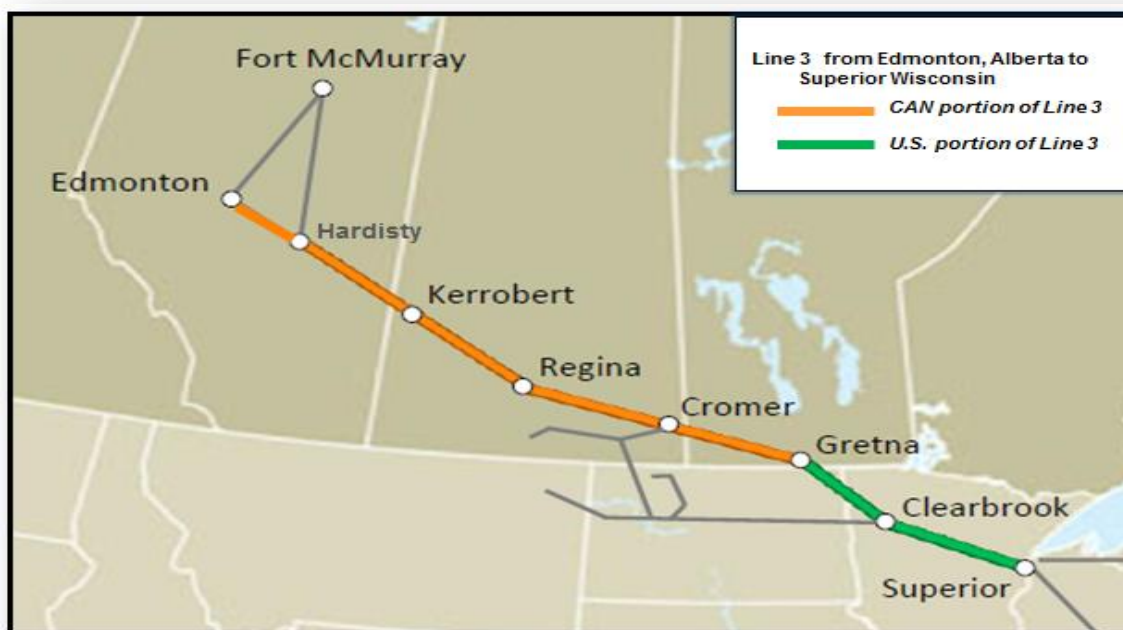


## 2.0 BACKGROUND INFORMATION

### 2.1 History of Line 3

The existing Line 3 is a 34-inch outside diameter, 1,097 mile long pipeline that extends from Alberta, Canada to Superior, Wisconsin. Construction of Line 3 began in 1962 as 34-inch parallel loops to Enbridge's Line 2 pipeline to create additional Enbridge Mainline System capacity. (See Figure 2.1-1 for an overview map of Line 3.) Additional loops were constructed annually until a continuous 34-inch line, referred to as Line 3, was completed and separated from Line 2 in 1969. The types of crude oil that have been transported on Line 3 have varied significantly over its many years of operation based on type of crude produced, shipper demand and system operations. When the line was originally placed into service in 1968, the line transported only light crude oil.<sup>1</sup>

**Figure 2.1-1: Overview Map of Line 3**



<sup>1</sup> Before 1980, most of the bitumen produced was transported by truck, but trucking is seasonally restricted and relatively inefficient and expensive compared to pipeline transport. However, bitumen in its undiluted state is too viscous and dense to be transported by pipeline. To create a fluid capable of transportation by pipeline, bitumen must be mixed with a fluid that has much lower viscosity and will keep bitumen from precipitating out of the mixture. This mixture is referred to as "dilbit." By 1985 Alberta Energy Company was operating pipelines to transport dilbit from Cold Lake to Edmonton. Dilbit is now also transported by rail. Harrison, Lynda (September 2011). ["Riding the Rails, Oil companies climb aboard potential alternative to pipelines"](#). *Oil & Gas Inquirer* (Calgary, Alberta: JuneWarren-Nickle's Energy Group). Viewed 14 Mar 2012.

In the early 1980's, Line 3 began to transport medium crudes in addition to light crudes. By the mid-1980's through 2002, the line was used to transport predominantly heavy crudes. During the period from 2002 to 2005, Line 3 once again transported primarily light crudes, and from 2005 to 2011, the line was used for mixed service (light, medium and heavy crudes). Since 2011, the line has been used for light service. The line is physically equipped to transport all grades of crude oil, and the type of crude oil transported in the future (as in the past) will be based on shipper demand.

The annual average capacity of Line 3 has likewise varied greatly over its years of operation. Since it began operating in the late 1960s, the annual average capacity of the line has varied between a low of 390 kbpd, which is the current operating capacity of the line, and a much higher capacity, which is highly dependent on the type of crude oil transported through the line and the presence or absence of safety-related pressure restrictions on the pipeline.<sup>2</sup> The annual average capacity of the Project will be approximately 760 thousand barrels per day (kbpd), which is based on an assumption that the pipeline will transport a mixture of heavy and light crude. At various times in the past, including when the Presidential Permit was issued in 1991, the line transported volumes of crude oil in the same range of 760 kbpd.

Due to its geographic location, Line 3 has played and continues to play an important and integral role in delivering crude oil to (i) Minnesota Pipe Line Company's interconnecting facilities at Clearbrook, for ultimate redelivery to Minnesota refineries, and (ii) the Superior Terminal, for ultimate delivery to other refineries in the U.S. and Canada. The Project is generally expected to serve the same markets and transport the same products as the existing Line 3 has done throughout its operating history.

Over the years, Enbridge's pipeline maintenance program has revealed corrosion growth and other pipe material flaws that have impacted the operating capabilities of the pipeline. Subsequently, Enbridge's pipeline maintenance program for Line 3 has become increasingly complex requiring successive pressure restrictions<sup>3</sup> to be voluntarily imposed and an increasing number of investigatory digs and repairs to be undertaken. These maintenance activities allow for the continued safe operation of the pipeline and are an important component of Enbridge's "integrity management" program for Line 3, but are costly and will not lift the pressure restrictions once completed.

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<sup>2</sup> A pipeline is capable of transporting greater volumes of light crude than medium or heavy crude. At various times in the past when Line 3 was used exclusively for light crude transport, and before any safety-related pressure restrictions were implemented, over 960 kbpd of light crude oil was transported through the pipeline.

<sup>3</sup>For example, to ensure safe and reliable operation of Line 3, in 2008, Enbridge implemented a voluntary long-term pressure reduction on the discharge of all pump stations along Line 3. In 2010, Enbridge extended the pressure restriction across all of Line 3 to further increase the line's operating safety margin. Finally, in 2012, Enbridge voluntarily derated Line 3's maximum operating pressure (MOP) to align with the pressure restriction.

Over the years, Enbridge's integrity management plan for Line 3, discussed in more detail below, has necessitated an increasing number of integrity digs and repairs. In 2008, Enbridge implemented a voluntary long-term pressure reduction on the discharge of all pump stations. In 2010, Enbridge extended the pressure restriction across all of Line 3 to further increase the line's operating safety margin. Finally, in 2012, Enbridge voluntarily derated Line 3's maximum operating pressure (MOP) to align with the pressure restriction. As a result, Line 3's annual average capacity was reduced to 390 kbpd. The Project is intended to restore Line 3's historical operating capabilities.

## **2.2 Background on Line 3's Integrity Management Plan**

Safe and reliable operations are the foundation of Enbridge's business, and maintaining pipeline safety through the integrity management program is essential. Enbridge's pipeline operations are vast and complex. Over the last decade, Enbridge has transported almost 12 billion barrels of crude oil, and has done so with a safe delivery record better than 99.999 percent. However, Enbridge strives to reach a 100 percent safe delivery record, with the goal of preventing all crude oil spills. Integrity management, including the inspection, repair and maintenance of its pipelines, is one of several programs Enbridge has implemented to ensure the safety and integrity of its pipeline system.

Enbridge's pipeline maintenance program is designed to provide a comprehensive, measured, and individualized approach to integrity analysis that identifies each pipeline's current, and predicts its future integrity risks. All pipelines in the Enbridge Mainline System undergo regular and systematic inspections and preventive maintenance activities to ensure their integrity and safe operation.

Enbridge has gathered extensive integrity data on Line 3 throughout its years of operation. The integrity data shows a high number of integrity anomalies – specifically, corrosion and long seam cracking. Because of its integrity anomalies, Line 3 has experienced a number of failures during its more than 50-year history. As a result, Line 3 requires a high level of integrity monitoring and an extensive on-going integrity dig and repair program to maintain safe operation of the line. For example, approximately 4,000 integrity digs in the United States alone are currently forecasted for Line 3 over the next 15 years to maintain its current level of operation. This would result in year-after-year impacts to landowners and the environment, and may result in repeated impacts to the same landowners and environmental features.

Moreover, while Line 3 could continue to be safely operated through the current maintenance plan, the dig and repair program will not restore the operating pressure of the line. Due to the extent of the integrity digs forecasted, as well as the associated impacts of on-going integrity digs on landowners and the environment, Enbridge concluded that the replacement of Line 3 is the optimal solution to restore Line 3 to its historical operating capabilities.

## **2.3 Line 3 Replacement Program**

As noted above, Enbridge determined that the most efficient and least-invasive approach to maintaining Line 3's integrity was to replace the pipe. The analysis Enbridge undertook in concluding that it should replace versus continuing its dig and repair integrity program is consistent with the decision process and criteria recommended in the Kiefner Report filed on March 11, 2015, with the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA).

The proposed 36-inch replacement pipe will serve the same purpose as the existing Line 3, which is the transportation of crude oil from Canada to the Enbridge Clearbrook Terminal near Clearbrook, Minnesota and to Enbridge's Superior Station and Terminal Facility near Superior, Wisconsin. The replacement pipeline is generally expected to serve the same markets, and transport the same product mix as the existing Line 3. Upon replacement, the average annual capacity of Line 3 will be 760 kbpd, which is within the historical operating range for the line.

The Replacement Program includes the replacement of the existing Line 3 pipeline between Hardisty Terminal in Alberta Canada and Superior, Wisconsin. For maintenance related purposes, the Line 3 Replacement Program has already commenced. In Canada two sections have been replaced: (1) a 1.7-mile segment from Gretna, Manitoba to the Canadian/U.S. border and (2) a 12.5-mile segment downstream of Cromer, Manitoba. The remaining portion of the Line 3 replacement in Canada is currently under review by the National Energy Board. In the U.S., an approximately 15.3-mile segment has been replaced from the Canadian/U.S. border to the Joliette Valve in Pembina County, North Dakota. An additional 13-mile segment will be replaced between the Joliette Valve and the North Dakota/Minnesota border. The segment from the Minnesota/Wisconsin border to Superior, Wisconsin is currently under review by the Wisconsin Public Service Commission. Finally, as a result of filing this Application, the final segment of the Line 3 Replacement Program, the Project, will be under review by this Commission. See Figure 2.3-1 for a map depicting the entire Line 3 Replacement Program.

Figure 2.3-1: Line 3 Replacement Program

