



INDUSTRIAL COMMISSION OF NORTH DAKOTA
NORTH DAKOTA PIPELINE AUTHORITY

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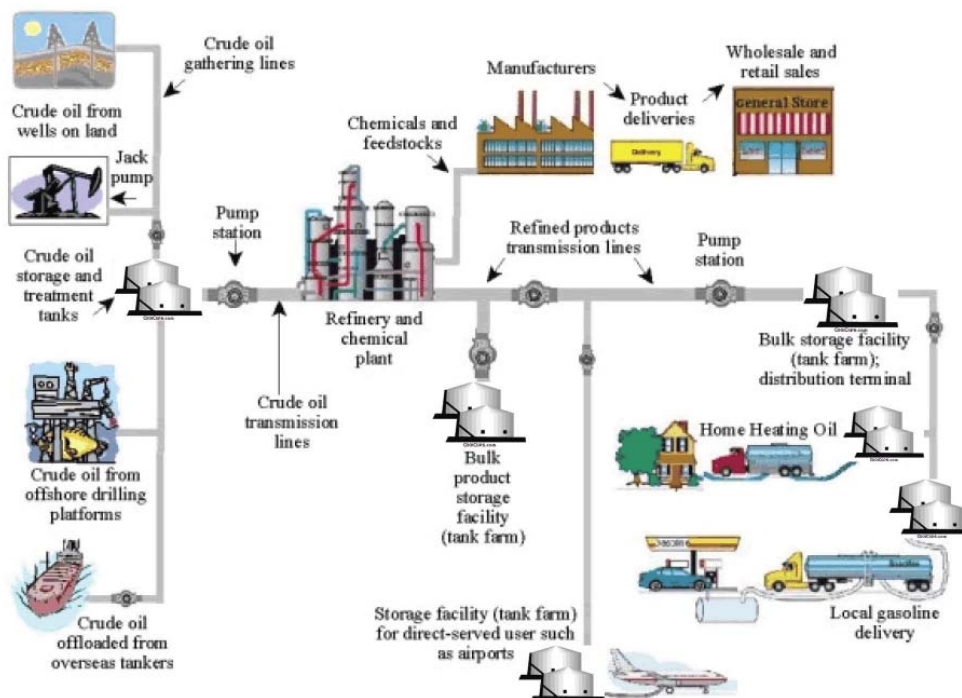
Pipelines and Refined Products Report
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This report is the third in a series of whitepapers. One of the targeted objectives of the Pipeline Authority was to report on North Dakota’s pipeline infrastructure needs as they pertain to refined products. The North Dakota Pipeline Authority was authorized by the Legislature to promote the development of pipeline facilities that support the production, transportation and utilization of North Dakota energy related commodities. Previous reports on crude oil and natural gas pipelines can be found on the North Dakota Pipeline Authority website at: <http://www.nd.gov/ndic/pipeline.htm>

Americans have a serious thirst for petroleum fuels - the largest in the world. The United States gulps almost 21 million barrels of petroleum products every day. Almost 143 billion gallons of gasoline and 66 billion gallons of diesel fuel were used in 2007.

North Dakotans are no exception. According to records at the State Tax Commissioner’s office, we used 362 million gallons of gasoline and 466 million gallons of diesel fuel for all purposes in 2007. Gasoline and diesel fuel consumption has been fairly constant in North Dakota until last year when diesel usage took a noticeable jump. According to 2004 statistics at the U.S. Energy Information Administration, North Dakota was the fourth highest energy consuming state on a per capita basis.

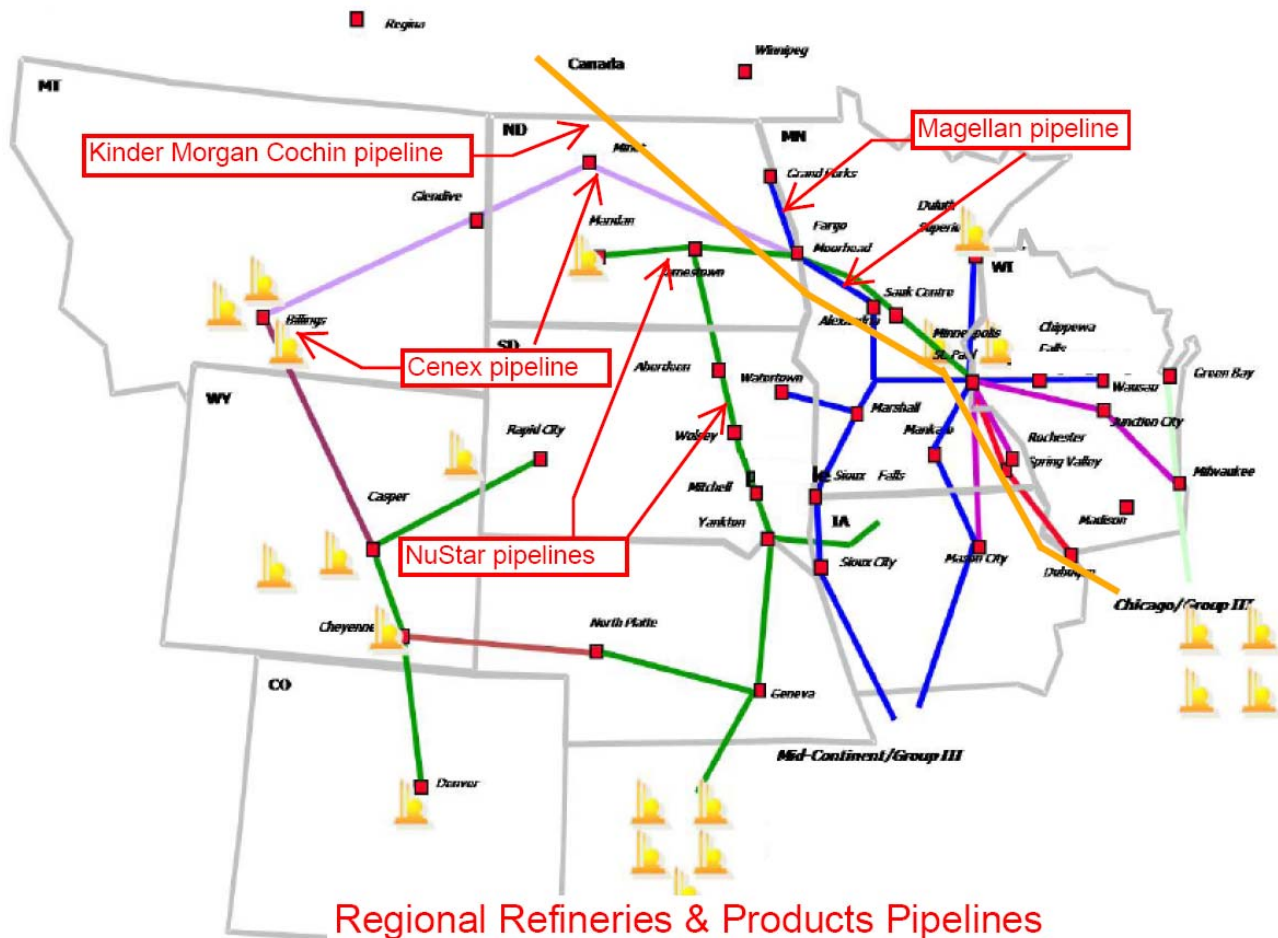
We all depend on an expansive network of underground pipelines to efficiently and safely deliver those petroleum products. The energy transportation network of the United States consists of over two million miles of pipelines. About 170,000 miles of those pipelines carry petroleum or petroleum products. Refined products pipeline systems transport gasoline, diesel fuel and many other products from refineries to distribution or storage terminals and to end users.



Source: PHMSA Stakeholder Communications: Petroleum Pipeline Systems: From the Wellhead to the Consumer



Where do North Dakota's refined products come from?



Cenex serves a large portion of North Dakota's retail market from their products pipeline which begins at their Laurel, Montana refinery, runs to a tank terminal near Minot, and ends at their terminal in Fargo. This pipeline serves much of the western and northern parts of the state.

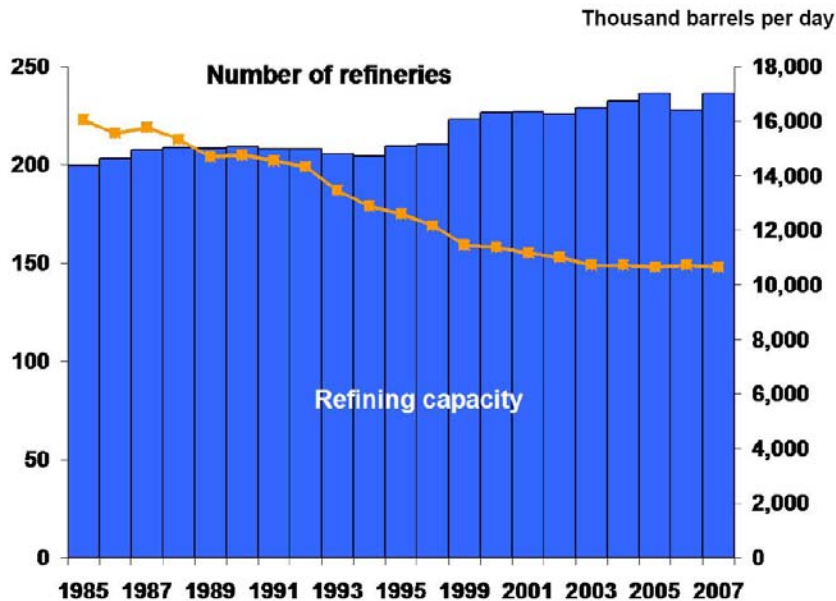
A NuStar pipeline carries product from Tesoro's Mandan refinery east to Roseville, Minnesota. A second NuStar line carries product from the Mid-continent refining areas of Group III north to the terminal near Jamestown.

Magellan Midstream's pipeline delivers product from Group III refiners in both the mid-continent and Chicago areas to eastern North Dakota at Fargo and Grand Forks.

It is estimated that Tesoro Mandan refinery annually produces about 881 million gallons of gasoline and diesel products. About 75% of Tesoro's diesel output and 40% of its gasoline output is used in North Dakota. Tesoro's product is trucked to its distributors from terminals in Mandan, Jamestown, and Moorhead, Minnesota. North Dakota consumers have several branded and unbranded options from which to purchase their fuel. Therefore, North Dakota doesn't use all Tesoro's refined product output. The remainder is shipped via NuStar's pipeline to Minnesota. It would be difficult for Tesoro to compete for additional business with the Cenex-served customers in the northern parts of North Dakota because they have to truck their product to this area while Cenex delivers by pipeline.

How do we meet growing U.S. demand for refined products?

While there hasn't been a new refinery constructed in the last 30 years there has been an increase in U.S. refining capacity. This has been done through expansions of existing refineries. It is estimated refinery expansions cost \$15,000 per daily barrel of oil processed. That's about two-thirds what new construction would likely cost.



Source: American Petroleum Institute

Several U.S. refineries have already expanded or are planning significant expansions to their facilities. However, public acceptance of these expansions as well as competition from alternative or renewable fuels has made refiners cautious in their approach to plant expansions. Refinery expansions coupled with renewable fuel standards is estimated by some to cut U.S. gasoline imports in half by 2010 and completely eliminate those imports by 2020.

While U.S. refining capacity hasn't entirely kept pace with Americans ever-increasing consumption, there is adequate global capacity. U.S. refined product imports have increased from 1.6 million barrels per day in 1995 to 3.6 million barrels in 2007. New refineries are being constructed elsewhere in the world. However political instability in oil producing areas of the world and U.S. dependence on foreign sources creates several other issues. The U.S. imports over 60% of its petroleum requirements. Canada is the largest exporter of petroleum and petroleum products to the U.S., providing about 17% of those imports.

What refinery expansions have happened or are planned in our region?

Refineries serving our region have been expanding facilities and those improvements should directly affect supplies to North Dakota. Coffeyville (part of the Mid-Continent Group III) added 15,000 barrels per day to their Kansas refinery in 2007 bringing their capacity to 115,000 per day. The Flint Hills refinery in Rosemount, Minnesota added 50,000 barrels per day to its process capacity in late 2007 bringing their total up to 330,000 barrels per day. The Gary Williams refinery in Wynnewood, Oklahoma added 15,000 barrels per day in 2007 bringing their capacity to 65,000 per day. Murphy Oil is considering a 200,000 barrel per day expansion of its present 35,000 barrel refinery in Superior, Wisconsin. The Sinclair refinery is proposing to add 30,000 barrels per day to their Tulsa, Oklahoma facility in 2009. Conoco-Phillips is considering a 10,000 barrel per day expansion to their Billings, Montana refinery which would bring their capacity up to 71,000 barrels per day by 2011. Tesoro is using sales tax incentives to improve their reliability and increase low sulfur diesel fuel production at their Mandan refinery.

Why is building a refinery so difficult?

Construction of a new refinery is a significant undertaking. The last one built in the U.S. was the Garyville, Louisiana refinery constructed by Marathon Oil Company in 1976. The permitting and regulatory process for a brand new facility are estimated to take years. Environmental issues and public opposition to new refineries are also significant factors.

Cost is a big issue. Last year the American Petroleum Institute (API) estimated a new refinery would cost at least \$24,000 per daily barrel of oil processed. In a March 19, 2002 letter to The Honorable Thomas Daschle, the U.S. Small Business Administration explained that a small refinery, one that processes less than 125,000 barrels per day, would not have the production volumes over which to spread its cost of regulatory compliance. A single small refiner wouldn't have the buying power or ready access to capital that their large, multinational competitors enjoy. Applying API's cost estimate to this would mean a refinery of that size would likely cost at least \$3 billion.

Pipeline infrastructure is needed to provide a reliable cost efficient supply of crude oil to a refinery and to carry refined products to market centers. Any new pipeline project will face significant hurdles. Pipelines are very expensive. Steel and other equipment costs are at an all time high. According to industry representatives, pipeline construction costs can range from \$35,000 to \$50,000 per inch diameter per mile of length. That means a 10" pipeline might run a half million dollars per mile. A worldwide boom in pipeline construction activities has placed a squeeze on the availability of contractors and pipe.

Because North Dakota already produces more refined product than it uses, additional refined product would likely have to be shipped to a metropolitan center. To get the refined product from Bismarck to Fargo it would cost approximately \$100 million for a 10 inch pipe. Because Fargo is already served by three pipelines, the pipeline may have to extend to Minneapolis. In which case the pipeline could cost approximately \$225 million. Entering the market in Minneapolis also presents problems because any new product from a North Dakota refinery would be competing with the 330,000 barrels per day output of refineries located in the Minneapolis area. All these factors make the attraction of new investment capital into the refining business difficult.

What about new refinery prospects in our region?

Hyperion, a Texas energy group, is considering an \$8 billion combined refining/electric generation facility near Sioux Falls, South Dakota. Hyperion is proposing to process 400,000 barrels per day of crude oil. Hyperion is currently working on final selection of the project site and obtaining environmental permits for that project.

In North Dakota, the Three Affiliated Tribes of the Fort Berthold Indian Reservation have been considering the construction of a 15,000 barrels per day facility to process Canadian syncrude. EPA air and water permits are pending on that project.

A Williston group is considering a refinery located adjacent to a proposed ethanol facility there. The North Dakota Industrial Commission, through the Oil and Gas Research Council, has provided funding to study the viability of that project. That study is currently underway and results are expected in September.

American Lignite Energy is exploring a coal-to-liquids plant in North Dakota that could produce 1.4 million gallons of fuel per day.

It may be useful to note that a company called Arizona Clean Fuels has been working unsuccessfully to construct a new 150,000 barrel per day refinery near Yuma, Arizona for almost 10 years. That facility was estimated to cost over \$3 billion.

Didn't we previously have more refineries in North Dakota?

Yes. There were two other refineries in North Dakota, one at Williston and the other at Dickinson. Many small U.S. refineries shut down operations when stricter environmental regulations would have required them to make large investments in facilities and their economies of scale made it impossible to compete. Nearly 75 of them have been idled in the last 20 years. Most of those were small inland refineries processing sweet crude oil. A new or reactivated refinery would have to comply with all modern fuel standards and other environmental requirements and face those same market conditions.

Wouldn't a new refinery decrease the price of fuel in the state?

To evaluate the economics of a new refinery one must consider how often North Dakota's retail prices will exceed national averages in the future and whether a multi-billion dollar facility should be constructed to address those shortfalls. A new refinery will have to compete for market share with present supplies from the Mandan refinery and the three product pipelines which already carry product into the state.

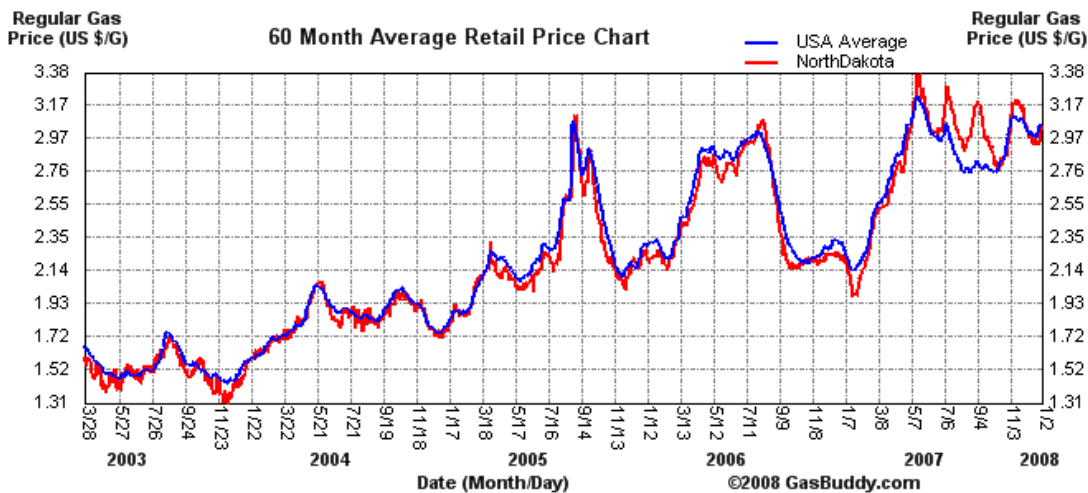
Refining is a complex and risky business. That's a large part of the reason existing refiners have elected to expand rather than build new. It's impossible to predict what the petroleum market will look like in the future. Looking back five years – the price of crude oil was about \$30 per barrel and the price of gasoline was about \$1.65 per gallon. Today crude oil costs over \$110 per barrel and gasoline runs about \$3.50 per gallon. Expecting it would take at least five years before a new refinery would come on line; one must guess what market conditions will look like at that time.

Predicting future consumption of Americans is another difficult proposition. The U.S. government has recently increased the mileage requirements for new vehicles. Americans may be starting to change their driving habits. These factors might soften U.S. demand for gasoline and diesel fuel. Thus far however, our thirst for energy seems to grow each year.

There is no evidence that a local refinery reduces the local fuel costs paid by the consumer. According to AAA, retail gasoline prices in Bismarck/Mandan are consistently three to eight cents higher than Fargo, where there is no refinery. Similarly at the time of this writing, Montana, which has four refineries, has higher retail fuel prices than North Dakota or South Dakota.

Why are our fuel prices high when we have a refinery in North Dakota?

North Dakota gasoline prices traditionally track the national average. This chart, available at GasBuddy.com, illustrates the number and duration of times that North Dakota's gasoline prices exceeded the national average since 2003.



While at times it may seem North Dakota prices are high, it's only during interruptions in supply that our prices have actually exceeded the national average. Except for late 2007, when there was significant and unusual disruptions due to multiple regional refineries being down at the same time, there were only a couple of brief times that North Dakota's prices exceeded the national average.

Why did North Dakota's prices exceed the national average in late 2007?

Supply and demand. Refinery problems during 2007 prevented replenishment of normal inventories. The Coffeyville refinery in Kansas was forced to stop production due to storm flooding. This limited fuel deliveries to North Dakota via the NuStar pipeline terminal at Jamestown. The Cenex refinery at Laurel, Montana had a fire immediately following its planned maintenance shutdown and was unable to come back online as quickly as expected. This resulted in virtually no shipments to their Minot and Fargo terminals. Refineries in Minnesota were also down for reconstruction and maintenance activities. The Flint Hills' Rosemount refinery was completing a 50,000 barrel per day expansion. Marathon's St. Paul refinery was down for routine maintenance. These outages forced Magellan to decrease or stop deliveries to their terminals in Fargo and Grand Forks. Normal summer driving and fall harvesting activities depleted already low inventories.

What's the difference between branded and unbranded gas stations?

Americans drive over 200 million motor vehicles more than 7 billion miles per day. They refill their vehicles at one of the 167,000 service stations across the country. Products are delivered to these stations via tank trucks. These tank trucks are filled at terminals located along pipeline routes. There are basically four types of service stations that market gasoline and diesel fuel to consumers.

1. Oil company owned-and-operated retail outlets – These are branded retail locations that provide one brand of products from one company. They account for the smallest segment of the marketplace, representing less than 10 percent of the service stations in the United States. Keeping these stations supplied with product is the first priority of the owner oil company.
2. Independent, but franchise-branded retail outlets – These retailers pay the oil company a fee and have a contractual relationship with them to buy their branded products. They are allowed to use the oil company's brand name. They also constitute less than 10 percent of U.S. service stations. These operators are next on the supply priority chain.
3. Independent, jobber operated or jobber franchised outlets – A jobber or distributor is an independent operator who owns and operates service stations and enters into an agreement to sell branded products. A jobber also might franchise that brand to other dealers. Jobbers represent the largest percentage of the stations in the United States comprising more than two-thirds of the outlets. These stations are third on the supply priority chain.
4. Independent, unbranded retail outlets – This group represents retailers who buy unbranded products without long-term contracts or who buy products under contract at the wholesale level. These retailers may pay lower spot market prices and buy their product anywhere when supplies are plentiful, but could risk losing that supply during times of shortage.

According to estimates from the North Dakota Petroleum Marketers Association, about 75% of North Dakota's retail gas stations are branded, while about 40% of the wholesale jobbers are branded.

What about propane supplies and prices?

Propane is produced from both the processing of natural gas and refining of crude oil. Since propane fuel typically competes with crude oil-based fuels, its price is influenced mainly by the cost of crude oil. Propane prices are affected by several factors, some common to all petroleum products, and others unique to propane. Because propane is portable, it can serve many different markets, from fueling barbecue grills to producing

petrochemicals. The price of propane in these markets is influenced by many factors, including the prices of competing fuels in each market; the distance propane has to travel to reach a customer; and the volumes used by a customer.

Propane supply and demand is subject to changes in domestic production, weather, and inventory levels, among other factors. While propane production is not seasonal, residential demand is highly seasonal. This imbalance causes inventories to be built up during the summer months when consumption is low and for them to be drawn down during the winter months when consumption is much higher. When inventories of propane at the start of the winter heating season are low, chances increase that higher propane prices may occur during the winter season. Colder-than-normal weather can put extra pressure on propane prices during the high demand winter season because there are no readily available sources of increased supply except for imports. Imports may take several weeks to arrive, during which time larger-than-normal withdrawals from inventories may occur, sending prices upward. Cold weather early in the heating season can cause higher prices sooner rather than later, since early inventory withdrawals affect supply availability for the rest of the winter.

North Dakota's propane supply comes from several sources. The Kinder Morgan Cochin pipeline (see map above) is a significant source of propane to the state with several terminals located along its route. The Hess gas plant at Tioga supplies a fair amount and the Tesoro refinery at Mandan contributes some. Other supplies are shipped into the state from adjoining states by trucks. Consumption of propane in North Dakota has remained fairly level at about 95 million gallons per year for the last several years.

Conclusion

Crude oil and its products such as gasoline and diesel fuel are global commodities. Like it or not, what happens to these commodities on the world market affects the supply and therefore the price of them here in North Dakota.

Pipeline infrastructure is needed to provide a reliable cost-efficient supply of crude oil to a refinery and to carry refined products to market centers. Any new pipeline project will face significant hurdles. The North Dakota Pipeline Authority was authorized by the Legislature to promote the development of all pipeline facilities that support the production, transportation and utilization of North Dakota energy related commodities. The Authority is committed to assisting with the development of pipeline infrastructure needed to distribute all petroleum and fossil fuel products, whether that is crude oil, refined products, or natural gas. The Authority will facilitate third party discussions and provide information to interested stakeholders on the development of the state's pipeline infrastructure.

It is also important to the developer of any pipeline project that they deal with a reasonable regulatory process. Obtaining construction permits and rights-of-way in a timely fashion and at reasonable cost is crucial to the success of the project. The North Dakota Pipeline Authority will continue working to facilitate all these objectives.

Sources used in the preparation of this paper:

U.S. Department of Energy Information Administration (EIA) website: www.eia.doe.gov/

American Auto Association (AAA) website: www.fuelgaugereport.com

American Petroleum Institute (API) website: www.api.org/

Pipeline and Hazardous Material Safety Administration (PHMSA) website: www.phmsa.dot.gov/

Gas Buddy website: www.gasbuddy.com

Oil & Gas Journal website: www.ogj.com/index.cfm

If the reader is interested in learning more about refined products, additional information can be found under the “Publications” link on the Pipeline Authority’s website at: www.nd.gov/ndic/pipeline.htm Some additional topics we have explored there are:

- Refining basics
- Environmental requirements for gasoline and diesel fuels
- Ultra low sulfur diesel fuel (ULSD)
- Price components of gasoline and diesel fuels
- Regional affects on fuel prices
- Regulatory jurisdiction over refined products pipelines