

North Dakota Pipeline Authority



Annual Report

July 1, 2021 – June 30, 2022

Industrial Commission of North Dakota

Governor Doug Burgum, Chairman

Attorney General Drew H. Wrigley

Agriculture Commissioner Doug Goehring

North Dakota Pipeline Authority

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Overview

At the request of the North Dakota Industrial Commission, the Sixtieth Legislature passed House Bill 1128 authorizing the North Dakota Pipeline Authority. It was signed into law on April 11, 2007. The statutory mission of the Pipeline Authority is “to diversify and expand the North Dakota economy by facilitating development of pipeline facilities to support the production, transportation, and utilization of North Dakota energy-related commodities, thereby increasing employment, stimulating economic activity, augmenting sources of tax revenue, fostering economic stability and improving the State’s economy”. As established by the Legislature, the Pipeline Authority is a builder of last resort, meaning private business would have the first opportunity to invest in and/or build additional needed pipeline infrastructure.

By law, the Pipeline Authority membership is comprised of the members of the North Dakota Industrial Commission. Upon the recommendation of the Oil and Gas Research Council, the Industrial Commission authorized the transfer of \$600,000 from the Oil and Gas Research Fund during the 2021-2023 biennium for the Pipeline Authority’s operations and studies. On August 1, 2008 the Industrial Commission named Justin J. Kringstad, an engineering consultant, to serve as Director of the North Dakota Pipeline Authority. The North Dakota Pipeline Authority Director works closely with Lynn Helms, Department of Mineral Resources Director, Ron Ness, North Dakota Petroleum Council President and Karlene Fine, Industrial Commission Executive Director. The Pipeline Authority has no other staff and receives no direct General Fund appropriation. The Pipeline Authority Director reports to the Industrial Commission and the Oil and Gas Research Council on a regular basis.

Statutory Authority

Statutory authority for the Pipeline Authority is found in Chapter 54-17.7 of the North Dakota Century Code (N.D.C.C.). Section 54-17.7-04 N.D.C.C. delineates the powers of the Pipeline Authority including: 1) making grants or loans or to borrow money; 2) to issue up to \$800 million in revenue bonds; 3) enter into lease-sale contracts; 4) own, purchase, lease, rent and dispose of pipeline facilities or the right to capacity in any pipeline system or systems within or without the State of North Dakota; 5) enter into contracts to construct, maintain and operate pipeline facilities; 6) investigate, plan, prioritize and propose transportation corridors; and 7) participate in regional pipeline organizations.

Before the Pipeline Authority may exercise its power to construct pipeline facilities, it must follow a process defined by statute to ensure public participation and comment. In particular, the Pipeline Authority must publish a notice describing the need for the pipeline project. Entities interested in

constructing the facilities or furnishing services to satisfy the identified needs have 180 days to respond by filing a notice of intent. If the Pipeline Authority receives a notice of intent from an interested entity, it may not exercise its powers to construct unless the Pipeline Authority makes a finding that doing so would be in the public interest. In making such a finding, the Pipeline Authority shall consider the economic impact to the state, economic feasibility, technical performance, reliability, past performance, and the likelihood of successful completion and ongoing operation.

North Dakota Pipeline Regulatory Programs

The Pipeline Authority does not serve in any capacity as a regulatory agency for the pipeline industry. North Dakota's pipeline industry is regulated by several state and federal agencies. Roles of each regulatory entity are complex and the Pipeline Authority urges all interested parties to please contact the agencies below for more information on their jurisdiction of the pipeline industry.

- North Dakota Department of Emergency Services
- North Dakota Department of Environmental Quality
- North Dakota Public Service Commission
- North Dakota Industrial Commission-Department of Mineral Resources-Oil and Gas Division
- Environmental Protection Agency
- Federal Energy Regulatory Commission
- U.S. Department of Transportation-Pipeline and Hazardous Materials Safety Administration-Office of Pipeline Safety
- Homeland Security's Infrastructure Security Division

Summary of Activities

North Dakota's petroleum industry started the 2021-2022 fiscal year with WTI oil prices around \$70/barrel. Despite the economically attractive oil price, only 23 drilling rigs were active in July 2021 as the industry remained extremely cautious about the demand outlook post-covid. After an extremely volatile first half of 2022, in June 2022, oil prices had risen to over \$100/barrel and the drilling rig count had slowly increased to the mid-40's.

Average oil production throughout the fiscal year was relatively flat at just under 1.1 million barrels per day, down significantly from the record of 1.5 million barrels per day set in late 2019.

Despite the extreme price and weather volatility experienced over the 2021-2022 fiscal year, the long-term outlook for North Dakota's petroleum industry remains robust. North Dakota's midstream industry continues to position itself to meet current production levels and continues to plan for further expansion in the long term. During the past year, the Pipeline Authority has been fully engaged in continuing efforts to convert production and development information into oil and natural gas transportation solutions. Working alongside industry to produce crude oil and natural gas production forecasts to quantify future

pipeline needs and time frames continues to be one of the principle tasks of the Pipeline Authority. Pipeline companies are conservative by nature and these forecasting exercises are very beneficial in providing the confidence needed to move forward with expansion project planning.

During the fiscal year the Pipeline Authority contacted, met with, and shared information with numerous interested parties including, but not limited to, the following:

Enbridge Pipeline	Hess Corporation
TC Energy	Marathon Petroleum
MDU/WBI Energy	True Companies
ONEOK	Crestwood
Alliance Pipeline	BNSF Railway
Northern Border Pipeline	Basin Electric
Moody's Analytics	Sequent Energy
Bakken Midstream/Energy	Barr Engineering
Pembina Pipeline	Energy Transfer Partners
Sumitomo	JPMorgan Chase
SolSpec	GA Group
Kinder Morgan	BP
Oasis Petroleum	Marathon Oil
PetroNerds	Outrigger Energy
ConocoPhillips	SolSpec
Nova Energy	Ovintiv
Steel Reef Infrastructure	Mesa Solutions
Incho	Mineral Tracker
Pivotal Energy Partners	ExxonMobil
UBS	Minnkota Power
Summit Carbon Solutions	Border States Electric
Hex Strategies	Callan
Continental Resources	RBN Energy
4H2 Inc	Citadel Commodities
Cerilon GTL	Enverus
Xcel Energy	Advantage Engineering
Ormat	Northern Plains Nitrogen
EcoVapor	Nustar Energy
Dakota Natural Gas	Sapphire Gas Solutions
Harms Group	United Energy Trading/Rainbow Gas
Frio Valley Pipeline	Grayson Mills
Applied Blockchain	CHS/Cenex
Fufeng	WSP/Parsons Brinkerhoff
Goldman Sachs	Energy Xtractors
SkySkopes	Astute Environmental & Regulatory

Fintech/ComboCurve
MarbleRock Advisors
Windstream Communications

A1 Development
QRI International

In addition, the Pipeline Authority worked with a number of state and federal agencies to gather information and provide expertise on pipeline issues. Those agencies and entities included:

North Dakota Public Service Commission	North Dakota Department of Commerce
North Dakota Transmission Authority	Energy and Environmental Research Center
North Dakota Oil and Gas Division	North Dakota Department of Transportation
North Dakota Governor's Office	Department of Environmental Quality
North Dakota Tax Department	Bank of North Dakota
EmPower North Dakota Commission	US Energy Department of Energy
North Dakota State Water Commission	North Dakota Oil & Gas Research Program
Upper Great Plains Transportation Institute	North Dakota OMB

The Director of the Pipeline Authority also worked with the following trade associations/groups:

North Dakota Petroleum Council
North Dakota Building Trades Union
Greater North Dakota Chamber
Landman's Association of North Dakota
Grand Forks Region Economic Development Corporation
Laborers' International Union of North America (LIUNA)
North Dakota Independent Community Bankers
Western Dakota Energy Association
North Dakota Bar Association
National Association of Royalty Owners
Economic Development Association of North Dakota

As noted above, the Pipeline Authority has been facilitating discussions between governmental agencies and companies interested in expanding North Dakota's midstream infrastructure.

In addition, the Director of the Pipeline Authority provided information to citizens and news media on issues related to pipelines.

Natural Gas Pipeline Program

North Dakota's Natural Gas Pipeline Program was established by the Legislature in 2021 under the control of the North Dakota Industrial Commission to provide funding for the development of high-pressure transmission pipeline infrastructure for the transportation and competitive selling of natural gas to eastern North Dakota. The program guidelines provide that the Industrial Commission shall consult with

the Natural Gas Pipeline Review Committee. The review committee, chaired by the Pipeline Authority Director, includes the Department of Mineral Resources Director, Bank of North Dakota President or his designee, Clean Sustainable Energy Authority Director, Department of Commerce Commissioner.

The purpose of the Natural Gas Pipeline Program is to provide grants to assist with the construction of a high-pressure transmission pipeline to transport natural gas for utilization in eastern North Dakota thereby expanding the North Dakota economy, increasing employment, stimulating economic activity, augmenting sources of tax revenue, and fostering economic stability.

SB 2345 Section 1, subsection 1 was passed with the following appropriation language:

There is appropriated from federal funds derived from the state fiscal recovery fund, not otherwise appropriated, the sum of \$150,000,000, or so much of the sum as may be necessary, to the Industrial Commission for the purpose of pipeline infrastructure grants to allow for the transportation of natural gas to eastern North Dakota for the period beginning December 1, 2021 and ending June 30, 2023. Of the funds appropriated in this subsection, at least \$10,000,000 must be used for a project to transport natural gas to areas in Grand Forks County.

Full grant program details are available on the ND Industrial Commission website.

Crude Oil and Natural Gas Production Forecasting

The Pipeline Authority continued to develop and maintain crude oil and natural gas production forecasts for North Dakota and the United States portion of the Williston Basin. These forecasts are widely used throughout both public and private organizations. Three assumption scenarios are forecasted for the purpose of communicating the production impacts of different price and activity levels. The “Base” case was modeled as expected production assuming the Federal Energy Information Administration’s (EIA) West Texas Intermediate (WTI) oil price forecasts. The “Low” case was modeled as a conservative production outlook based on lower-than-expected activity and/or oil prices. The “High” case scenario is intended to model production scenarios under an environment in which petroleum industry activity in North Dakota returns to near pre-pandemic levels. Figure 1 is a long-term oil production forecast for North Dakota. Figure 2 shows a long-term natural gas production forecast using the same three activity scenarios for North Dakota.

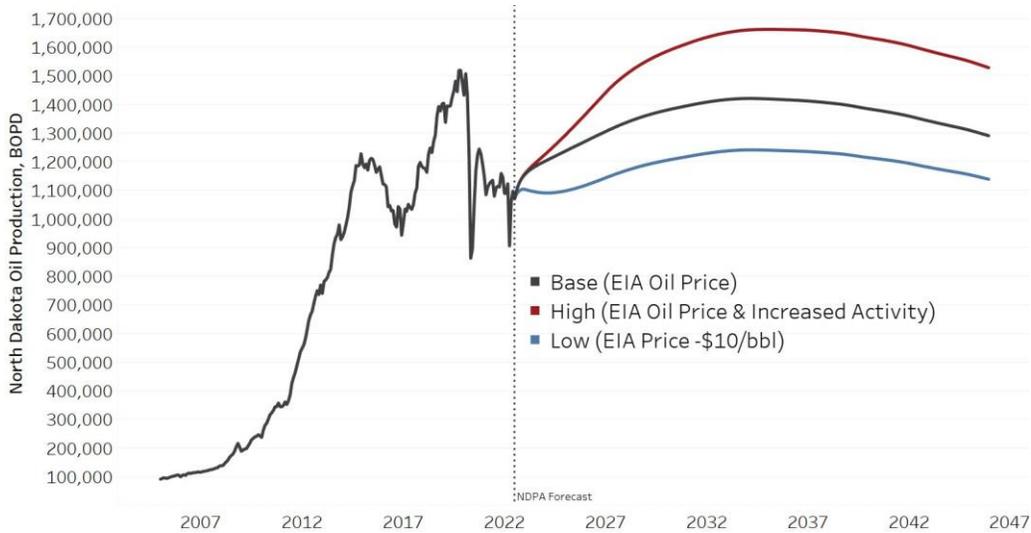


Figure 1. Long term crude oil production forecast for North Dakota starting in Aug. 2021

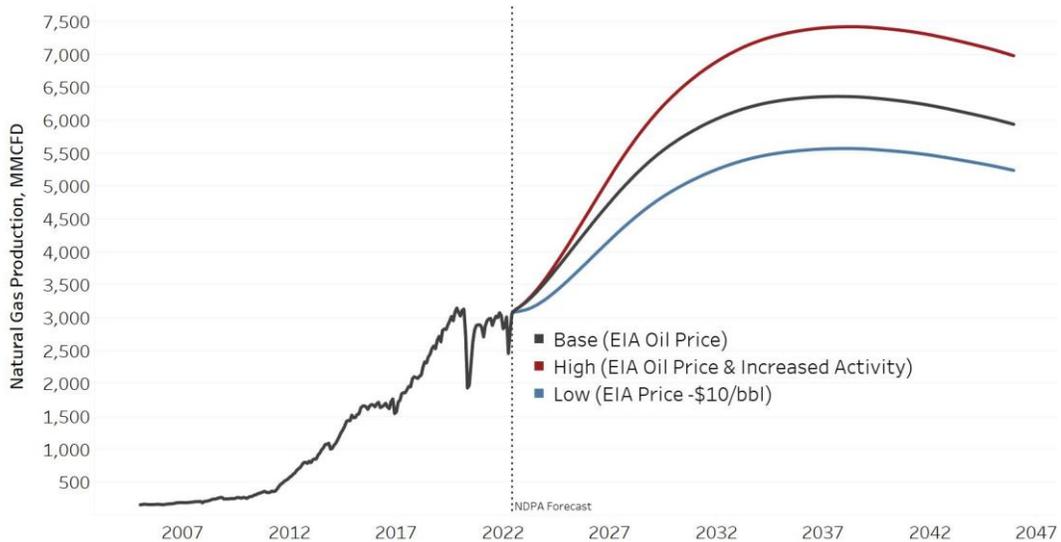


Figure 2. North Dakota natural gas production forecast starting in Aug. 2021

Given the continued amount of market uncertainty surrounding the COVID-19 pandemic recovery, Eastern Europe military conflict, and Russian energy sanctions, the Pipeline Authority created a series of production forecasts based on various well completion scenarios in North Dakota. Figures 3 and 4 represent the near-term estimated oil and natural gas production levels at the stated number of new well completions per month. These scenario calculations have proven very beneficial to assist in transportation, budget, and policy planning. Additional information on this topic can be found on the Pipeline Authority website.

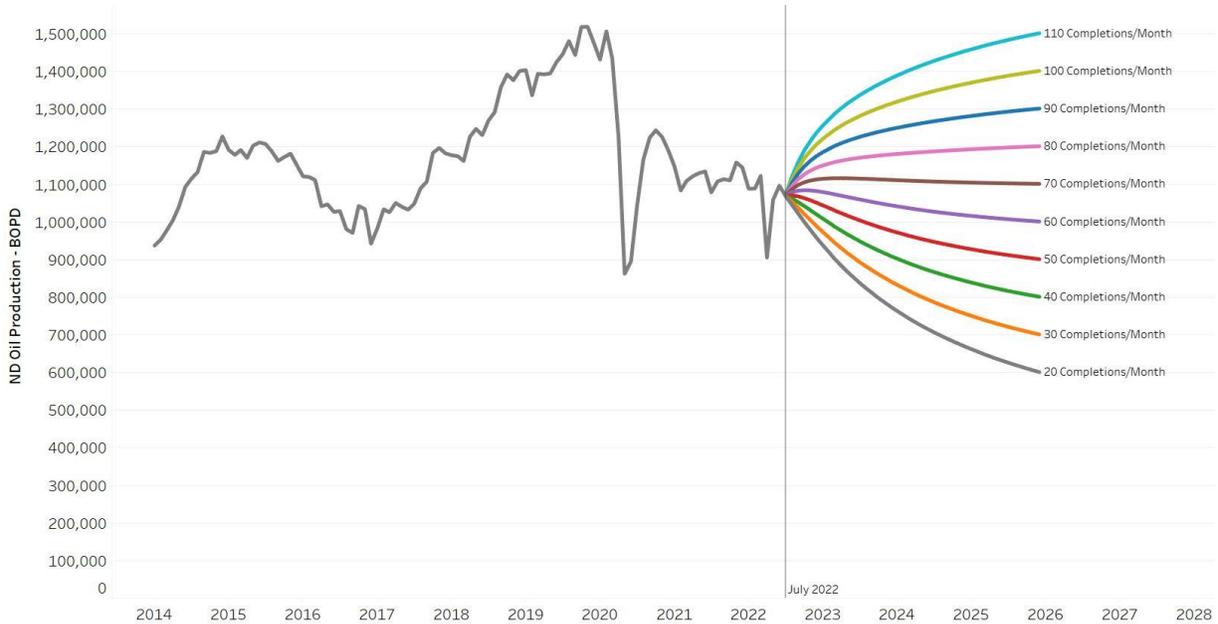


Figure 3. North Dakota oil production under various completion scenarios

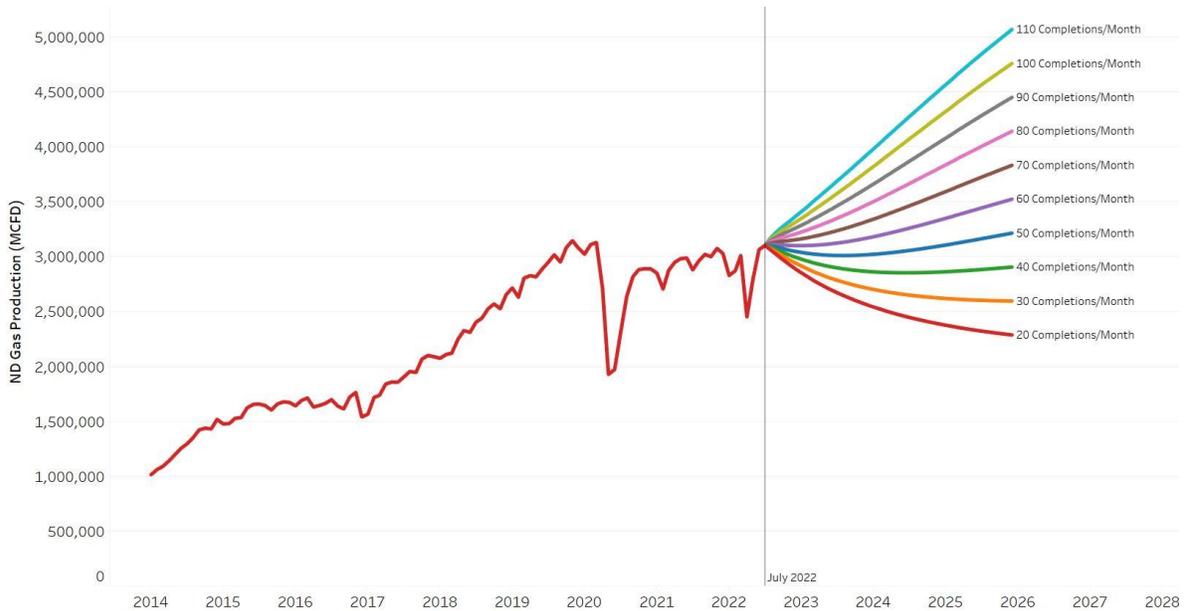


Figure 4. North Dakota natural gas production under various completion scenarios

Natural Gas Liquids

The Pipeline Authority continued to focus considerable attention in the 2021-2022 fiscal year to the topic of natural gas liquids (NGLs). Natural gas produced from the Bakken and Three Forks Formations is very high in NGLs such as ethane, propane, and butane. Forecast models created by the Pipeline Authority

were continually updated to better understand the production potential and required transportation infrastructure going forward.

The forecast in Figure 6 shows three potential production cases based on different activity level assumptions. North Dakota faced a significant shortfall of gross pipeline capacity until ONEOK’s Elk Creek Pipeline went into service in late 2019. It is expected that NGL production will exceed pipeline capacity again in 2024 until further system expansions take place or a new market option is developed. Further complicating the NGL transportation dynamics is the fact that not all NGL pipelines can handle the same types of NGL products. In addition, natural gas plants around the region produce either purity products or unfractionated product, known as Y-grade.

There are several options going forward to address the growing volume of NGLs in North Dakota. One option would be to build, expand, or repurpose existing pipeline systems. A second option would be the development of value-added industries that would use NGL products as feedstock. Another potential use for NGLs is enhanced oil recovery (EOR) in the Williston Basin as fields continue to mature. The use of NGLs as a working EOR fluid is still in the research phase with early lab results appearing promising.

In an effort to advance the opportunities of using North Dakota NGL products as a feedstock for value-added industries, funding was provided to the Energy and Environmental Research Center to study the potential of salt cavern storage in the Williston Basin. In late 2020, the research paper was released suggesting storage opportunities may be commercially viable in North Dakota. Additional funding was provided during the 2021 legislative session for development of pilot projects to confirm the study results. The Pipeline Authority will stay actively engaged on this topic, as it could have significant impacts on how North Dakota’s NGL products are transported and utilized.

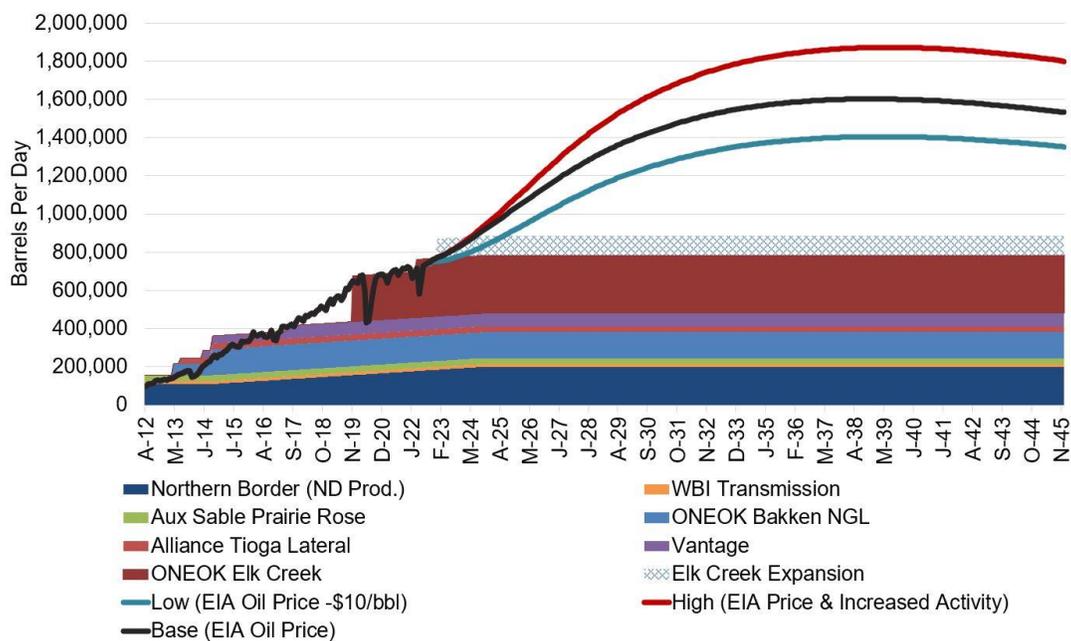


Figure 6. Forecasted North Dakota NGL production and transportation options.

Natural Gas Capture

While not a regulatory agency, the Pipeline Authority plays a very active support role in helping the state maximize the amount of captured natural gas. The Pipeline Authority continually monitors and reports capture statistics and provides analysis on current and future developments to industry participants, regulators, policy makers, and the public.

Several significant actions were taken by the ND Industrial Commission in past years that have had a positive impact on increasing natural gas capture. The first was the requirement for operating companies to submit a natural gas capture plan to the Oil & Gas Division to outline how produced natural gas would be sold or utilized on location. The second action was an Industrial Commission order on July 1, 2014 that provided gas capture targets to the year 2020 and provided a means of enforcement at the Oil & Gas Division through the use of production and permitting restrictions.

In November 2018, the Industrial Commission updated the natural gas capture regulations for Bakken and Three Forks production. More details on the November update can be found on the Oil & Gas Division website.

The current North Dakota gas capture target rates are as follows:

- 74% Capture – Q4 2014
- 77% Capture – Q1 2015
- 80% Capture – Q2 2016
- 85% Capture – Q4 2016
- 88% Capture – Q4 2018
- 91% Capture – Q4 2020

In July 2022, the North Dakota's petroleum industry produced 3.1 billion cubic feet per day (BCFD) with a gross capture rate of 94%. Industry estimates indicate over \$20 billion has been invested in pipeline and processing assets to help reach the capture targets. In order for the industry to meet future gas capture targets, significant additional investments in gas gathering, processing, and transmission will be required.

Natural Gas Processing

For reference, a North Dakota Gas Processing and Transportation map can be found on the Pipeline Authority website and a table of all gas processing plants can be found in Appendix C

New or Expanding Natural Gas Plants

Due to the vast footprint of the Bakken resource, natural gas gathering and processing operators in North Dakota have faced difficult challenges in the past to keep pace with faster, more efficient drilling and completion techniques. Despite the daunting task, industry is rising up to reap the great economic reward contained in the rich Bakken gas.

North Dakota currently has thirty-three natural gas processing/conditioning plants operating, with the capability to process roughly 4.1 BCFD. One additional plant is expected in the first quarter of 2023 and will add 0.2 BCFD of processing capacity (Figure 7). A detailed breakdown of the existing and proposed facilities can be found in Appendix C and on the Pipeline Authority website.

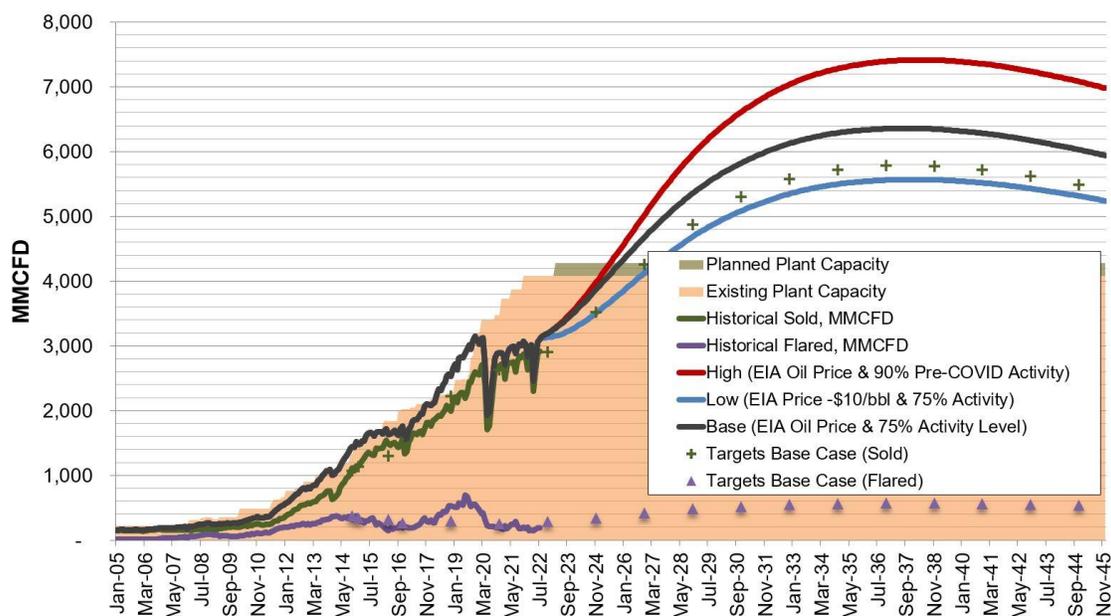


Figure 7. North Dakota natural gas processing plant intake capacity, gas production, gas forecast, and NDIC capture targets. (Forecast starts in Aug. 2022)

Williston Basin Gas Storage

One primary use of residue natural gas is heating residential and commercial buildings. Without the use of underground natural gas storage, the supply chain would be challenged to handle strong seasonal demand shifts. During the warm summer months, excess natural gas is stored in underground reservoirs and withdrawn during colder periods with higher demand (Figure 8). The reservoirs used for natural gas storage are typically depleted gas producing fields that are converted to serve a storage role.

The nearest residue gas storage field is located near Baker, MT and is operated by WBI Energy Transmission. Located primarily in SE Montana in the Cedar Creek Anticline, the Baker field is the largest natural gas storage field in the United States. The Baker gas storage system has a working gas capacity of over 193 BCF and has been operating the past year with a balance of less than 32 BCF (Figure 8). Regional interstate residue gas pipelines provide transportation service to and from the Baker storage field.

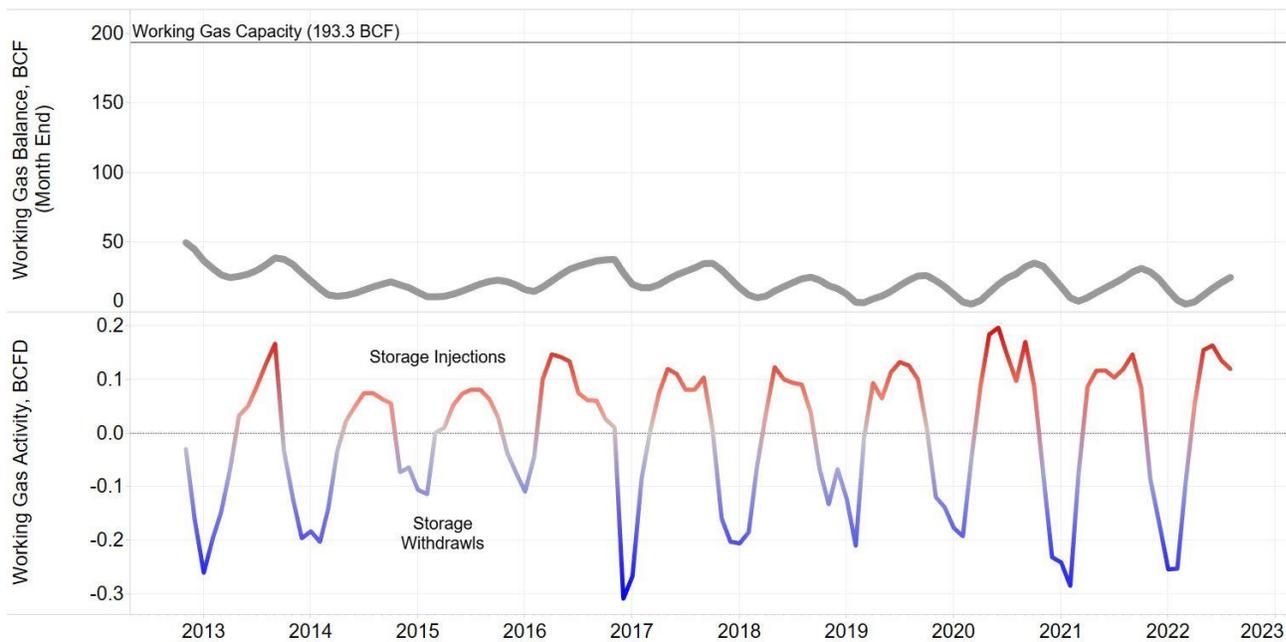


Figure 8. WBI Energy gas storage field activity

North Dakota Freight Advisory Committee

In the fall of 2018, the Pipeline Authority Director and a number of other private and public entities joined the North Dakota Department of Transportation in an effort to create the North Dakota Freight Advisory Committee. The primary objective of the group is to improve collaboration between transportation providers, industry sectors, and government entities in order to efficiently expand North Dakota’s economy.

In June 2022, a draft combined *State Freight and Rail Plan* was published on the North Dakota’s Dept. of Transportation’s website. Public outreach and comment periods commenced in Q3 2022, with the goal of having a final report and plan by late 2022.

Along with the Pipeline Authority, member entities include:

- BNSF Railroad
- Dakota, Missouri Valley, & Western Railroad
- Magnum Trucking
- Federal Highway Administration
- North Dakota Department of Commerce
- Teamsters Local 638
- Enger Grain & Livestock
- North Dakota Aeronautics Commission
- United Sugars Corporation

- North Dakota Motor Carriers Association
- North Dakota Mill and Elevator
- North Dakota League of Cities
- North Dakota Trade Office
- North Dakota Department of Transportation
- North Dakota Public Service Commission
- Upper Great Plains Transportation Institute
- Fargo-Moorhead Metropolitan Council of Governments
- Mountrail County
- Impact ND

Industry and Public Communications Activities

Pipeline Authority Websites

In an effort to provide industry and public users with the most timely and complete set of information, the Pipeline Authority continues to update the agency websites as new information becomes available. The websites allow the Pipeline Authority to provide users with current Williston Basin oil production data, maps, news, publications, basic pipeline information, pipeline safety information, and links to pipeline mapping systems.

Monthly Updates

During the 2021-2022 fiscal year, the Pipeline Authority produced monthly transportation and production reports to allow interested parties a quick view of how much crude oil and natural gas was produced each month and how each commodity was shipped and/or processed. Information contained in the reports is presented during monthly media events in conjunction with the ND Oil & Gas Division. Monthly reports are placed on the Pipeline Authority website and an email distribution list has been created to circulate the update to interested parties.

North Dakota Drilling Inventory and Economics

In order to assist the midstream industry in understanding current and future petroleum activity levels, the Pipeline Authority routinely publishes information exploring the economics of drilling in North Dakota's Bakken/Three Forks Formations. The research takes a detailed look at where drilling in North Dakota has been most successful in the past and then predicts where drilling may be concentrated during periods of fluctuating oil prices.

Figure 9 was generated during the drilling economics research to represent the expected after-tax rate of return at three different drilling and completion costs. While assuming \$70/bbl at the wellhead, it was discovered that wells drilled in North Dakota could consistently receive a 10%-20% rate of return or higher when they were producing at least an average of 500 barrels of oil per day during the well's peak production month. Maps were also generated to show where the wells in Figure 9 are located.

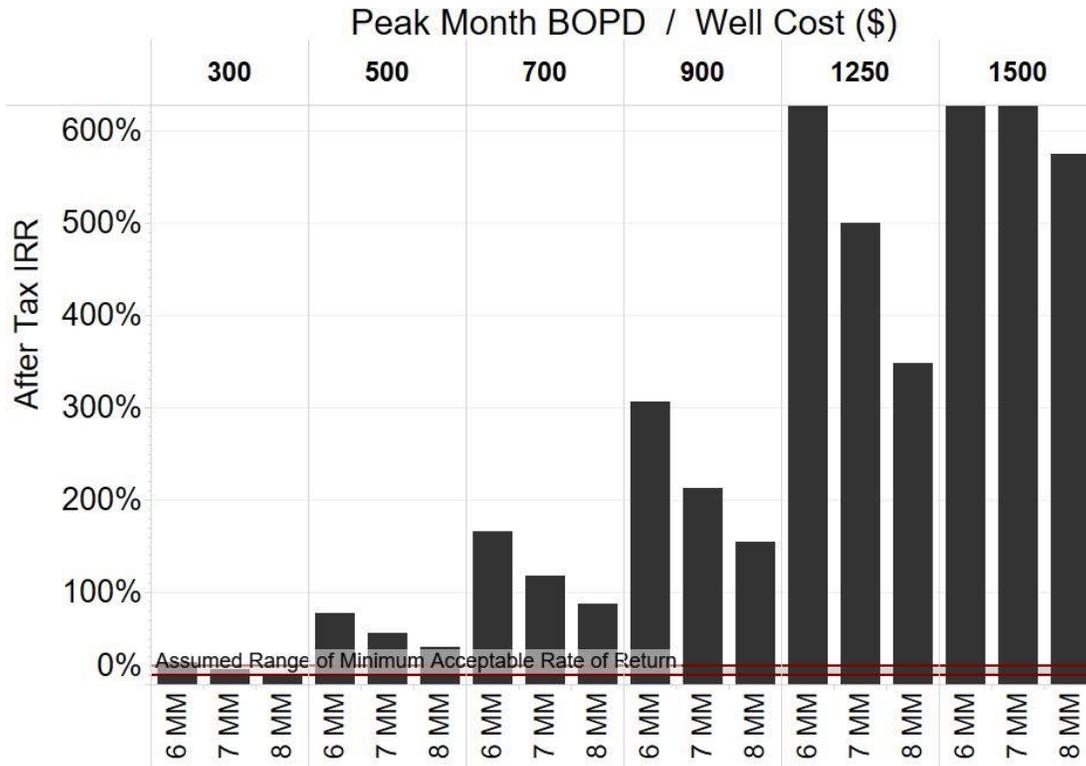


Figure 9. North Dakota drilling economics summary (Assumes \$70/bbl at the wellhead)

In February 2022, the Pipeline Authority updated its view on well performance and drilling economics in the Bakken and Three Forks. The refreshed work highlighted decades of remaining drilling inventory in the Bakken and Three Forks Petroleum System. The NDPA work used well performance datasets from the last two years and compared it to the same work performed in 2020. The results showed that an additional 3,000 square miles of acreage was reclassified and could now be economically developed at prices as low as \$60 per barrel. A comprehensive slide deck and video presentation of the work is available on the Pipeline Authority website.

Pipeline Presentations

The Pipeline Authority has had the opportunity to make presentations at a variety of legislative, industry, and public events during the past fiscal year. Presentation topics were typically focused on North Dakota’s transportation dynamics with additional material on drilling economics and production techniques. Slides from many of the major events are placed on the Pipeline Authority website as content is updated.

Williston Basin Pipeline Infrastructure

For reference, a series of North Dakota pipeline maps can be found in Appendix A

Pipeline Mileage

North Dakota’s pipeline industry added 411 miles of new oil, natural gas, and produced water pipelines in calendar year 2021 (Figure 10). The majority of the new pipelines installed in 2021 operate as gathering pipelines for oil, natural gas, and produced water (Figure 11). The significant decrease in pipeline construction in 2016 through 2021 was proportional to the slowdown in well completions and a geographic concentration of activity in the core of the oil play. Data from the Federal Department of Transportation and North Dakota Oil & Gas Division indicates that North Dakota has over 30,060 miles of gathering and transmission pipelines. Further details about North Dakota’s pipeline network can be found on the Pipeline Authority website.

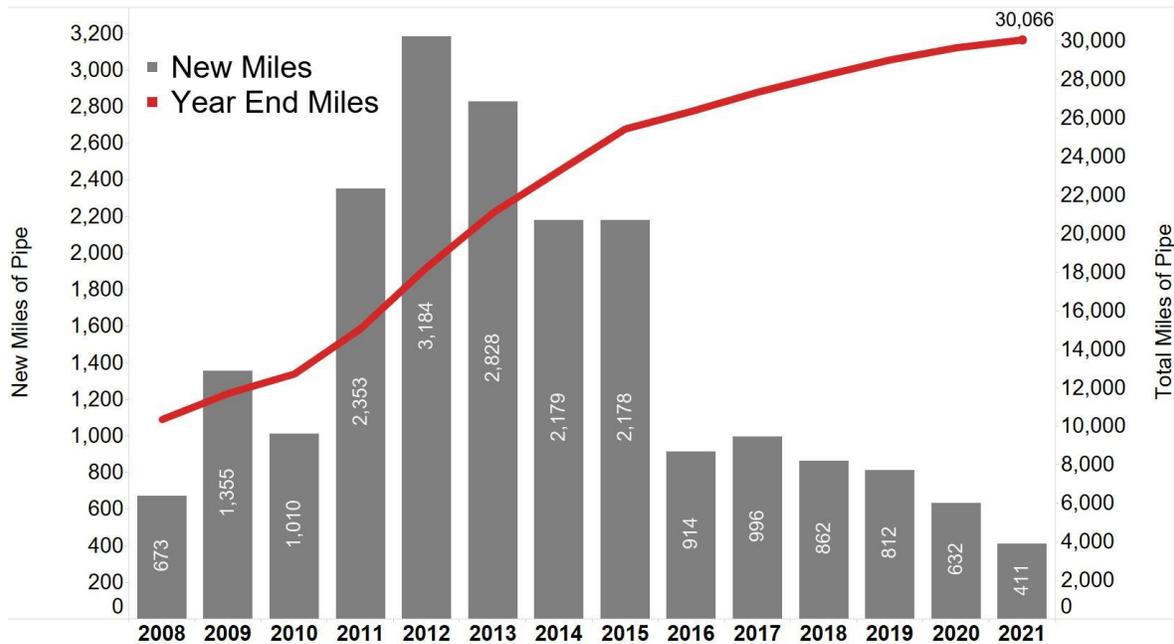


Figure 10. North Dakota pipeline mileage

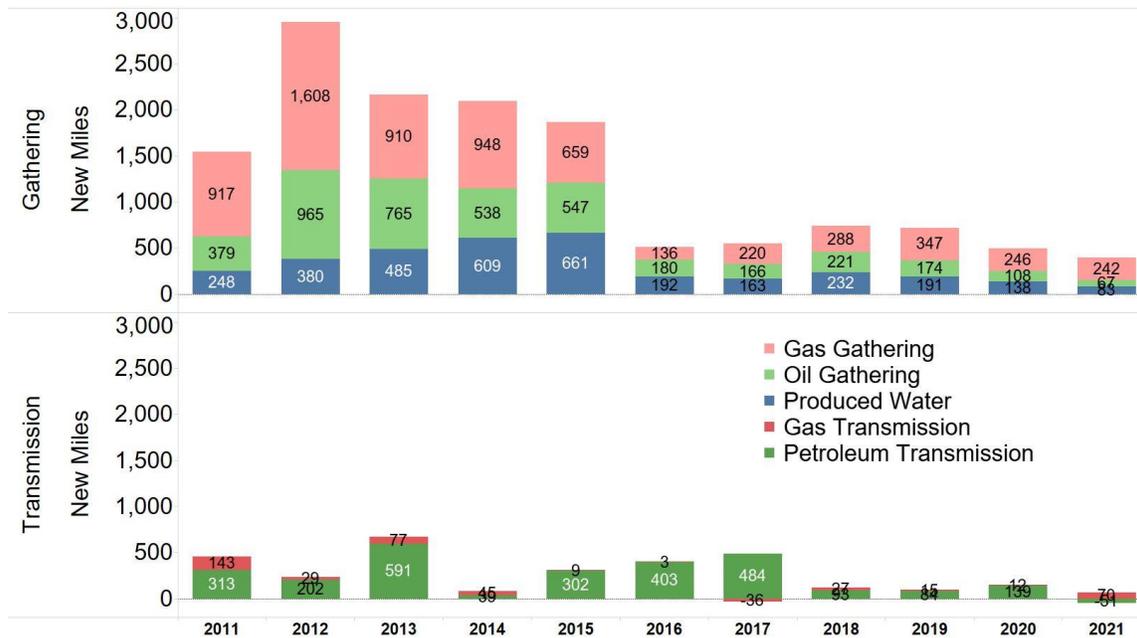


Figure 11. New North Dakota pipeline mileage by category

Crude Oil Pipelines, Refining, and Rail Transportation

Enbridge/North Dakota Pipeline Company: Having completed several expansion projects over the past number of years, Enbridge now has the capacity to move 355,000 BOPD on its pipeline system to Clearbrook, MN. Enbridge completed their work to expand north bound capacity of 145,000 BOPD in early 2013 for the larger scale “Bakken Expansion Project”. Oil using the northbound route navigates the Enbridge Saskatchewan system to an interconnect with the Enbridge Mainline at Cromer, MB. Once on the Mainline system, the Williston Basin oil quickly reenters the United States and meets east bound Enbridge oil at Clearbrook, MN.

Enbridge’s plans to construct the 225,000 BOPD “Sandpiper” system were deferred during the third quarter of 2016 due to unexpected market conditions in the near-term planning horizon. Enbridge plans to monitor market conditions and reevaluate potential expansion opportunities in North Dakota.

Bridger, Belle Fourche, and Butte Pipelines: Bridger and Belle Fourche Pipelines operate as intra-regional pipeline systems moving oil to several pipeline interconnects or rail facilities in the Williston Basin. One such pipeline interconnect is with the Butte Pipeline near Baker, MT. The Butte Pipeline currently has the capacity to move 260,000 BOPD to Guernsey, WY. In Guernsey, WY, the oil is transported to Wood River, IL on the Platte Pipeline, Cushing, OK on the White Cliffs Pipeline, or loaded into rail cars for further transport.

In mid-2022, Bridger Pipeline began constructing a multi-segment expansion project from Johnson’s Corner, ND to Guernsey, WY to meet growing production levels. Proposed to be in service before the end of 2022, the 16”, 137 mile “South Bend Pipeline” will be able to ship 175,000 BOPD to Baker, MT.

Additionally, a 191-mile southern section of new 20" pipeline will move up to 200,000 BOPD of North Dakota and Rockies oil from Hulett, WY to Guernsey, WY. At Guernsey, WY the oil will have multiple shipping options by pipeline and rail.

BakkenLink: After announcing plans in 2010 to offer a pipeline system connecting the Williston Basin to the Keystone XL Pipeline in Eastern Montana, BakkenLink has altered their current project scope. Now in service, the BakkenLink system collects crude oil from various locations along its route south of Lake Sakakawea and delivers the oil to a unit train rail facility located near Fryburg, ND. In late 2015, Andeavor (formerly Tesoro Corporation) purchased the BakkenLink pipeline and rail facility from Great Northern Midstream.

In February 2018, Andeavor sought, and was granted, approval from the North Dakota Public Service Commission to add NGL service to the existing BakkenLink crude oil system. Completed in late 2018, the additional NGL service to Fryburg, ND uses three new line segments on the north and south ends of the BakkenLink system.

Energy Transfer Partners: In early 2014, Energy Transfer Partners (ETP) held an open season to solicit interest in a new 30" pipeline from North Dakota to Patoka, IL. In June 2014, ETP announced that they had secured sufficient shipper support to move forward with the project. The project began construction in May 2016 and was placed into commercial service on June 1, 2017. When the "Dakota Access" pipeline began collecting oil north and south of Lake Sakakawea it had the ability to transport up to 520,000 BOPD.

In 2018, two successful open seasons were held for additional service on the Dakota Access pipeline. With additional shipper commitments, the pipeline was expanded to carry up to 600,000 BOPD.

In 2019, ETP began the regulatory process to expand the Dakota Access system up to 1.1 million BOPD through the use of additional pump stations and horsepower at existing pump facilities. In August 2021, ETP announced the most recent completion of the Dakota Access Pipeline system expansion to a new system capacity of 750,000 BOPD. No timelines have been announced as to when the full system expansion up 1.1 million BOPD would be complete.

In 2020, DC District Court Judge James E. Boasberg ruled that the US Army Corp of Engineers needed to conduct a full environmental impact statement (EIS) for the Lake Oahe crossing in south central North Dakota. After months of rigorous review, in May 2021 Judge Boasberg ruled that the Dakota Access pipeline could continue operations while the EIS proceeds. The EIS is anticipated to be complete in 2023.

Plains All American Pipeline: In November 2010, Plains All American Pipeline (Plains) announced plans to construct a new 103-mile, 12-inch, pipeline from Trenton, ND to an interconnect with the existing Wascana Pipeline at the United States-Canada border in northeast Montana. The "Bakken North" pipeline went into service in May 2014, with an initial capacity of 40,000 BOPD, expandable to 75,000 BOPD.

TC Energy (TransCanada) Bakken Marketlink: On September 13, 2010, TransCanada launched a successful open season for Bakken producers interested in accessing TransCanada’s proposed Keystone XL Pipeline project in eastern Montana. The proposed 100,000 BOPD interconnect would be located near Baker, MT and would require new pumps and tanks to accommodate the Bakken oil. Third party shippers would be necessary to move the crude to the Baker, MT facility from North Dakota.

In November 2015, President Obama announced that the Keystone XL Pipeline was not in the national interest of the United States and that a required Presidential Permit would not be granted. In March 2017, President Trump reversed the White House decision and granted a Presidential Permit to TransCanada for the Keystone XL Pipeline. TC Energy (formerly TransCanada) continued their work towards regulatory approval of the Keystone XL Pipeline, before President Biden canceled the Presidential Permit in January 2021. TC Energy formally cancelled the project in June 2021.

Marathon Petroleum Mandan Refinery (Formerly Andeavor/Tesoro): Expanded by 10,000 BOPD in 2012, Marathon Petroleum operates a 68,000 BOPD refinery in Mandan, ND. The refinery receives its light sweet feedstock through a network of pipelines in the Williston Basin. Products generated at the refinery are distributed directly from a truck rack at the facility or through the NuStar North Pipeline to Eastern North Dakota and Minnesota.

In 2017, Tesoro Corporation changed its name to Andeavor. In the second half of 2018, Andeavor merged with Marathon Petroleum and will operate under the Marathon Petroleum name.

Marathon Petroleum Dakota Prairie Refinery: In late June 2016, Tesoro Corporation purchased the Dakota Prairie Refinery from MDU Resources Group and Calumet Specialty Products Partners. The Dakota Prairie Refinery, began processing 20,000 BOPD at its facility just west of Dickinson, ND in May 2015. The “diesel topping” refinery produced around 7,000 BPD of diesel fuel for regional consumption, while the remaining product was transported for further processing or use.

In 2018, a decision was made to convert the refinery to produce renewable diesel fuel by mid-2020. Beginning in June 2020, the facility no longer used crude oil as a feedstock. Renewable diesel fuel from the facility is now primarily being shipped by rail to markets in California.

Davis Refinery: Meridian Energy Group is planning to construct a crude oil refinery in Billings County, east of the Fryburg Rail Facility in Belfield. The refinery is designed with an inlet oil capacity of 49,500 BPD. All refined products are expected to be marketed regionally with transportation taking place by truck and/or rail. Preliminary site preparation began in July 2018 with plant completion proposed in 2024.

A map of North Dakota crude oil gathering systems can be found on the Pipeline Authority website

Rail Loading Facilities: The transportation of crude oil by rail car has played a key role in moving growing volumes of crude oil from the Williston Basin to markets around the United States and Canada. Figure 12 shows the estimated Williston Basin market share percentages for rail, pipeline, and local refining. Figure

13 shows the estimated volume of oil moved by rail out of North Dakota. Maps, capacities, and additional information on the various facilities can be found on the Pipeline Authority website.

A significant decrease in crude by rail volumes can be identified during the 2015-2017 timeframe in Figures 12 & 13. The 2015-2017 volume decrease can be attributed to production declining in North Dakota and reduced market incentives to utilize crude by rail. Prior to the industry downturn in 2020, crude by rail volumes had been steadily increasing as production rose and egress pipelines were at capacity. The Pipeline Authority estimates ten of the twenty-plus rail facilities are still active loading crude oil, with the most active facilities being those with unit train loading capabilities and multiple inbound/outbound marketing options.

The future of crude by rail utilization in North Dakota will be driven by oil production volumes, market pricing, pipeline capacity, and regulatory oversight.

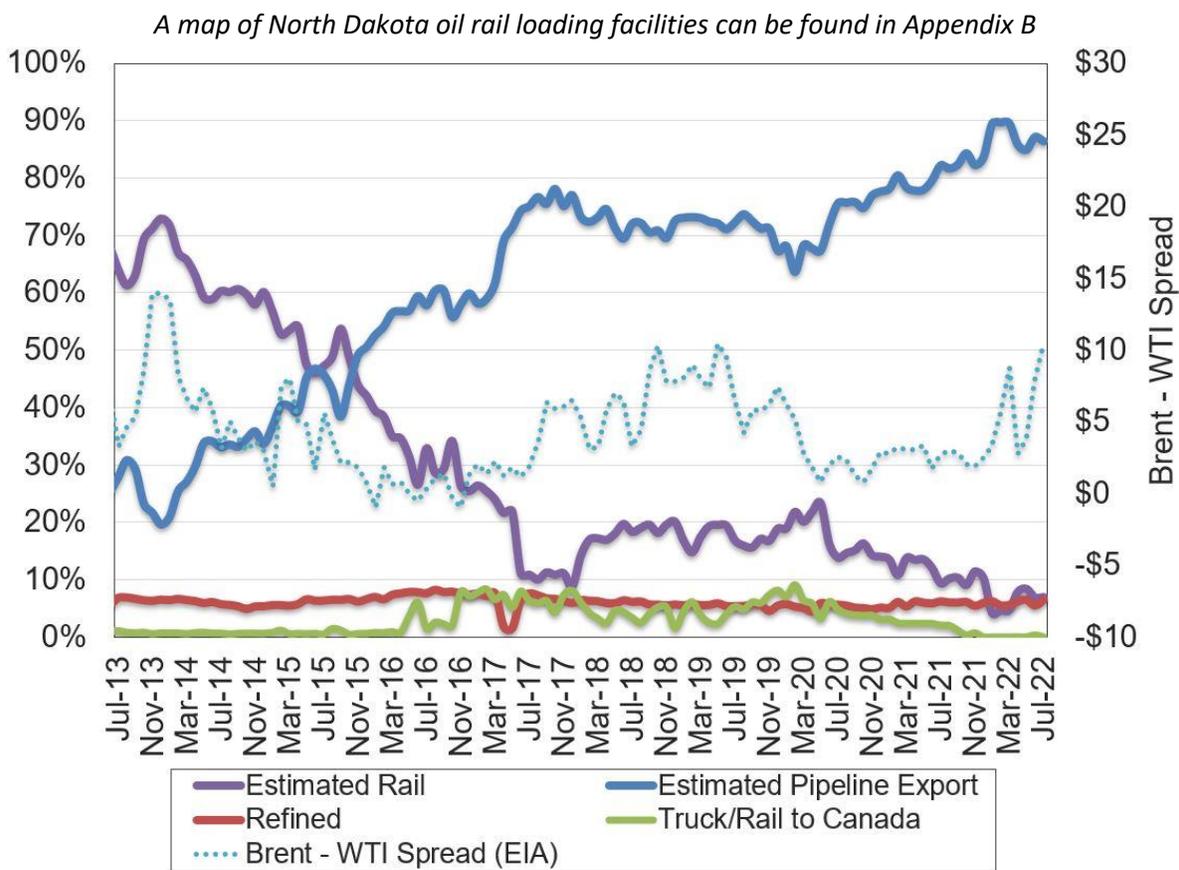


Figure 12. Estimated oil transportation by mode (July 2022 data)



Figure 13. Estimated outbound crude oil rail shipments (July 2022 data)

Natural Gas Pipelines

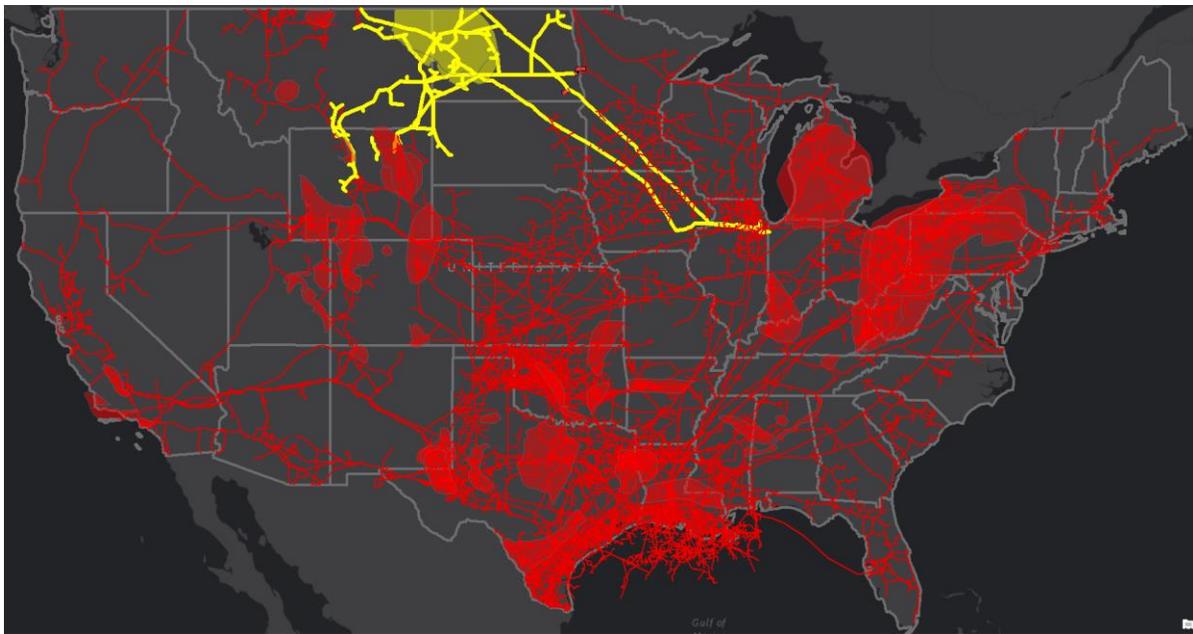


Figure 14. North Dakota's interstate gas pipelines (yellow) and the national interstate gas pipeline network (red)

Alliance Pipeline: The Alliance Pipeline is a high pressure, large diameter natural gas pipeline that originates in British Columbia, Canada and terminates at the Aux Sable gas processing plant near Chicago, IL. The Alliance Pipeline transports “dense gas” or gas that still contains high BTU natural gas liquids, such as propane and butane. In February 2010, the Alliance Pipeline began transporting rich natural gas from

North Dakota via a new interconnect with the Prairie Rose Pipeline near Bantry, ND (See Aux Sable below). The 36-inch diameter United States portion of the pipeline has a certified capacity of 1.513 billion cubic feet per day (BCFD). The Alliance Pipeline has one direct North Dakota delivery point in Hankinson and one interconnect with Montana Dakota Utilities to serve industrial manufacturing in Gwinner.

In response to growing natural gas production, Alliance Pipeline announced plans on June 22, 2011, to construct a new, 80-mile, natural gas pipeline from the Hess Gas Plant in Tioga, ND to an interconnection point near Sherwood, ND. Commissioned in late 2013, the “Tioga Lateral Pipeline” has the ability to deliver liquids rich, high BTU, natural gas to Chicago, IL for further processing and transportation. The Tioga Lateral has the capacity to transport up to 126 million cubic feet per day (MMCFD).

Northern Border: The Northern Border Pipeline, owned by TC Pipelines and ONEOK Partners, is a 1,249-mile pipeline originating at the Port of Morgan in Montana and terminating near North Hayden, Indiana. The pipeline has a system receipt capacity of 2.37 BCFD, with less than half of the gas supply in 2020 originating in Canada through a receipt point with the Foothills Pipeline at the Port of Morgan. The 42-inch diameter Northern Border Pipeline receives gas deliveries at a total of seventeen receipt points in the Williston Basin with fourteen of those points for North Dakota gas supply. (See the Bison Pipeline section below for details on the proposed Bison XPress expansion project)

In May 2020, Northern Border submitted a proposed tariff modification to the Federal Energy Regulatory Commission (FERC) that would limit the energy content of flows exiting North Dakota to 1,100 BTU. The FERC decision process resulted in a technical conference being held and multiple opportunities for interested party input. While the Pipeline Authority remained neutral on the proposed tariff modifications, considerable efforts were made to model and quantify the potential impacts to North Dakota’s petroleum industry. FERC ultimately rejected the proposed BTU limit, but left open the opportunity for a similar proposal to be filed in the future with additional supporting evidence.

WBI Energy Transmission: Formerly known as Williston Basin Interstate Pipeline Co., WBI Energy Transmission operates more than 3,700 miles of natural gas transmission pipelines throughout North Dakota, Montana, Wyoming, and South Dakota. This network of pipelines plays a vital role in North Dakota’s natural gas industry. It contains twelve interconnecting points with other regional pipelines and can also deliver natural gas to local distribution companies or natural gas storage fields. WBI continues to make system upgrades in western North Dakota in order to meet growing customer demand.

In June 2016, WBI announced an open season to connect the eastern North Dakota portion of the system with the Viking Pipeline in western Minnesota. This project, known as the Valley Expansion, does not directly support North Dakota gas production volumes, but rather would serve to provide additional gas volumes to consuming markets in eastern North Dakota. The Valley Expansion project became operational in late 2018.

In early 2019, WBI Energy announced plans to construct a new gas pipeline system called the “North Bakken Expansion Project”. Started in July 2021 and completed in Q1 2022, the \$260 million system

consists of 60 miles of 24" pipe and 30 miles of 12" pipe. The initial project added 250 MMCFD of capacity from Tioga, ND to an interconnect with the Northern Border Pipeline in McKenzie County. Capacity can be expanded to 600,000 MCFD to meet growing gas volumes in the future.

In Q3 2021, WBI Energy held a successful open season for a system expansion in Southeast North Dakota. The 60.5 mile, 12" pipeline will deliver up to 20.6 MMCFD of natural gas from Mapleton, ND to Wahpeton, ND. WBI Energy began the FERC regulatory process in Q2 2022, with formal support from the Industrial Commission being submitted in June 2022. The pipeline is expected to be in-service Q4 2024 and has the potential to connect to additional nearby communities and end-users.

In Q1 2022, WBI Energy held a successful open season for the expansion and permanent reversal of the existing Grasslands pipeline. The 16" pipeline connects to the Northern Border pipeline near Manning, ND and is slated to deliver gas to two additional natural gas pipelines in Wyoming for further transport to the Cheyenne trading hub. The project is scheduled to begin construction in summer 2023 and be complete Q4 2023. Initial project capacity is estimated to be 94 MMCFD.

Aux Sable: In June 2011, Aux Sable announced the acquisition of the Prairie Rose Pipeline and condensate recovery facility near Stanley, ND. Originally constructed by Pecan Pipeline, the 75-mile, 12-inch system went into service February 2010 and has the capability to transport over 100 MMCFD of unprocessed natural gas from Mountrail County to an interconnect with the Alliance Pipeline near Bantry, ND.

Bison Pipeline: TC Energy placed the 302-mile, 30-inch Bison Pipeline into service in early 2011. The pipeline was built to connect natural gas production in the Powder River Basin of Wyoming to the Northern Border Pipeline in Morton County, North Dakota. The pipeline had an initial capacity of 407 MMCFD and could be expanded to 1 BCFD. From 2018 to the first half of 2020, the Bison Pipeline was idle. Limited and sporadic natural gas transportation resumed in May 2020 and ceased in September 2020.

In the first half of 2022, TC Energy began informally seeking interest for a proposal to reverse the Bison Pipeline to serve growing natural gas transmission needs from North Dakota. The proposed "Bison XPress" project has a capacity of approximately 400,000 MCFD and in-service target of Q1 2026. TC Energy continues to work with potential shippers to secure the necessary commitments to proceed with the project.

Dakota Natural Gas: Dakota Natural Gas, LLC was formed in 2018 to provide natural gas service to areas of North Dakota that were currently not served by any other natural gas utility. Regulated by the North Dakota Public Service Commission, Dakota Natural Gas was authorized to provide natural gas distribution service to retail and commercial customers in North Dakota. The first project was completed in 2019 and provided gas service from the Viking Pipeline in western Minnesota to the community of Drayton, ND. The second project was completed in late 2021 and delivers gas from the Viking Pipeline to residential and industrial users in the communities of Mayville and Hillsboro, ND. An additional expansion to residential and commercial users in Portland, ND is expected to be complete by Q4 2022.

Natural Gas Liquids Pipelines

ONEOK Bakken NGL Pipeline: On July 26, 2010, ONEOK Partners announced plans to construct a new 12” natural gas liquids pipeline capable of moving 60,000 BPD from existing and planned facilities in the Williston Basin to an interconnect with the Overland Pass Pipeline near Cheyenne, WY. The “Bakken NGL Pipeline” was built to address the high volumes of natural gas liquids that are extracted from the rich Bakken gas during processing. The pipeline operates as a Y-grade system, with product fractionation taking place in Bushton, KS. ONEOK announced completion of the pipeline in April 2013 and an expanded capacity of 140,000 BPD in September 2014.

In February 2018, ONEOK announced a new NGL transmission system known as the Elk Creek Pipeline. The \$1.4 billion project could initially connect 240,000 barrels per day of NGLs from the Williston Basin to further NGL infrastructure in Kansas. Construction of the pipeline began in 2018 and was placed in service late 2019. This project could be expanded up to 400,000 barrels per day if market conditions justify the added investment.

Vantage Pipeline: On July 15, 2010, Mistral Energy announced a new 430-mile liquid ethane pipeline from Tioga, ND to Empress, AB. With an initial capacity of 40,000 BPD, the new “Vantage Pipeline” was built to address the high concentration of ethane found in North Dakota’s natural gas. Placed into service Q2 2014 in conjunction with the Hess Tioga Gas Plant Expansion, the pipeline was constructed of 10” pipe. In September 2014, Pembina Pipeline Corporation purchased the Vantage Pipeline from Mistral Midstream.

On February 10, 2015, Pembina Pipeline announced that the Vantage ethane pipeline would expand to connect to ONEOK’s Stateline plants with 50 miles of 8” pipeline. The \$85 million system expansion also included taking the existing mainline capacity from 40,000 bpd to 65,000 bpd. Ethane deliveries from the ONEOK Stateline plants to Vantage began in May 2017.

Carbon Dioxide Pipelines

Dakota Gasification: The Dakota Gasification Company’s, 12-14 inch, 205-mile pipeline went into service in 2000 and transports roughly 150 MMCFD of carbon dioxide to oilfields near Weyburn, SK.

Denbury Resources: Denbury Resources began construction in 2021 on a pipeline to connect the Cedar Creek Anticline oilfields in eastern Montana and southwest North Dakota to the existing Greencore Pipeline at Bell Creek, MT. The 110 mile, \$150 million, extension began injecting carbon dioxide in the field in early 2022.

Project Tundra: Project Tundra has proposed a plan to collect carbon dioxide from the Milton R. Young Station and transport it to the Williston Basin for either sequestration and/or enhanced oil recovery. If approved, a pipeline carrying carbon dioxide from the Young Station could be in service by the mid-2020’s.

Midwest Carbon Express: Summit Carbon Solutions, created by Summit Agricultural Group in early 2021, is actively developing the “Midwest Carbon Express” pipeline. Projected to be operational in 2024, the Summit Carbon Solutions project will be able to capture and permanently store more than 12 million tons of carbon dioxide annually, making it the largest such project in the world.

Summit Carbon Solutions would construct the Midwest Carbon Express system across five states, including North Dakota, Nebraska, Iowa, Minnesota, and South Dakota to connect more than 30 ethanol plants for long-term underground sequestration in North Dakota. Initial project costs are estimated at \$4.5 billion.

The Pipeline Authority continues to work with additional interested parties on the development of new carbon dioxide pipelines for capture and sequestration, as well as enhanced oil recovery operations. The Pipeline Authority is an active member of the Plains CO₂ Reduction Partnership through the Energy and Environmental Research Center in Grand Forks, ND.

Hydrogen Development

Bakken Energy: Bakken Energy, formerly Bakken Midstream Natural Gas, and Mitsubishi Power Americas signed a strategic partnership agreement in early 2021 to create a clean hydrogen hub in North Dakota to produce, store, and transport hydrogen while capturing and sequestering associated carbon dioxide emissions.

The site of the hydrogen hub is tentatively set for the Dakota Gasification Plant near Beulah, ND. The purchase and conversion of the Dakota Gasification Plant is subject to purchase terms and expected to be completed by early 2023.

The hydrogen hub is expected to be commercially operational by 2027 with a redevelopment budget for the broader hub including carbon capture and sequestration and hydrogen storage exceeding \$2 billion.

Liberty Hydrogen Hub: In mid-2022, TC Energy and Marathon Petroleum proposed a new hydrogen hub concept to the Clean Sustainable Energy Authority. Funding from the Clean Sustainable Energy Authority for a FEED study was authorized and will be managed by the Energy and Environmental Research Center. The hub is proposed to be located in North Dakota, with many specific details remaining confidential at time of report.

The Pipeline Authority continues to work with additional interested parties on the development of additional hydrogen related projects, including the potential for blending hydrogen into existing natural gas pipelines.

Planned Activities

Over the past year, the Pipeline Authority has continued to experience great success by working with industry to quantify future crude oil, natural gas, and natural gas liquids production in order to provide the assurance needed to move forward with various expansion projects. The forecasted petroleum production levels will continue to be updated to reflect emerging industry trends and oil price projections from the U.S. Energy Information Administration. The Pipeline Authority will continue to utilize new and existing development information to gain a deeper understanding of the crude oil, natural gas, natural gas liquids, and carbon dioxide pipeline needs in the Williston Basin.

To assist with the expansion of natural gas transmission in eastern North Dakota, the Pipeline Authority will continue to work with parties interested in utilizing grants funds available through North Dakota's Natural Gas Pipeline Program.

The Pipeline Authority Director will continue to explore the possibility of blending hydrogen into regional natural gas pipelines. The blending of hydrogen into an existing natural gas pipeline is common in some portions of the United States and could be very beneficial for North Dakota as it looks to address pipeline gas quality issues and provide a readily available market opportunity for hydrogen production in the state.

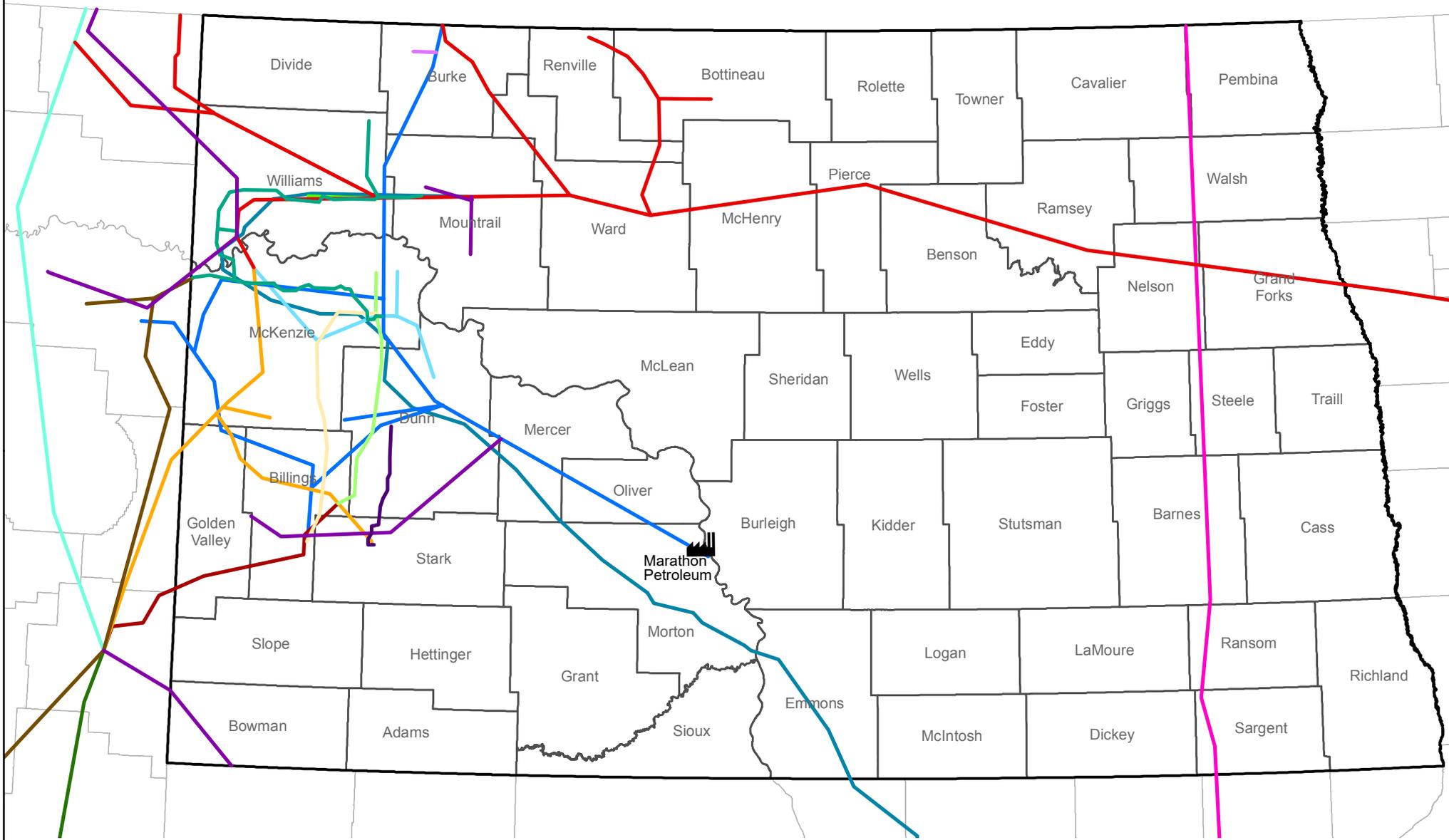
The Pipeline Authority Director will continue to actively engaging in his role on the Clean Sustainable Energy Authority's technical committee. It is anticipated that many of the proposals brought to the Clean Sustainable Energy Authority will have an impact or reliance on regional midstream energy assets in the state.

Industry and public information distribution will continue with the use of web events, presentations, monthly updates, and agency websites. The Pipeline Authority will continue to conduct information presentations to public audiences, legislative groups, and industry representatives at various events throughout the coming year.

APPENDIX A

North Dakota Pipeline Maps

North Dakota Crude Oil Pipelines



Refinery

Basin Transload

Butte

Double H

Hiland

Bridger

Bakken Oil Express

Belle Fourche

Crestwood

Enbridge

Keystone Pipeline

Targa

BakkenLink

Bridger

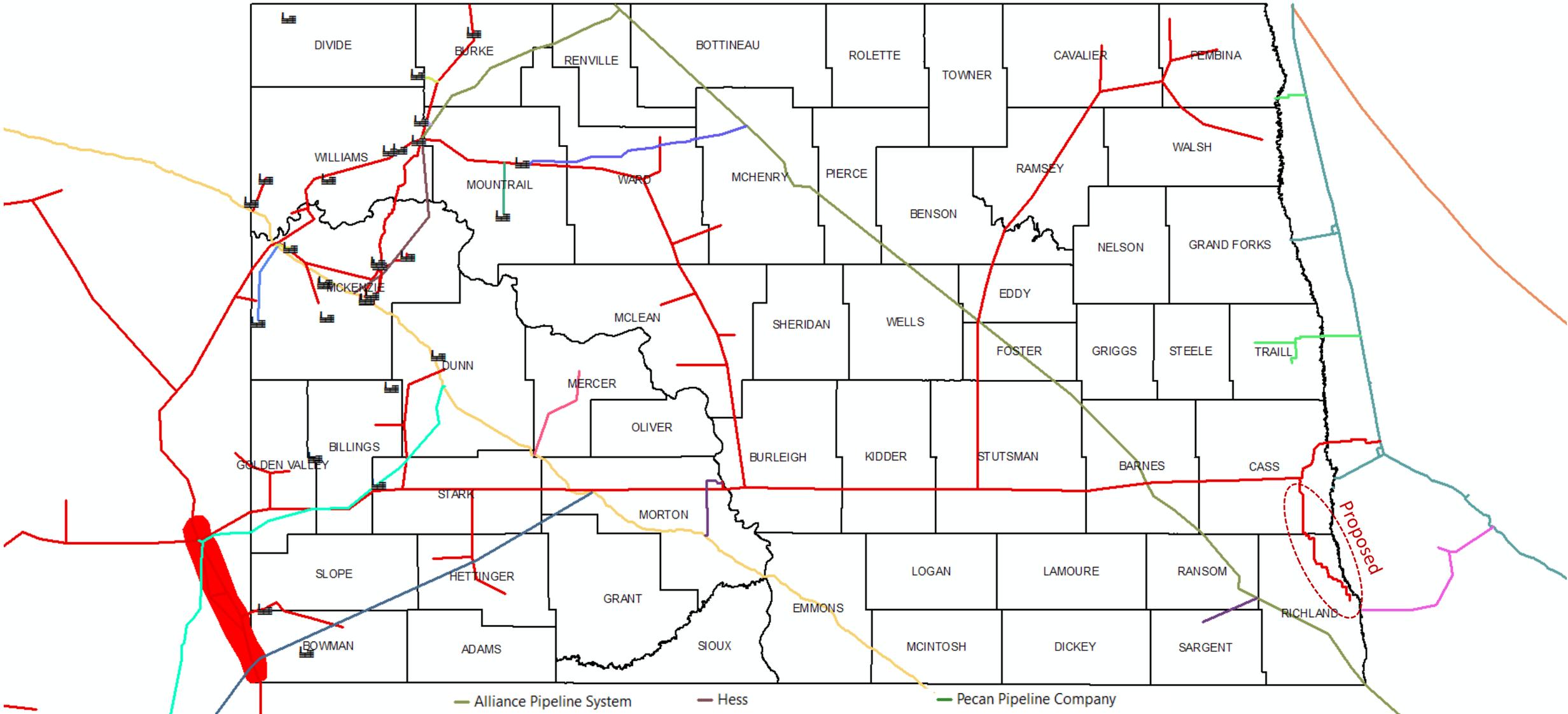
Dakota Access

Four Bears

Little Missouri

Marathon

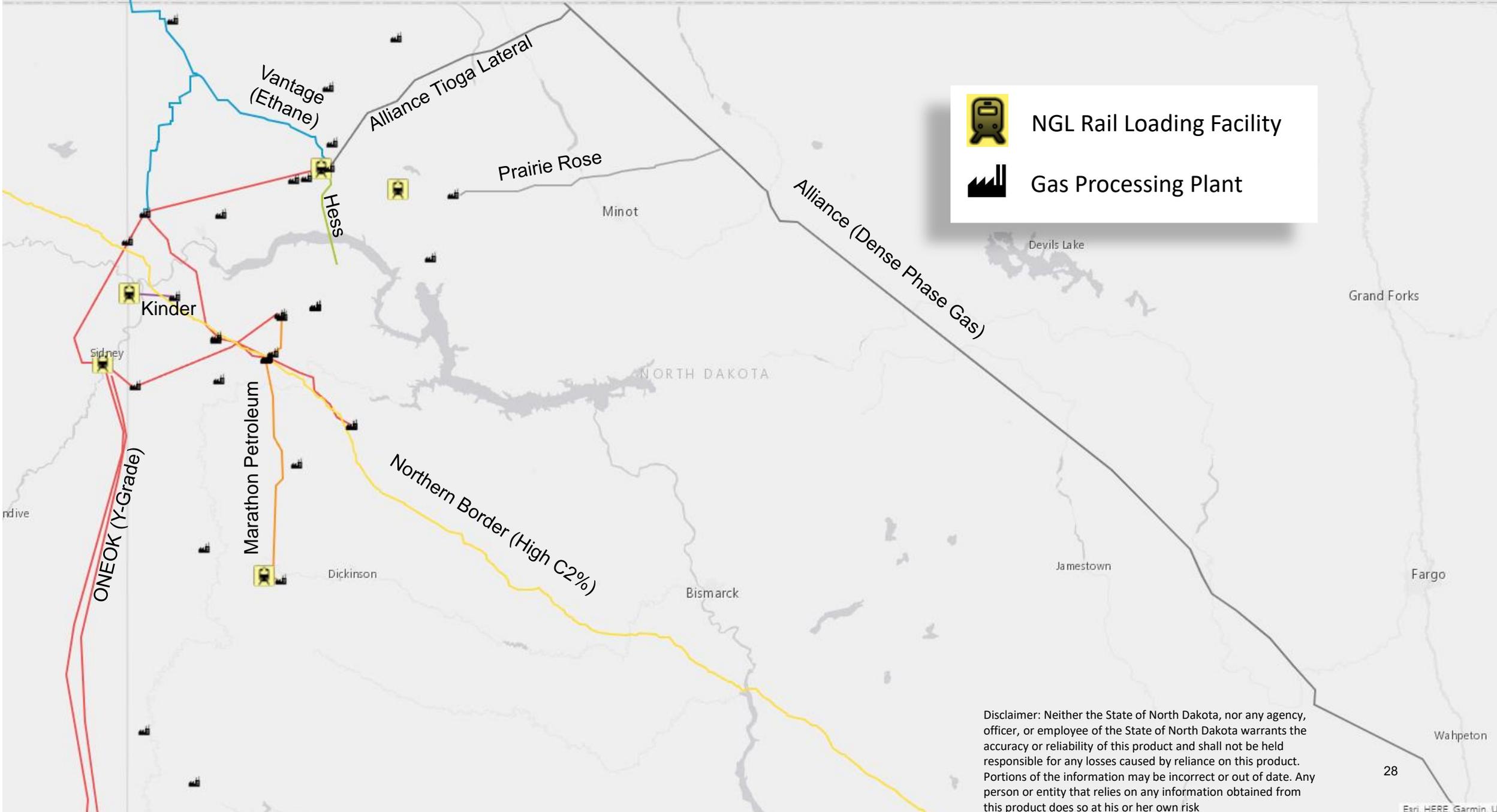
Major Natural Gas Infrastructure



- | | | |
|--------------------------------|------------------------------|------------------------------------|
| — Alliance Pipeline System | — Hess | — Pecan Pipeline Company |
| — Aux Sable | — Kinder Morgan | — Viking Gas Transmission Co |
| — Basin Electric | — Liberty Midstream | — Williston Basin Interstate PL Co |
| — Bison Pipeline | — MDU | — Gas Plants |
| — Dakota Natural Gas | — Marathon Petroleum | — WBI Baker Gas Storage |
| — Grasslands Pipeline | — Norse Pipeline LLC | |
| — Great Lakes Gas Trans Co | — Northern Border PL Co | |
| — Great Plains Natural Gas Co. | — ONEOK Gas Transmission LLC | |

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Major Natural Gas Liquids Infrastructure

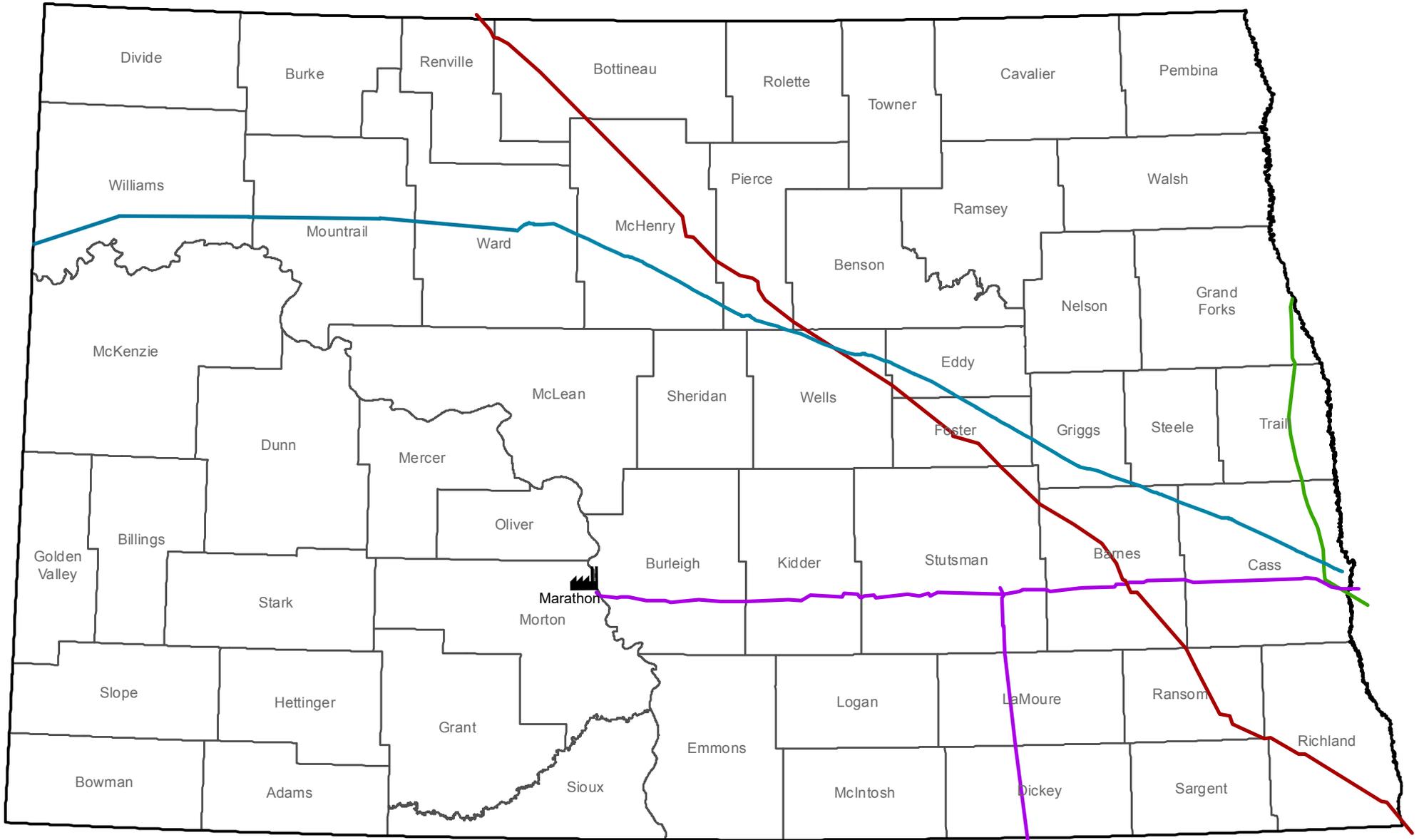


 NGL Rail Loading Facility

 Gas Processing Plant

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North Dakota Products Pipelines



- Cenex Pipeline LLC - Refined Products

— Magellan Midstream Partners LP - Refined Products

 Refinery
- Kinder Morgan Cochin - Condensate

— NuStar Energy - Refined Products

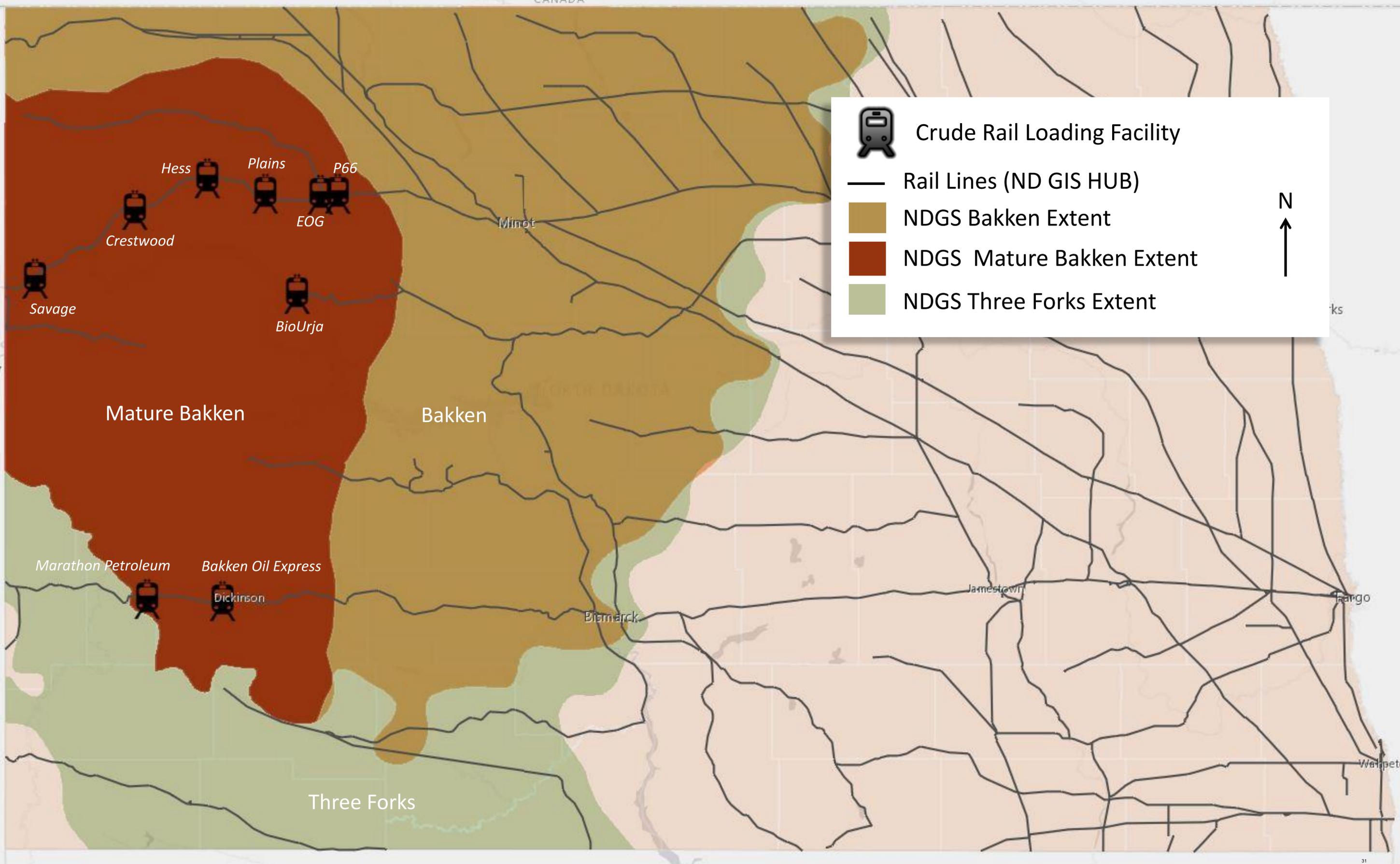
APPENDIX B

North Dakota Crude Oil Rail Loading Map

North Dakota Crude Oil Rail Loading Facilities In Service

North Dakota Pipeline Authority – July 2022

CANADA



-  Crude Rail Loading Facility
-  Rail Lines (ND GIS HUB)
-  NDGS Bakken Extent
-  NDGS Mature Bakken Extent
-  NDGS Three Forks Extent



APPENDIX C

North Dakota Gas Processing Plant Table

Natural Gas Processing Capacity, Million Cubic Feet Per Day

Owner Company	Facility	County	2006	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
North Dakota																		
Steel Reef	Lignite	Burke	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
ONEOK	Marmarth	Slope	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	NA						
ONEOK	Grasslands	McKenzie	63	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
ONEOK	Stateline I	Williams	NA	NA	NA	NA	100	100	100	100	100	120	120	120	120	120	120	120
ONEOK	Stateline II	Williams	NA	NA	NA	NA	NA	100	100	100	120	120	120	120	120	120	120	120
ONEOK	Garden Creek I	McKenzie	NA	NA	NA	NA	100	100	120	120	120	120	120	120	120	120	120	120
ONEOK	Garden Creek II	McKenzie	NA	NA	NA	NA	NA	NA	120	120	120	120	120	120	120	120	120	120
ONEOK	Garden Creek III	McKenzie	NA	NA	NA	NA	NA	NA	120	120	120	120	120	120	120	120	120	120
ONEOK	Lonesome Creek	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	200	200	280	280	280	280	280	280
ONEOK	Demicks Lake	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	200	200	200	200
ONEOK	Demicks Lake II	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	200	200	200	200
ONEOK	Demicks Lake III	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200
ONEOK	Bear Creek	Dunn	NA	NA	NA	NA	NA	NA	NA	NA	80	80	130	130	130	130	130	130
ONEOK	Bear Creek II	Dunn	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	200	200
Petro Hunt	Little Knife	Billings	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
True Oil	Red Wing Creek	McKenzie	4	4	4	4	4	10	10	10	10	10	15	15	15	15	15	15
Sterling Energy	Ambrose	Divide	0.5	0.5	0.5	0.5	0.5	0.5	NA									
EOG Resources	Stanley	Mountrail	NA	20	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
Whiting Oil & Gas	Ray	Williams	NA	10	NA	NA	NA	NA	NA	10	10	10	15	25	25	25	25	25
Andeavor	Robinson Lake	Mountrail	NA	30	45	90	90	90	110	130	130	130	130	150	150	150	150	150
Andeavor	Belfield	Stark	NA	NA	NA	30	30	35	35	35	35	35	35	35	35	35	35	35
XTO - Nesson	Ray	Williams	NA	10	10	10	10	10	10	25	25	25	25	25	25	100	100	100
Hess	Tioga	Williams	110	110	110	110	110	110	250	250	250	250	265	265	265	415	415	415
Targa/Hess JV	LM4	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	200	200	200	200
Kinder Morgan	Badlands	Bowman	4	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Kinder Morgan	Norse	Divide	NA	NA	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Kinder Morgan	Watford City	McKenzie	NA	NA	NA	50	90	90	90	90	90	90	90	90	90	90	90	90
Kinder Morgan	Roosevelt	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	50	50	50	200	200	200	200	200
Liberty Midstream Solutions	County Line	Williams	NA	NA	NA	NA	NA	NA	NA	NA	20	20	30	30	30	30	30	30
Summit Resources	Knutson	Billings	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**
Targa Resources	Badlands	McKenzie	NA	NA	NA	45	45	45	45	90	90	90	90	90	90	90	90	90
USG Midstream Bakken	DeWitt	Divide	NA	NA	NA	NA	NA	3	3	3	3	3	3	3	3	3	3	3
1804 Ltd	Spring Brook	Williams	NA	NA	NA	NA	NA	NA	NA	45	45	45	60	70	70	70	70	70
Oasis	Wild Basin	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	80	145	320	320	320	320	320	320
Arrow Field Services	Arrow	McKenzie	NA	NA	NA	NA	NA	NA	NA	NA	NA	30	30	150	150	150	150	150
Caliber Midstream	Hay Butte	McKenzie	NA	NA	NA	NA	NA	NA	10	10	10	10	10	10	10	10	10	10
Outrigger Energy II	N/A	Williams	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250	250	250
Aux Sable - Chicago, IL																		
Aux Sable	Prairie Rose Pipeline	Mountrail	NA	NA	126	126	126	126	126	126	126	126	126	126	126	126	126	126
Total, MMCFD			222.0	355.0	491.0	661.0	901.0	1,015.0	1,444.5	1,599.5	2,029.5	2,137.0	2,492.0	3,202.0	3,402.0	4,077.0	4,077.0	4,277.0



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