In addition to reporting requirements, pipeline companies are required to comply with regulations pertaining to the following:

- Design
- Construction
- Pressure testing
- Operations and maintenance
- Qualification of pipeline personnel
- Corrosion control

Federal pipeline regulations are minimum safety standards, and companies may choose to go above-and-beyond regulatory requirements (however states are preempted from adopting addition safety requires for *interstate* pipelines).²⁰⁹ Federal safety regulations were included in the Hazardous Liquid Pipeline Safety Act of 1979; however portions of Minnesota's oil pipeline infrastructure date back to the 1930s, '40s and '50s. That means approximately 65% of oil pipelines in Minnesota were built before 1979.

Table 13: Minnesota oil pipeline mileage by installation year²⁰⁸

Pre 1920 or unknown	8.6
1920 to 1929	0
1930 to 1939	1.5
1940 to 1949	557.0
1950 to 1959	1,197.0
1960 to 1969	514.6
1970 to 1979	429.2
1980 to 1989	357.2
1990 to 1999	12.5
2000 to 2009	1,047.0
2010 to 2014	5.5
Total mileage	4,129.6

Operators of pipelines constructed before 1979 are not held to requirements pertaining to design, construction or pressure testing, but they must comply with reporting, operation, and maintenance and corrosion control requirements regardless of age.

For newer pipelines, those constructed after 1979, design and construction requirements are important safety standards. Design requirements are among the ways a pipeline's maximum operating pressure is

²⁰⁷ Title 49 Code of Federal Regulations Part 195 – Transportation of Hazardous Liquids by Pipeline

²⁰⁸ Data Source: U.S. DOT Pipeline and Hazardous Materials Safety Administration 10/30/2014

<http://phmsa.dot.gov/portal/site/>

²⁰⁹ Title 49 US Code § 60104

determined. Regulations incorporate industry standards and specifications to define safe operating pressures. Maximum operating pressure is based on the pipe material (steel for liquid pipelines), valves, fittings, and external loading. Construction regulations determine installation locations, transportation and installation of pipe, welding and fabrication methods, location of valves, inspection, testing and record keeping – all integral to safe operation of a pipeline system.

MNOPS inspections

Minnesota Office of Pipelines Safety carries out its safety role by conducting routine pipeline inspections and investigations of pipeline accidents. Routine inspections include reviewing pipeline operator procedures, training and records, and observe practices and conditions in the field to ensure compliance with state²¹⁰ and federal regulations.²¹¹ MNOPS also conducts construction inspections, and in the event of a pipeline accident, inspectors conduct investigations to determine whether the pipeline operator followed proper procedures and maintained regulatory compliance, and ensure that the operator takes steps to prevent similar incidents from occurring in the future. Inspections are part of the agreement with the Pipeline and Hazardous Material Safety Administration and interstate pipeline facilities are inspected as directed by the Interstate Inspection Plan.²¹² The administration prioritizes annual interstate inspections by risk elements pertaining to each pipeline operator. Risk elements include date of installation, installation methods, location, accidents, and leaks. PHMSA creates an annual interstate inspection plan and MNOPS carries it out.

Between 1994 and 2014, 400 inspections of various types on crude oil and petroleum pipelines have been completed by MNOPS.

Table 14: Oil and refined petroleum pipeline inspection cases (1994-2014)²¹³

Construction inspection	75
Integrity management inspection	50
Specialized inspection	46
Standard inspection	229

Inspection types:

- **Construction inspections** – field and record review of pipeline construction and testing.
- **Integrity management inspections** – review the operator’s integrity management program, which includes steps taken by the operator to minimize threats to the pipeline system.
- **Specialized inspections** – follow-up to know pipeline concerns or specific areas of code compliance.

²¹⁰ Minn. Stat. 299F adopts these regulations for intrastate pipeline companies and provides MNOPS with statutory authority for inspection and investigation.

²¹¹ Companies transporting oil and refined petroleum products are required to comply with Title 49 Code of Federal Regulations, Part 195 – Transportation of Hazardous Liquids by Pipeline and Part 199 – Drug and Alcohol Testing.

²¹² Title 49 United States Code, Section 60102

²¹³ MNOPS data generated October 10, 2014

- **Standard inspections** – include review of operations and maintenance plans, field and records inspections, control room inspections, follow-up to safety related condition reports, operator qualification programs, drug and alcohol programs, and public awareness plans.

Accidents are also investigated by MNOPS. In the event of a pipeline accident, inspectors work with pipeline companies and emergency responders to minimize damage to lives, property, and the environment. In the case of an *interstate* pipeline accident, MNOPS conducts investigations on behalf of PHMSA.

During the response to an accident, the first concern is whether the pipeline operator is making the area safe. These measures include the shut-down of pumping stations and isolation of the damaged section with designated emergency valves. The investigation continues with inquiry on the cause of the release and a plan of action for repair and start-up of the line. Pipeline operators are required to investigate the cause of the release and minimize the possibility of recurrence. Since 1994, MNOPS has investigated 253 crude and refined oil-product pipeline accidents. The table below summarizes all reportable incidences since 2004.

Table 15: PHMSA hazardous liquid incident data (2004-2013)²¹⁴

Year	Number	Fatalities	Injuries	Property damage	Gross barrels spilled	Net barrels lost
2004	5	0	0	\$1,622,951	1016	997
2005	3	0	0	\$77,530	504	500
2006	8	0	0	\$5,481,317	3,240	1,466
2007	6	2	0	\$3,016,785	340	326
2008	7	0	0	\$708,192	1,622	104
2009	11	0	0	\$4,280,517	5,050	2,596
2010	12	0	0	\$3,127,737	4,793	4,547
2011	3	0	0	\$15,844	10	0
2012	11	0	0	\$2,435,828	1,484	372
2013	12	0	0	\$1,231,237	61	16
Totals	78	2	0	\$21,997,942	18,124	10,927
2014 YTD	7	0	0	\$1,387,827	30	25
3-year average (2011-2013)	9	0	0	\$1,227,637	519	130
5-year average (2009-2013)	10	0	0	\$2,218,233	2,280	1,507
10-year average (2004-2013)	8	0	0	\$2,199,794	1,812	1,093
20 Year Average (1994-2013)	8	0	0	\$2,199,794	1,812	1,093

²¹⁴ Table extracted from: http://primis.phmsa.dot.gov/comm/reports/safety/MN_detail1.html. Report generated on: 10/07/14

In addition to PHMSA, Minnesota Statutes Chapter 115E requires all facilities and companies handling oil and hazardous substances to take reasonable steps to prevent spills. In practice, the other agency implementing 115E, the MPCA, has not asserted authority over pipeline construction, operation, or maintenance. The MPCA considers compliance with federal regulations to be a reasonable prevention step. Transportation companies that are out of compliance with federal prevention regulations are also considered to be out of compliance with Minnesota’s law.

Company inspections

Regulations require many operations and maintenance²¹⁵ activities to maintain safe operation, and pipeline operators are required to have operations and maintenance procedures for carrying out these activities, including record keeping, ensuring compliance with regulations, responding to emergencies, and abnormal pipeline operations. The operations and maintenance manual defines procedures for preventing accidental ignition, pipeline signage installation, maintenance of firefighting equipment, and other items as noted below:

Table 16: Common pipeline operations and maintenance functions²¹⁶

Required operation and maintenance	Frequency required
Inspection of pipeline rights-of-way	26 times per year (intervals not exceeding three weeks)
Inspection of navigable water pipeline crossings	Every five years
Maintenance of valves used for safe operation	Two times per year (intervals not exceeding 7 ½ months)
Inspection of breakout tanks	One time per calendar year (intervals not exceeding 15 months)
Monitoring of pipeline corrosion protection levels (cathodic protection)	One time per calendar year (intervals not exceeding 15 months)
Monitoring of corrosion protection equipment (rectifiers)	Six times per year (intervals not exceeding 2 ½ months)
Inspection of buried pipelines for corrosion	Any time the pipeline is exposed
Inspection of aboveground pipelines for corrosion	One time every three calendar years (intervals not exceeding 39 months)

High-population areas and navigable waterways in environmentally sensitive areas are defined as high consequence areas. Pipelines in high consequence areas are required to be covered by integrity management plans²¹⁷ which are used to assess the integrity of the pipeline system. Pipeline operators analyze data on specific pipelines to identify potential threats to the integrity of the lines. They obtain data from records on construction, leak history, and inspections. General industry data is considered, as well.

²¹⁵ §195.402 Procedural manual for operations, maintenance, and emergencies.

²¹⁶ Title 49 CFR Part 195

²¹⁷ §195.452 Pipeline integrity management in high consequence areas.

Pipeline anomalies such as dents, gouges, cracks, and corrosion are revealed during integrity work. Pipeline companies address these issues by reducing pressure or digging up the pipeline and making repairs.

Pipeline pressure-test data and design pressure information are used to define the pipeline's maximum operating pressure to be used in daily pipeline operation to avoid safety issues, leakage, or failure. Pressure-testing regulations require 125% of the maximum operating pressure and include visual inspections for leaks under test pressure. In cases where pipeline is not visually inspected, an additional four-hour test at 110% of the maximum operating pressure is required. Pressure tests generally employ water as the test medium instead of fuel or other hazardous materials in the line. Pipelines are designed to allow the use of in-line inspection tools called "pigs." Pigs are run through a pipeline to clean it or assess the integrity of a pipeline system. Design regulations also set standards for leak detection and for the design and construction of breakout tanks, all of which are inspected by pipeline companies as well as the state office of pipeline safety.

Regulations require steel pipelines to be coated and electrically protected from corrosion. Cathodic protection is a technique used to control metal pipeline corrosion by making the surface the cathode of an electrochemical cell. These systems require routine maintenance and monitoring – operations required by law to be carried out by qualified personnel trained under a qualification program to perform specific tasks affecting day-to-day operation of the line. Corrosion on pipelines can compromise the integrity of the line by reducing the thickness of the pipe wall, which can eventually lead to a leak or rupture.

Enforcement

Pipeline operator compliance with regulations is verified by inspections or investigations, and in the event of non-compliance of an intrastate pipeline, an enforcement action is issued by MNOPS. PHMSA officials decide the appropriate course of action with regard to non-compliance on interstate lines. Generally, enforcement actions include:

- A citation of the applicable regulation.
- Evidence regarding the non-compliance.
- A compliance order designed to ensure future compliance.
- A proposed monetary civil penalty, if applicable.

Additionally, federal regulations govern penalty amounts for interstate pipelines. Federal penalty amounts may not exceed \$200,000 for each violation and not exceed \$2 million for a series of related violations. Since 1994, MNOPS inspectors have cited 582 violations of Title 49 CFR Part 195.

Intrastate pipeline violation penalty amounts are covered by Minnesota state statute. Penalty amounts may not exceed \$100,000 for each violation and not exceed \$1 million for a series of related violations.

Pipeline abandonment and exposure

Pipeline requiring abandonment must comply with regulations on operation and maintenance.

Regulations require the pipeline to be safely disconnected from the system, and sealed to maximize safety and minimize environmental hazards. Pipelines are generally purged of product and filled with an inert gas like nitrogen. State regulations require abandoned pipelines to be mapped by the operator, and located and marked when excavation takes place.

Pipelines that may become exposed must be inspected by the pipeline company for corrosion or damage. Regulations do not require the pipeline to be moved, but specific regulations apply when pipe relocation is necessary.

Education and public awareness

Pipeline public awareness and damage prevention programs are operator activities required by law. The programs educate the public, government agencies, contractors, and responders on Minnesota's pipeline system, hazards, indications that a release may have occurred, and appropriate response to an incident. Pipeline companies must provide continuous training for pipeline emergency-response personnel²¹⁸ and pipeline employees undergo written examinations and assessments,²¹⁹ and participate in hands-on training²²⁰ before performing independently.

MNOPS is the education and enforcement authority for the "Call Before You Dig" law, Minnesota's excavation safety law. The law requires any individual or company to call the Gopher State One Call Center before digging so that pipeline and utility operators can be notified to mark underground utilities. This process saves lives and minimizes excavation damage to pipelines. Excavation damage is a threat to pipelines throughout Minnesota. When excavation equipment operators strike pipelines, the impact can cause dents, gouges, or ruptures on the line. Damage can be potentially devastating. Minnesota statutes currently define "excavation" as a mechanical method of digging. Even though hand digging is exempt from current law, instances occur where digging with a shovel or driving stakes into the ground damages pipeline facilities.



Preparedness plans

State requirements for response preparedness

In contrast to strong federal preemptions for pipeline accident and spill prevention, there are no federal preemptions for state spill response oversight or preparedness planning.

Minnesota Statutes Chapter 115E was passed in 1991 making companies handling oil and hazardous substances responsible for preparing and responding to spills. Specifically, railroads and pipeline companies are required to have Prevention and Response Plans²²¹ that show how they are prepared for a worst-case spill.²²²

State required prevention and response plans must include:

- Spill/release prevention.
- Roles within the company for response, coordination with other responders.
- Potential spills, worst case spill.
- Actions that will be taken if a spill occurs.
- Means to procure and deploy equipment and personnel.
- Sensitive areas that may be affected and will need protection.
- Training and drills.

²¹⁸ 49CFR part 195

²¹⁹ §195.505 Qualification program

²²⁰ §195.403 Emergency Response Training

²²¹ Minn. Stat. section 115E.04

²²² Minn. Stat. sections 115.03 and 115.04

The statute does not include specific standards on how much equipment and response personnel a pipeline or other facility must be capable of delivering and deploying for a spill, nor how quickly that deployment must be done.

The statute identifies the Minnesota Pollution Control Agency as the agency responsible for reviewing a company's preparedness to protect the environment before a spill occurs, or after a poor spill response. The statute also identifies the Department of Public Safety as having the authority to review a company's preparedness to protect the public's safety.

MPCA's reviews of other prevention and response plans revealed some common concerns:

- Often the spill safeguards, drainage, and surroundings of rail yards, pipeline pumping stations, maintenance facilities, fueling, and other areas of a transportation industry system are not well described in an overall company plan.
- Drainage patterns and waters that will receive spills and residues are often not well described or planned.
- Training for response duties of key company people and positions is often not well described.
- Sensitive areas near a facility are often shown on a map, but seldom are there pre-planned responses to protect those areas.
- Contractors and other non-company responders and equipment are often listed in a plan without evidence that arrangements have been made.
- Time for notification, mobilization, travel, and deployment of response equipment and responders is often unrealistically optimistic.

While Minnesota Statutes Chapter 115E gave additional authorities to the MPCA and DPS, it was done so without additional funding. As a result, industry prevention and response plans have only been sporadically reviewed over the years by MPCA's emergency response staff. When preparedness has been reviewed, the MPCA has occasionally ordered poorly prepared companies to obtain equipment or training or otherwise improve preparedness. It is common in a pre-spill plan review that the MPCA reviewer finds that some preparedness component needs improvement. In a few cases, the MPCA has called unannounced drills to test a company's preparedness and the company made the called-for improvements. As necessary, the MPCA may use its enforcement authority to issue field citations with penalties²²³ capped at \$2,000 or Administrative Penalty Orders²²⁴ with penalties capped at \$20,000 for companies that fail to meet their preparedness obligations.

Federal requirements for response preparedness

Federal regulations promulgated under the Oil Pollution Act²²⁵ of 1990 require extensive oil spill response planning and preparedness for some types of facilities and almost nothing for other facilities like oil cargo vessels, and almost nothing for other facilities like railroads and pipelines.

Contrastingly, other federal entities such as the U.S. Coast Guard²²⁶ and the U.S. EPA²²⁷ regulations for ships, barges, refineries, and many large storage tanks have detailed requirements for equipment, staffing, training, organization, and other aspects of preparedness for large spills. The regulations also identify the amount of response equipment and staffing, and the timelines by which the equipment must be deployed

²²³ Minn. Stat. 116.073

²²⁴ Minn. Stat. 116.072

²²⁵ U.S.C. Title 33, Chapter 40

²²⁶ CFR Title 33, Parts 154 and 155

²²⁷ CFR Title 40, Part 112

and operating. However, no such detail has been promulgated on the federal level for railroads or pipelines.

Pipeline operators are required to submit a response plan to the Pipeline and Hazardous Materials Safety Administration.²²⁸ The response plan must address a worst-case discharge, identify environmentally and economically sensitive areas, and describe the responsibilities of the operator and others in removing such a discharge. These regulations are not prescriptive, rather they identify timeframes, or tiers, ranging from 6 to 60 hours, for which the company must have equipment and responder at the spill site. This allows for individual companies to determine its response.

After the 2010 rupture of the Enbridge pipeline 6B which released 1.15 million gallons of crude oil to Talmadge Creek, a tributary to the Kalamazoo River in Michigan, the National Transportation and Safety Board (NTSB) reviewed the federal program for pipeline spill response planning and preparedness.²²⁹ The NTSB concluded that PHMSA's regulatory requirements for response capability planning are not as stringent as those of the Coast Guard and the EPA. The NTSB concluded that without specific federal spill response preparedness standards, pipeline operators do not have response planning guidance for a worst-case discharge.

Emergency response

Pipeline operators must, and local emergency responders may call the Minnesota state duty officer to make notification of pipeline emergencies.²³⁰ Emergency response to an oil spill or pipeline rupture is triggered by the obligation to report a spill or an accident. State agencies also advise local emergency responders during pipeline emergencies. Public safety is always an immediate concern, followed by the immediate and long term impacts to the environment.

Reporting requirements

Emergency response often occurs after a report. Federal pipeline regulations²³¹ require various reports regarding pipeline infrastructure, accidents, and construction. See "Federal hazardous liquid operator reporting requirements" in the appendix for additional information. The reported data drives inspection, changes to regulation, and investigation in the case of an incident. Additionally, under Minnesota Statute Section 115.061 any person, facility, or company that has a spill of a material that might cause pollution is required to report the incident to the Minnesota state duty officer. The statute specifies a five-gallon threshold for petroleum spill reporting.

Public safety response

State emergency response

The response protecting public safety in the event of a pipeline incident is not extensively evaluated in this report. Under legislation passed in 2014, the commissioner of the department of public safety is required to submit a report on emergency response preparedness for incidents involving transportation of oil.²³² The report was released in January 2015.²³³

²²⁸ 49 CFR 194.101

²²⁹ The NTSB report is available at <http://www.nts.gov/doclib/reports/2012/PAR1201.pdf>

²³⁰ Minn. Stat. section 115.061

²³¹ Title 49 CFR Part 195

²³² Laws of Minnesota, 2014, chapter 312, article 10, section 11, subdivision 1

The following are key findings of the report:

- Minnesota takes an all hazards approach to emergency preparedness: state and local planners consider potential threats, risks, and hazards and plan accordingly. Under state and federal law, Minnesota has a comprehensive framework that would apply to an oil transportation incident. Railroad and pipeline companies are ultimately responsible for responding to an emergency involving the substances they transport, but local first responders and state agencies also play a role. Minnesota’s statutory framework places an emphasis on coordination and collaboration across governments and sectors.
- Capacity to respond to protect public safety in an oil transportation incident involves a combination of components, including equipment, trained personnel, emergency plans, mutual aid agreements, and exercises to test preparedness. The local government mutual aid infrastructure in Minnesota is well developed, and most counties and cities have all-hazard emergency plans that would apply to an oil transportation incident. First responders are relatively unfamiliar with private sector resources and regional response team resources.
- Local governments generally do not have the equipment or personnel to respond to a significant oil transportation incident, such as a large spill or fire. However, local governments are not the primary responsible party for an oil transportation incident—the rail or pipeline company is responsible.
- About half of the first responders surveyed reported that their departments have staff members who have not received training on how to respond to an oil transportation incident, and only about one-third indicated that they had participated in a preparedness exercise in the last two years.
- Additional training is essential for responder preparedness, and survey information indicates that training and preparedness exercises increase perceptions of preparedness. The relatively low level of awareness and familiarity reported by first responders surveyed indicates that awareness-level training is necessary.
- The majority of first responders surveyed said they did not know what additional equipment or resources are necessary to respond to an oil transportation incident.

Other human health considerations

All emergencies have a health component, and the Minnesota Department of Health (MDH) is responsible for ensuring a ready and robust system is in place to prepare for and respond to public health and healthcare emergencies. MDH reports that healthcare professionals lack statewide, consistent standards to follow and they lack legal protections in a crisis such as a pipeline-related mass casualty when there is not enough life-saving equipment or supplies to meet the demand. For example, Minnesota has only 32 licensed burn beds (all in the metro area and all usually nearly full), and transportation of highly flammable fuels by pipeline is increasing dramatically throughout the state. Minnesota lacks support for the state’s two specialized “Mobile Medical Teams” that stand ready with staff and supplies to set up acute or long term care in any part of the state to help with a catastrophe, loss of facility, or sudden increase in patients. The current medical reserve corps is underfunded and is often looked to for filling gaps during local responses.

Another important consideration is the need for relocation of long term care and functional needs populations who will be adversely impacted by a pipeline incident. A plan should be in place for the

²³³ The report can be found here: <https://dps.mn.gov/divisions/hsem/planning-preparedness/Documents/mn-preparedness-oil-transportation-incident-report.pdf>

relocation process of evacuated hospitalized, long term care patients, and functional needs populations. The Hospital Preparedness Program (which took a 37% budget cut in July 2014) would be available to assist in the bed tracking process, but capacity in the local regions for planning, training, and exercising has been reduced.

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Federal regulatory emergency response requirements

Federal pipeline regulations include specific requirements regarding pipeline emergencies. In addition to regulations noted below, pipeline companies are required to conduct a continuous training for pipeline emergency-response personnel.

§195.402 Procedural manual for operations, maintenance, and emergencies.

(e) Emergencies. The manual required by paragraph (a) of this section must include procedures for the following to assure safety when an emergency condition occurs;

1. Receiving, identifying, and classifying notices of events that need immediate response by the operator, or notice to fire, police, or other appropriate public officials and communicating this information to appropriate operator personnel for corrective action.
2. Prompt and effective response to a notice of each type emergency, including fire or explosion occurring near or directly involving a pipeline facility, accidental release of hazardous liquid or carbon dioxide from a pipeline facility, operational failure causing a hazardous condition, and natural disaster affecting pipeline facilities.
3. Having personnel, equipment, instruments, tools, and material available as needed at the scene of an emergency.
4. Taking necessary action, such as emergency shutdown or pressure reduction, to minimize the volume of hazardous liquid or carbon dioxide that is released from any section of a pipeline in the event of a failure.
5. Control of released hazardous liquid or carbon dioxide at an accident scene to minimize the hazards, including possible intentional ignition in the cases of flammable highly volatile liquid.
6. Minimization of public exposure to injury and probability of accidental ignition by assisting with evacuation of residents and assisting with halting traffic on roads and railroads in the affected area, or taking other appropriate action.
7. Notifying fire, police, and other appropriate public officials of hazardous liquid or carbon dioxide pipeline emergencies and coordinating with them preplanned and actual responses during an emergency, including additional precautions necessary for an emergency involving a pipeline transporting a highly volatile liquid.
8. In the case of failure of a pipeline transporting a highly volatile liquid, use of appropriate instruments to assess the extent and coverage of the vapor cloud and determine the hazardous areas.
9. Providing for a post-accident review of employee activities to determine whether the procedures were effective in each emergency and taking corrective action where deficiencies are found.

Environmental response

Spill recovery and clean-up

Minnesota Statute Section 115.061 also says that anyone spilling a material that might cause pollution is required to “...rapidly and thoroughly recover the spilled material and take all other actions necessary to protect environment and health.” MPCA’s Emergency Response Team oversees that response and cleanup by the person responsible for the spill. There is no federal pre-emption of state requirements for cleanup of spills. The U.S. EPA also oversees a few major Minnesota incidents within its jurisdiction.

One of the risks to human health and the environment is a large oil spill. From a public safety aspect, this is particularly a concern in highly populated areas and from an environmental aspect, a spill that impacts Minnesota’s water resources, especially groundwater which may have drinking water implications is especially concerning. This section describes some of the most important considerations and approaches for an immediate and long term environmental response to an oil spill.

Oil in surface water

Many factors contribute to the spread and spill response efforts of an oil spill to surface waters, including weather, wave action, and the chemical and physical properties of the oil. Oil spilled from pipelines or other sources that reaches surface water spreads on the surface of the water, and consequently, if the water is moving, the oil will move as well. Additionally, wind will spread oil on water and thick layers of oil will spread out and become thinner, more extensive layers.

Some of the oil on water will evaporate. For example, Bakken shale oil is more volatile than many other crude oils. The “light” portion of the oil increases the risk of ignition and therefore the exposure of emergency responders to the toxic volatile components of the oil. Some of the oil on water surface will sink, especially as it mixes with sediment and as it loses the light ends through evaporation. Albert oil sands crude is more prone to sinking than are many other crude oils and the sunken oil may move with water and may sink into bottom sediment. It may later release from bottom sediment if disturbed or with changes in temperature or current. Some of the oil on water will dissolve into the water. Benzene, a toxic component of all crude oil, is among the most soluble components of crude and refined oils. Oil in moving waters will form emulsifications, called oil mousse, which is difficult to recover. Crude oils and refined oils will also have varying levels of hydrogen sulfide and other gases and constituents that are potentially toxic to humans and water life. In addition, oil spilled in surface water will coat emergent vegetation, shorelines, wildlife, structures, and vessels.

Most aspects of an oil spill to surface water are made more difficult and less effective in winter ice and snow conditions. This is especially so if oil gets under ice, or if the ice is not safe for responders and equipment. Sometimes frozen ground or oil on top of competent ice makes oil recovery easier.

Oil that sinks is especially challenging, and tactics for finding and recovering sunken deposits of oil are not well developed.²³⁴ Removal of oiled sediment creates significant damage on its own. Often a point is reached where the environmental damage caused by attempting to recover oil outweighs the damage of the oil. Consequently, oil spill recovery strategy is to get the oil back before it gets away.

²³⁴ Development of Bottom Oil Recovery Systems – Final Project Report. Homeland Security. June 2013. Accessed November 29, 2014.
<http://www.uscg.mil/iccopr/files/Development%20of%20Bottom%20Oil%20Recovery%20Systems%20-%20Final%20Project%20Report.pdf> via <http://wisconsinwatch.org/2014/03/spill-response-inadequate-for-tar-sands-crude-on-great-lakes/>

Spill response to protect surface water

Every oil spill recovery tactic requires speedy deployment of specialized equipment by specially trained responders. The tactics of recovery of oil from surface water include:

- Reaching the location of the spill, and reaching downstream of oiled or potentially oiled locations. Access along a railroad track or pipeline right-of-way to the spill site sometimes is easy, but getting access to oil that got away from the spill site down river or into fringing wetlands is often very difficult.
- Stopping the flow of oil from the land into the water with valves, dikes, and pumping up oil from the land before it escapes to water. Each tactic requires access, and much equipment and specialized training.
- Containing oil at the place where it is entering surface water. For example, where an oil-filled ditch is flowing oil to a creek. This is usually attempted with floating containment booms at and downstream of the ditch to hold the oil. Placing containment booms require access and boats, booms and ropes, anchors, buoys, and specialized training. This equipment is seldom nearby. Containment booms are limited in the amount of oil they will hold back. Containment booms lose effectiveness in water with currents or shallow water.
- Containing oil in ditches and creeks can also be done with diking or underflow dams, each of which takes access and equipment and training.
- Capturing and containing oil downstream of the spill site. Containment typically becomes less effective the further downstream oil travels and the more dispersed oil has become. Downstream capture and containment depends on the currents, weather, shoreline type, and access; and it requires boats, booms, and specialized training. In the best of cases, companies have examined and prioritized potential containment sites in response planning before the spill.
- Skimming, sorbing, or pumping oil from the water's surface. A skimmer is a vacuum or sorbing device that pulls the floating oil layer off of the water. Sorbents are natural or man-made materials that absorb oil but not water. The oiled sorbent must then be recovered from the water for disposal. Vacuum trucks can pump oil from oil pools or thick layers of oil on water. Skimming, sorbing, and pumping oil requires access and equipment and tanks to store recovered oil and eventual disposal.
- Downstream, ahead-of-oil protection of shorelines and sensitive features. Containment boom can be deployed at some sensitive locations before the oil arrives to deflect oil further downstream. Protection measures require careful selection of sites to be protected, since equipment and time does not allow protection of all areas. In the best of cases, sensitive areas have been examined and prioritized in response planning before the spill.
- Mopping up oil that has been stranded on shorelines, wetlands, marinas, structures. This can be done with sorbents, power washers, oil-lifting chemicals, excavation, etc. This is very labor intensive work requiring equipment, access, and specialized training. Some mopping up methods can be destructive of environmental features, for example steam cleaning rocky shores, or moving people and boats through wetlands.
- Sampling water, sediment, shoreline, vegetation etc. to assess where oil or oil components remain in the environment and whether additional recovery is possible and warranted.
- Recovering residual oil from sediments, shorelines, wetlands, and other places as possible.
- Monitoring the ongoing effects of residual oil and of recovery operations.

Groundwater

As oil sinks into the ground, some oil will be retained by soil, so that a small spill may be absorbed into soil and never reach groundwater directly, but the oil retained on or in the soil will serve as a continuing source of groundwater contamination as infiltrating precipitation passes through it. Some soils such as clay have small or non-connected pore spaces such that oil will not readily pass through it, while soils like sands and gravels have large interconnected pore spaces through which oil will pass readily and quickly. The speed of travel is dependent on the viscosity of the substance and some oils are very “liquid” passing through soil quickly; other soils are thick, and the oil move through soil pores slowly.

Factors such as soil type and the viscosity of the oil influence the spill response and clean-up methods.

Spill response to protect groundwater

Once groundwater has become contaminated, the response strategies include understanding the direction, speed, and other characteristics of the groundwater. These response strategies use a variety of tools, including pre-existing information, soil borings, groundwater monitoring wells, and geophysical methods. Classic physical strategies to protect groundwater from spills include:

- Pumping spilled oil from the ground’s surface before it sinks into the ground.
- Digging and removing oil-saturated soils so that the oil won’t continue sinking into the ground and groundwater.
- Using high capacity blowers into the ground to suck the oil out as a vapor.
- Installing skimmers and pumps into the free product oil floating on the groundwater surface to pump out free product.
- Pumping groundwater to draw floating and dissolved oil to the surface for treatment.

Unfortunately, even a very aggressive and effective spill response will often not recover all spilled oil from the ground. In those cases, once oil reaches groundwater, strategies for mitigating contaminated groundwater include:

- Ongoing groundwater pumping and treatment.
- Well replacement or treatment of a contaminated well.
- Adding restrictions on drilling new wells in the area.
- Adding oxygen and other materials to enhance natural degradation of oil.
- Ongoing monitoring to track contaminated groundwater behavior.
- Monitoring natural attenuation and biodegradation.

Historically, the industry practice for “cleaning up” pipeline ruptures was to pump what oil could be pumped, sometimes burn residual surface oil, and dig out near-surface soil saturated with oil. These practices resulted in contaminated sites from historic pipeline leaks. Throughout the 1990s and 2000s, the PCA worked with the pipeline companies to investigate many such historic pipeline spills and completed additional cleanup.

Biodegradation of oil

Oil that cannot be retrieved after a spill will eventually biodegrade over a period of many decades. The rate at which biodegradation occurs is variable and contingent on many factors, including soil types, temperatures, adequate oxygen, and moisture. Likewise, the chemical and physical properties influence biodegradation as some refined oils have additives or other non-biodegradable components.

Dissolved oil at the forward and side of the plume will typically be attacked by indigenous microbes. A steady-state will eventually be reached, and the microbial biodegradation at the forward edge of the plume keeps up with the oncoming oil in the oncoming groundwater. As oil content of the plume is exhausted, this biodegradation consumes most or all of the spilled oil and the plume shrinks. This process is called natural attenuation. Understanding natural attenuation is important in a spill response, but natural attenuation is never accepted as the sole response to any spill.

Evaluating the harm of an oil spill

MPCA and the DNR are “co-trustees” for the state’s natural resources. A trustee can prepare a Natural Resource Damage Assessment and Restoration (NRDAR) after an oil spill or a cleanup under state or federal law. The NRDAR is a legal process by which natural resource trustees can recover lost resources and the services provided by those resources, such as habitats or lost recreational use services. The program addresses spills that enter, or have the potential to enter, state surface or groundwater. When these spills affect fish and wildlife or sensitive natural resources, rehabilitation or restoration may be required of the responsible company. In the event of a spill, restitution can be required to compensate for lost fish and wildlife. Minnesota Statutes 97A.341 and 97A.345 allow the Department of Natural Resources to establish restitution values, which were adopted in Minnesota Rules chapter 6133. The values are for lost fish and wildlife based on counts from a field investigation and usually involved game species.

Oil spills in Minnesota

Since recording spills in the 1960s, the MPCA’s spill log contains hundreds of reports related to pipelines, from small and slow leaks, large and sudden ruptures, discoveries of historic spills, and storage tank leaks. However, data collected from various state agencies beginning in the 1990s is considered the most accurate. See “Oils spills in Minnesota” in the appendix for a list of operator reported spills over 10 thousand gallons since the 1990s.

Understanding attenuation

The United States Geological Survey (USGS) manages one of the world’s premier oil spill research sites near Bemidji. The research project was a result of an approximately 450,000 gallon spill of crude oil from a pipeline in 1979. Although most of the spill was recovered, excavated, and burned as part of the cleanup, approximately 25,000 gallons of oil remains in the soil and groundwater today.

Researchers from around the country and the world have intensively studied the site since the 1980s. Much of the current knowledge of oil behavior and attenuation in soil and groundwater comes from this Minnesota research. The groundwater plume from this large pipeline spill extends about 500 feet in length and is not migrating or expanding.

More information about the project is at:
<http://mn.water.usgs.gov/projects/bemidji/>

The largest pipeline spill in Minnesota in recent decades was a 1.7 million gallon crude oil spill from Lakehead, now called Enbridge line 3, in Grand Rapids in March 1991. Pumping and extensive excavations of wetland was done to recover most of the oil. About 300,000 gallons escaped to the Prairie River. Most of that oil flowed onto the river's ice surface, and was recovered by an aggressive and effective company response. A spill that went beneath the ice, or a spill in a different season, would have been far more challenging to recover and would have caused much greater surface water damage.

While Minnesota has dealt with oil spills, including 80 spills over 10,000 gallons between the 1960 to 2012, it has not seen a spill as large as the one that occurred in Michigan's Kalamazoo River in 2010. Reviewing the happenings and the outcomes of the spill offers valuable insight for the state.

Kalamazoo River crude oil spill information

In July 2010, the Enbridge pipeline 6B, part of the Lakehead system, ruptured releasing over 1.150 million (revised number as of May 2014) gallons of crude oil to Talmadge Creek, a tributary to the Kalamazoo River in Michigan. The crude oil contaminated two miles of Talmadge Creek and almost 36 miles of the Kalamazoo River before being stopped. This was one of the largest on-land pipeline oil spill in U.S. history.

The crude oil released was a blend of Canadian heavy conventional and bitumen oil sand crude oils. To get bitumen to flow through a pipeline, it is diluted by about 30% with liquid chemicals or diluents that may include benzene. Once exposed to air, the benzene and other solvents volatilize leaving the heavy bitumen that may sink in water.

Operators received multiple alarms concerning pipeline pressure and volume discrepancies at a control station, but suspected there was an air bubble in the pipe causing the pressure issues. Operators continued several times to restart the pumps forcing more oil into the line to push the bubble out. This may have accounted for up to 80% of the total release. The National Response Center was alerted 17 hours after the rupture was discovered.

The area had just received six inches of rain over several days, and the rivers were flowing at flood stage when the spill began. This made containment with booms difficult at high flows. Local spill responders initially understood that the spill was regular crude oil and responded accordingly rather addressing the unique consistency and nature of the product. Enbridge did not initially communicate the type of oil spilled clearly to responders.

Residents living along Talmadge Creek and the Kalamazoo River complained of a foul stench causing dizziness and headaches as the crude oil flowed past. Benzene readings taken with hand-held monitors ranged from 50 ppb to 3,000 ppb. Local responders decided to evacuate people from their homes if benzene was found in concentrations greater than 200 ppb. Later, more sophisticated monitors found a wide range of benzene readings from 50 ppb to 10,000 ppb.

The Kalamazoo River, a tributary to Lake Michigan, was considered a wild and natural river after many years of improvements due to the Clean Water Act. It was not a drinking water source. However, Lake Michigan is a drinking water source. The EPA prioritized stopping the flow of the oil before it could reach Lake Michigan.

As the unrecovered oil was transported downstream within the water column, a portion of it incorporated suspended sediments, causing it to sink until it eventually moved from the suspended sediment load to submerged oil. The mixing of the crude oil and the suspended sediment occurred as a result of the turbulent flow within the river channel. When the crude oil that had been driven into the water column

reached the river bottom, it formed marble sized tar balls that were swept along the river bottom with other detritus. These tar balls would settle out in low-flow areas.

To clean up the tar balls, a plan was devised to allow the tar balls to settle out in three areas where dams were located. These areas would be repeatedly dredged to remove the contaminated sediments and tar balls. Other areas along the river, such as backwater wetlands and floodplain were left oiled when waters receded. These areas were then cleaned using more conventional methods of booms, skimmers, and vacuum trucks.

It is notable that the British Petroleum Deepwater Horizon spill occurred approximately 3 months earlier than the Kalamazoo River spill. Federal agency personnel and equipment were sent to assist with the Deepwater Horizon spill, resulting in less available resources for assistance with the Kalamazoo spill than would normally be available.

Transportation of oil raises critical questions about the damage that can result when accidents occur. While all modes eventually have incidents, the larger volume of pipelines means the average spill is historically “far graver” than the average rail spill.²³⁵ This potential has major ramifications on public safety, the environment, and local economies.

²³⁵ Rail vs. Pipelines: How to Move Oil. (2014, May 2). *International Energy Agency*. Retrieved from: <http://www.iea.org/ieaenergy/issue6/rail-vs-pipelines-how-to-move-oil.html>

Economics of the Kalamazoo pipeline spill

Spills can lead to business closures, loss of employment, short and long term health costs, destruction of property, and damage to difficult to monetize amenities (e.g., biodiversity, air quality). Assessing the economic risk of a substantial spill on Minnesota is vital, but difficult. Each spill involves unique factors such as magnitude, population density, industry mix, and ecosystem vulnerability.¹

Given the lack of clarity on the topic, examining an extreme case can give us clues on how a pipeline burst or rupture can affect an economy. In July 2010, a pipeline ruptured near Marshall, Michigan, resulting in Alberta oil sands heavy crude oil pouring into the Kalamazoo River and its tributaries.² The owner of the pipeline, Enbridge Energy Partners, spent \$1.21 billion over four years for emergency response, environmental remediation, cleanup activities, and third-party claims.³ Likely, the total cost of the disaster is higher as some expenses, including ongoing air and water monitoring, medical expenses related to exposure, property value decreases, administrative costs, and job loss, are not included in that total paid by Enbridge.

Newspaper reports and resident statements provide anecdotes of the effects on tourism and groundwater. Thirty-six miles of the Kalamazoo were closed for nearly two years, preventing tourism related to fishing, kayaking, and camping. Interviews conducted by the EPA noted community frustration in “economic losses for businesses associated with these activities.”⁴ Residents also expressed a concern about groundwater testing and its impact on community health and businesses (including a local wheat mill).

The impact of the spill on the local property market is also unclear. Enbridge purchased 150 residential properties located within a 200-foot “red zone” of affected waterways.⁵ Residents outside the zone are unsure how the stigma of the spill will change property values. Concerns exist that Enbridge could hurt property values by releasing all the homes it purchased at the same time—flooding the local property market. In December 2014, Enbridge and landowners agreed to settle a class action lawsuit—pending approval from a federal judge— for \$6.8 million. The funds will compensate land owners, fund a well-water sampling program, reimburse spill expenses, and pay for conservation efforts.⁶ Additional litigation from other affected parties is pending.

The spill also had negative impacts on non-market “amenities” such as air quality, natural beauty of the wilderness, and diversity of animal species. Though hard to quantify, these amenities have economic value. For example, the spill released noxious chemicals in to the air, water, and soil. Air-quality monitors found elevated benzene levels during the first week of the spill, leading to temporary illnesses in some residents.⁷ Area medical centers reported over 120 visits related to illnesses from the spill (both a direct cost and amenity cost).⁸

The spill also had obvious negative impacts of animal populations—the Michigan Department of Natural Resources recovered more than 3,000 turtles, 170 birds, and 40 mammals that were dead or injured.⁹ Though many of animal populations have begun to recover, tree removal and dredging has permanently altered their habitat—the river is now wider, shallower, and more algae-filled. The state of Michigan, U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration are conducting a natural resource damage assessment to determine if Enbridge should pay for addition restoration and compensate the public for loss enjoyment of natural resources.

Reviewing examples like Kalamazoo gives valuable information about the potential risk of pipelines. Unfortunately, the economic impacts of these events are not well studied and, even if they were, individual incident context is important to the size and characteristics of the impact.

¹ In McLaughlin, R. S. (2014). Transporting Crude Oil by U.S. Rail: Background, Issues, and Trends. *Congressional Research Service*. p. 36. Retrieved from <http://fas.org/sgp/crs/misc/R43390.pdf>

² EPA’s Response to the Enbridge Oil Spill. (2014). *Environmental Protection Agency*. Retrieved from: <http://www.epa.gov/enbridgespill/>

³ Ellison, Garret. (2014, November 5). New Price Tag for Kalamazoo River Oil Spill Cleanup. *MLive.com*. Retrieved from: http://www.mlive.com/news/grand-rapids/index.ssf/2014/11/2010_oil_spill_cost_enbridge_1.html

⁴ Community Involvement Plan: Enbridge Oil Spill. (2011, July 11). Prepared for the *Environmental Protection Agency by Weston Solutions, Inc.* Retrieved from: http://www.epa.gov/enbridgespill/pdfs/enbridge_cip_20110811.pdf

⁵ Ibid; How Do Pipeline Spills Impact Property Values? (2013, December). *Conversations for Responsible Economic Development*. Retrieved from: <http://credbc.ca/wp-content/uploads/2013/12/Pipeline-spills-property-values.pdf>; Research found limited information about the terms of these purchases, how the purchased property will be used going forward, or affect local property tax revenues.

⁶ Ibid.

⁷ Enbridge Oil Spill Daily Update. (2010, 12 August). *Calhoun County Public Health Department*. Retrieved from: http://www.epa.gov/enbridgespill/pdfs/enbridge_ccphd_update_20100812.pdf

⁸ Enbridge Pipeline Oil Spill in Marshall, Michigan: Hearing Before the Committee on Transportation and Infrastructure, House of Representatives, 111th Congress 2. (2010, September) (Testimony from Mark Schauer). Retrieved from: <http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg58236/html/CHRG-111hhrg58236.htm>

⁹ Matheny, K. (June 2013). Three Years after Oil Spill, a Slow Recovery Haunts Kalamazoo River. *Detroit Free Press*. Retrieved from: <http://www.freep.com/article/20130623/NEWS06/306230059/Kalamazoo-River-oil-spill>

Findings and considerations

Preparedness

- Minnesota Statutes Chapter 115E has required specific spill preparedness and planning for any facility that transports, stores, or otherwise handles hazardous substances or oil, including railroads that handle more than 100,000 gallons of oil per month. The original Chapter 115E language was performance based, for example, “must prevent spills” and must be prepared to handle spills, and not specific or detailed.

The language was not prescriptive or detailed as to how much equipment must be delivered to a spill site within any particular timeframes. Consequently, this should be changed to include equipment deployment times for the worst-case unit train spill and for spills of 10% of worst case. For example, the U.S. Coast Guard and the U.S. EPA regulations for ships, barges, refineries, and many large storage tanks have detailed requirements for equipment, staffing, training, organization, and other aspects of preparedness for large spills. Included in the regulations are the amount of response equipment and staffing, and the timelines by which the equipment must be deployed and operating.

- A lot can be gained from local and state plan reviewers and responders evaluating spill response preparedness. The agencies charged with administering Minnesota Statutes Chapter 115E have not been resources to do so. The 2014 Legislature provided funding for one position to work with railroad unit train response preparedness and planning. Specifically allocate funds to staff to review pipeline response plans and preparedness before spills occur.

Prevention

- Removing spilled oil from Minnesota’s water resources are especially difficult and never has all the oil spilled been recovered. Preventative measures and preparedness are the best ways to reduce the risk of spills. Shut-off valves are currently required on both sides of rivers greater than 100 feet in width. Assessment should be made of all water and stream crossings with calculation of potential drain-back to a crossing site rupture from both sides of the crossing. Assessment should include whether additional valves might actually increase spill frequency, since valves can be a vulnerable portion of a pipeline system.
- A “breakout tank” is an aboveground storage tank which receives and delivers oil to and from a pipeline. Breakout tanks may be many million gallons in capacity. Breakout tanks are preempted from state regulation. Federal pipeline regulations require breakout tanks to comply with various industry standards for construction, operation, and maintenance. The regulations require a dike, called secondary containment, to surround a breakout tank. But federal regulations have no design criteria for “tightness,” or ability of a secondary containment area to keep a spill from soaking into the ground. Some pipeline breakout tanks in Minnesota are placed on permeable soils that could not contain a spill.

Minnesota regulation for all other storage tanks include the requirement that each above ground tank be surrounded by a “tight” secondary containment structure. Tight secondary containment will prevent the spill from escaping the facility into a surface water or soaking into the ground and contaminating groundwater. Minnesota should urge PHMSA to require tight secondary containment around breakout tanks.

Emergency response

- All emergencies have a health component. This topic is not thoroughly reviewed in this report, and therefore more research and a greater evaluation of the readiness of Minnesota's health system to address a pipeline-related mass casualty event may be necessary.

The following should be included in any future evaluations:

- Address the readiness of the Hospital Preparedness Program in the state which would be available to assist in the bed tracking process, but capacity in the local regions for planning, training, and exercising has been reduced
 - Review logistical needs such as the relocation of long term care and functional needs populations who will be adversely impacted by a pipeline incident and issues such as the amount and availability licensed burn beds in the state.
 - Address how the lack of support for the state's two specialized "Mobile Medical Teams" that stand ready with staff and supplies to set up acute or long term care in any part of the state to help with a catastrophic event will impact a response.
 - Address the role of healthcare professionals, which lack consistent standards to follow and legal protections in a crisis such as a pipeline-related mass casualty event when there is not enough life-saving equipment or supplies to meet the demand.
- Federal pipeline regulations, created as part of the Hazardous Liquid Pipeline Safety Act of 1979, are minimum safety standards. Operators may choose to go above and beyond the regulatory requirements. While federal preemptions may apply to pipeline safety, there is no preemption of spill preparedness, response planning, response, or spill cleanup it is the responsibility of all stakeholders involved. Industry, regulators, emergency responders and the public all impact pipeline safety in Minnesota. As a result to be assured that resources and equipment are readily available for a response; Companies should be working with each other and with state agencies to strategically locate caches of equipment and cadres of trained responders and work towards equipment cooperatives and mutual aid. This cooperation should include response resources that are shared with communities and other industries, such as railroads or refineries.

Evaluating the harm of an oil spill

- In the event of a spill, restitution can be required to compensate for lost fish and wildlife. Minnesota Statutes 97A.341 and 97A.345 allow the DNR to establish restitution values, which were adopted in Minnesota Rules 6133. The values are for lost individual fish and wildlife based on counts from a field investigation and usually involve game species. Extending the statute to consider restitution for nongame species (other than threatened/endangered), should be explored. This is already occurring to some extent as nongame species are addressed through required habitat restoration efforts.

NRDAR goes beyond the fish and wildlife restitution program. NRDAR considers all of the injuries to the natural resources affected by a spill, and seeks compensation, restoration, or replacement of those injured natural resources and the services those resources provide. There should be additional guidance on how to establish dollars or restoration values on groundwater. The valuation of injured surface and groundwater resources presents challenges under the NRDAR process. Groundwater injury is especially difficult to place a dollar or restoration value on, including valuing groundwater for potential future use, and the use of groundwater in remediation efforts is increasingly imposing limitations on other existing and prospective groundwater users in some areas.

Appendices

Agency roles in pipelines oversight

Public Utilities Commission (Commission)

The Commission manages state oversight of proposals to construct or modify large energy facilities in Minnesota, which includes gas and petroleum facilities. The Commission's jurisdiction may include a state certificate of need and/or a state site or route permit. Applications or joint applications for projects subject to the Commission's jurisdiction must be filed in compliance with state statutes and administrative rules. The Commission's procedures for review of proposed large energy facilities incorporate compliance with the Minnesota Environmental Policy Act and provide public participation. Jurisdiction over siting and routing permits was transferred by 2005 legislation from the Minnesota Environmental Quality Board to the Commission²³⁶. While the Commission is the ultimate decision-maker on petitions for certificates of need²³⁷ and routing or siting dockets, certain environmental review procedures are the exclusive jurisdiction of the Minnesota Department of Commerce.

Department of Commerce, Division of Energy Resources (Commerce-DER)

The main role of the Commerce-DER is to represent the public interest in proceedings before the Commission by ensuring that the general public's long term interests are represented when utilities under the Commission's jurisdiction propose to change their rates, services, or facilities. This is done in two ways: first, Commerce-DER analyzes utility filings to ensure that the filing company has complied with all applicable rules and statutes and with any stipulations required in past Commission orders. Secondly, the Commerce-DER assists in assessing utility filings while building a complete record when utilities request permission for rate increases, construction of new facilities, changes to tariffs, or any other actions that require Commission approval under statutes or rules. Under either function, the Commerce-DER provides the Commission with a recommendation on what action should be taken based on its analysis of the utility's filing and the information in the record.

Minnesota Department of Commerce, Energy Environmental Review and Analysis (Commerce-EERA)

Commerce-EERA conducts the environmental review required for energy facilities for which Commerce is the responsible unit of government. These facilities include power plants, transmission lines, wind farms, and pipelines. In addition to environmental review, Commerce-EERA provides technical expertise and assistance to the Commission to aid the Commission's permitting of energy facilities. The Commission relies on Commerce-EERA to inform its permitting decisions through environmental review, analysis of siting and routing applications, and technical review of permit compliance filings.

Minnesota Environmental Quality Board (EQB)

The Minnesota Environmental Policy Act²³⁸ established the EQB²³⁹ to implement the act, promulgate rules²⁴⁰, develop policies, create long-range plans, and review proposed projects that would significantly

²³⁶ 2005 Session Laws, Chapter 97, Article 3.

²³⁷ Minn. Stat. § 216B.243, Subd. 2

²³⁸ See generally Minn. Stat. § 116D.04

²³⁹ Minn. Stat. § 116C.01 (1973). The year before an Executive Order established the Environmental Quality Board to coordinate the many agencies involved in environmental efforts.

influence Minnesota's environment. Specifically, regarding environmental review, MEPA and the board seek to avoid and minimize damage to Minnesota's environmental resources caused by public and private actions. This is accomplished by requiring certain proposed projects to undergo special review procedures prior to obtaining approvals and permits otherwise needed. Pursuant to 4410.3600, the EQB approved an alternative review process for pipeline routing in 1989. While environmental review is not an approval process, it is an information gathering process to help governmental units with permitting and making informed decisions that carry out the protection measures identified in environmental review.

Minnesota Department of Natural Resources (DNR)

The DNR permits activities encountered with pipeline development; is a substantial land owner and land administrator along pipeline routes, and reviews pipeline projects for impacts to natural resources. The agency reviews and comments on projects in order to meet statutory obligations developed to ensure natural, recreational, and cultural resources are protected.. The DNR has jurisdiction over wildlife in Minnesota and administers the Minnesota outdoor recreation system,²⁴¹ including wildlife management areas, scientific and natural areas, state parks, state forests, state recreation areas, and other DNR managed lands. The DNR Lands and Minerals Division (LAM) coordinates reviews for utilities that cross state or public land and issues licenses to cross public waters and state lands managed by the DNR. The DNR also issues water use (appropriation) permits from when users withdraw more than 10,000 gallons of water per day or one million gallons per year, usually during pipeline construction. Prior to pipeline construction, surveys for rare species may be required in order to determine if the proposed project would result in a taking of endangered or threatened species under Minnesota endangered species law²⁴² and therefore would require a permit from the DNR.

The DNR Natural Resources Damage Assessments program addresses spills that enter, or have the potential to enter, state surface or groundwater. When these spills affect fish and wildlife or sensitive natural resources, rehabilitation or restoration may be conducted by the responsible company.

Also, in the event of a spill, restitution can be required to compensate for lost fish and wildlife. Minnesota statutes 97A.341 and 97A.345 allow the department to establish restitution values, which were adopted in Minnesota rules chapter 6133. The values are for lost fish and wildlife based on counts from a field investigation and usually involved game species. Natural Resource Damage Assessment and Restoration (NRDAR) is a legal process by which natural resource trustees can recover lost resources and the services provided by those resources, such as habitats or lost recreational use services.

Minnesota Pollution Control Agency (MPCA)

The MPCA monitors environmental quality and enforces environmental requirements in accordance with applicable Minnesota rules and statutes. Environmental rules and statutes set standards for environmental quality and limits on pollutants that can be emitted and/or discharged from facilities and construction work. The MPCA regulates air emissions, hazardous and solid waste, above- and underground storage tanks, and water quality, including point source, nonpoint source, and construction and industrial stormwater discharges. The construction, installation, and operation of pipelines, tank terminals, and refineries may require MPCA permits for air quality, aboveground storage tanks, wastewater, industrial stormwater, construction stormwater, and Section 401 Water Quality Certification. Additionally, the MPCA is responsible for the environmental review of large storage facilities for hazardous materials,

²⁴⁰ Minn. Rules Chapters 4405 and 4410

²⁴¹ Minn. Stat. § 86A and § 84.027, subd. 2

²⁴² Minn. Stat. § 84.0895

including storage of crude oil, oil products, and chemicals in tanks or rail cars. The mandatory environmental assessment worksheet threshold is one million gallons at a facility. MPCA is responsible for overseeing oil spill recovery and cleanup, spill preparedness and is a co-trustee implementing the Natural Resource Damage Assessment and Rehabilitation.

Minnesota Department of Transportation (MnDOT)

MnDOT develops and implements policies, plans and programs for aeronautics, highways, motor carriers, ports, public transit, railroads and pipelines. It provides a balanced transportation system with a mission to maximize human health, the environment and the state's economy. The agency plans, builds, operates and maintains a safe, accessible, efficient and reliable transportation system that connects people to destinations and markets throughout the state, regionally and around the world.

Minnesota Department of Health (MDH)

MDH is the state's lead public health agency, responsible for protecting, maintaining and improving the health of all Minnesotans. Relative to oil pipelines, MDH regulates public drinking water, construction and abandonment of wells, and asbestos abatement.

Minnesota Department of Agriculture (MDA)

In 2005, MDA was expressly given the responsibility²⁴³ over mitigation measures for agricultural impacts related to pipeline projects. With this responsibility, the commissioner may participate and advise the Commission as to whether to grant a permit for the project and the best options for mitigating adverse impacts to agricultural lands if the permit is granted. Moreover, MDA is the lead agency on the development of any agricultural mitigation plan required for the project.

Minnesota Board of Water and Soil Resources (BWSR)

BWSR is the state agency responsible for promulgating the Wetland Conservation Act rules and oversight of local government units' (LGU) implementation activities. For activities that affect wetlands in more than one LGU, BWSR may coordinate the project review to ensure consistency and consensus among the LGUs involved²⁴⁴. Projects associated with pipelines often cross multiple LGUs, and in these instances, BWSR staff will typically coordinate the review of submitted materials and decisions on applications among the affected governments.

Minnesota Department of Public Safety (DPS), Minnesota Office of Pipeline Safety (MNOPS)

DPS has four divisions that would engage in the event of a Minnesota pipeline spill or other incident. The Minnesota State Patrol, State Fire Marshal Division, Homeland Security and Emergency Management Division, and Minnesota Office of Pipeline Safety have roles in the response and investigation in such an event. DPS divisions are engaged in the inspection, incident investigation, incident response, and emergency response preparedness training related to the safe operation of pipelines in Minnesota. MNOPS has been certified since 1991 to inspect both *interstate* and *intrastate* pipelines under authority of the U.S. Department of Transportation-PHMSA. MNOPS personnel inspect pipeline facilities and investigate pipeline accidents and incidents.

²⁴³ Minn. Stat. § 216B.243 and 216E.10

²⁴⁴ Minn. Rule 8420.0200, Subp.1, Item F

Department of Revenue (DOR)

The DOR manages the state's revenue system and administers state tax laws. Property tax, sales and use tax, and corporate franchise tax have the most direct impact on pipeline companies transporting crude oil and refined petroleum products in and through the state. For property tax purposes, the DOR performs annual valuations of the oil pipelines and certifies these market values to counties.

Department of Employment and Economic Development (DEED)

DEED is the state's principal economic development agency. DEED facilitates an economic environment to produce jobs and improve the quality of the state's workforce. For this report, DEED has provided an economic analysis of the interconnectedness of crude oil transportation with other industries and commodities, while exploring the economic impacts as a result of the North American oil boom, recent market uncertainty and construction of new pipelines in Minnesota.

Minnesota oil and refine product spills

Pipeline Spills Greater than 10 Thousand Gallons Reported to the MPCA (1996 – 2012)

This list does not include spills less than 10 thousand gallons or leaks of unknown volume.

Date (day/month/year)	Reported Spill Volume	Unit	City or County	Company Name	Product
24-Aug-96	420,000	Gallons	DONALDSON	Lakehead	Petroleum, Unspecified
19-Aug-98	51,700	Gallons	Barnesville	Amoco	Gasoline
16-Sep-98	147,000	Gallons	Red Lake	Lakehead	Crude Oil
23-Apr-99	24,000	Gallons	Fergus Falls	Amoco	Gasoline
22-Feb-99	20,000	Gallons	ARGYLE	Lakehead	Other (Described In Remarks)
29-Oct-99	168,000	Gallons	Brooton	Williams	
09-Nov-99	25,000	Gallons	MARSHALL	Williams	Light Fuel Oil and Diesel
22-Jul-00	20,000	Gallons	Leonard	Lakehead	Crude Oil
24-Apr-02	84,000	Gallons	Cottonwood	Williams	Jet fuel
04-Jul-02	252,000	Gallons	Cohasset	Enbridge	Crude Oil
24-Feb-03	100,000	Gallons	MSP airport	MSP airport fuel	Jet fuel

				hydrant	
27-Jun-06	134,400	Gallons	Little Falls	Pipeline	Crude Oil
28-Nov-07	15,000	Gallons	Clearbrook	Enbridge	Crude Oil
23-Mar-08	67,200	Gallons	Clearbrook	Koch Pipeline	Crude Oil
04-Dec-09	210,000	Gallons	Staples	Koch Pipeline	Crude Oil
14-Feb-12	63,000	Gallons	Apple Valley Rosemount terminal	Magellan	Gasoline

Federal hazardous liquid pipeline operator regulatory reporting requirements

The table below outlines federal pipeline operator reporting requirements (Title 49 CFR Part 195)

Hazardous Liquid Pipeline Operator Regulatory Reporting Requirements

Reporting Requirement	Purpose	Frequency
PHMSA Annual Report	Pipe Inventory (Size, Mileage, Material, & Vintage) Leaks (By Cause, Hazardous, & Non-Hazardous) Integrity Inspections conducted in the year Repairs made due to integrity inspections in the year	Annually (Due June 15 Each Year)
Telephonic Notice To National Response Center	Release resulting in one or more of the following: -Release of 5 gallons (19 liters) or more of hazardous liquid or carbon dioxide, except that no report is required for a release of less than 5 barrels (0.8 cubic meters) resulting from a pipeline maintenance activity if the release is: (1) Not otherwise reportable under this section; (2) Not one described in § 195.52(a)(4); (3) Confined to company property or pipeline right-of-way; and (4) Cleaned up promptly; -Caused a death or a personal injury requiring hospitalization -Resulted in either a fire or explosion not intentionally set by the operator -Caused estimated property damage, including cost of cleanup and recovery, value of lost product, and damage to the property of the operator or others, or both, exceeding	Soon as practicable (within 1 hour)

	<p>\$50,000</p> <p>-Resulted in pollution of any stream, river, lake, reservoir, or other similar body of water that violated applicable water quality standards, caused a discoloration of the surface of the water or adjoining shoreline, or deposited a sludge or emulsion beneath the surface of the water or upon adjoining shorelines</p> <p>-In the judgment of the operator was significant even though it did not meet the criteria of any other paragraph of this section</p>	
PHMSA Accident Report	<p>Formal written report in follow up to an incident meeting the requirements for telephonic notice</p> <p>The report describes incident details such as:</p> <p>Pipe Parameters involved in the incident</p> <p>Incident Cause as determined by the operator</p>	Within 30 days of the incident
Safety Related Condition Report	<p>Reporting of:</p> <p>(1) General corrosion that has reduced the wall thickness to less than that required for the maximum operating pressure, and localized corrosion pitting to a degree where leakage might result.</p> <p>(2) Unintended movement or abnormal loading of a pipeline by environmental causes, such as an earthquake, landslide, or flood that impairs its serviceability.</p> <p>(3) Any material defect or physical damage that impairs the serviceability of a pipeline.</p> <p>(4) Any malfunction or operating error that causes the pressure of a pipeline to rise above 110 percent of its maximum operating pressure.</p> <p>(5) A leak in a pipeline that constitutes an emergency.</p> <p>(6) Any safety-related condition that could lead to an imminent hazard and causes (either directly or indirectly by remedial action of the operator), for purposes other than abandonment, a 20 percent or more reduction in operating pressure or shutdown of operation of a pipeline.</p>	<p>Within 5 working days of determination</p> <p>No more than 10 working days after discovery</p>
General Notification	<p>(1) An operator must notify PHMSA of any of the following events not later than 60 days before the event occurs:</p> <p>(i) Construction or any planned rehabilitation, replacement, modification, upgrade, uprate, or update of a facility, other than a section of line pipe, that costs \$10 million or more. If 60 day notice is not feasible because of an emergency, an operator must notify PHMSA as soon as practicable;</p> <p>(ii) Construction of 10 or more miles of a new hazardous liquid pipeline; or</p> <p>(iii) Construction of a new pipeline facility.</p>	Within 60 Days

(2) An operator must notify PHMSA of any following event not later than 60 days after the event occurs:

(i) A change in the primary entity responsible (i.e., with an assigned OPID) for managing or administering a safety program required by this part covering pipeline facilities operated under multiple OPIDs.

(ii) A change in the name of the operator;

(iii) A change in the entity (e.g., company, municipality) responsible for operating an existing pipeline, pipeline segment, or pipeline facility;

(iv) The acquisition or divestiture of 50 or more miles of pipeline or pipeline system subject to this part; or

(v) The acquisition or divestiture of an existing pipeline facility subject to this part.

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