

## 7.0 FORECAST DATA

Minn. R. 7853.0520

For the geographical area to be served by the proposed facility, the applicant shall provide the following:

### A. Petroleum Products to be Transported

A list of the categories of petroleum products the applicant expects to transport or distribute in that geographical area during the first six forecast years, the 11th forecast year (the tenth year after the year of the application), and the 16th forecast year:

Enbridge expects that the Project will move both heavy and light crude oil in each of the first six forecast years, the 11th forecast year and the 16th forecast year.

The Project has been designed so that it can ship both heavy and light crude types that are produced in Western Canada. Enbridge's operating practice will be to arrange the crude type cycles (batch trains) to preserve quality. Batch trains reduce contamination by arranging the crude types from lowest quality to highest quality and then back to lowest quality. Light sour batches are typically used to separate the light sweet crudes and sweet synthetic crude from heavy crude types. In addition Enbridge will utilize larger batch sizes (e.g., double batches of the same crude type) wherever feasible to reduce contamination.

### B. Annual & Peak Day Quantities

For each category of petroleum product listed in response to item A and for each of the first six forecast years, the 11th forecast year, and the 16th forecast year, a list of the annual and peak day quantities expected, using the appropriate units of measure:

The Commission issued an order on January 27, 2015 granting Enbridge's request for an exemption from Minn. R. 7853.0510, subp. 1 (B) because Enbridge does not track peak day quantities of crude oil transported. Accordingly, and in compliance with the January 27, 2015 order, Enbridge hereby provides forecasted monthly and annual volumes of light and heavy crude oil produced in Western Canada expected to be transported on the Mainline System in Table 7.B-1. Enbridge's full forecast, prepared for Enbridge by Muse Stancil & Co., is provided in the Muse Report, included as Appendix C. The following tables are drawn from the Muse Report and provide the information required by Minn. R. 7853.0510, as exempted by the Commission.

Table 7.B-1: Annual Forecast <sup>1</sup>							
Enbridge Mainline System Throughput at International Border (Annual Average), kbpd							
	2018 (Year 1)	2019 (Year 2)	2020 (Year 3)	2021 (Year 4)	2022 (Year 5)	2028 (Year 11)	2033 (Year 16)
HVY	1,869.0	2020.9	1762.7	2069.3	2172.2	2189.6	2192.7
LGT	987.9	669.7	455.2	508.6	553.6	678.3	698.6

A monthly Enbridge Mainline System throughput forecast is provided in Appendix 3 of the Muse Report (Appendix C of this Application).

## C. Forecasting Methods & Assumptions

A discussion of the methods, assumptions, and factors employed for purposes of estimation in response to items A and B:

### WCSB Crude Supply:

The Muse Report provides a detailed forecast of Western Canadian crude oil supply, as well as market demand for Western Canadian crude oil in the U.S., specifically in markets served by the Enbridge Mainline System. Muse first conducted a forecast analysis for Enbridge's Line 3 Replacement application before the National Energy Board (NEB), and has updated that report in order to comply with the Commission's rules and provide greater detail.<sup>2</sup> Muse concluded that:

- There is a demonstrable market need for the Project.
- There is sufficient demand for Western Canadian crude oil in the markets served such that the Enbridge Mainline generally will be operating at, or close to, capacity throughout the forecast period ending in 2033.
- Transportation fuel (gasoline, diesel, and jet) demand in the Five State Area, consisting of Minnesota, North and South Dakota, Wisconsin, and Iowa, has been generally increasing in recent years, and is approaching the peak historical demand levels experienced in the mid-2000s. Minnesota diesel demand established a new peak demand volume in 2013.

<sup>1</sup> Muse Report, Appendix 3 (Appendix C of this Application).

<sup>2</sup> The NEB is the regulatory agency that has the primary responsibility for permitting crude oil pipelines in Canada.

- The refineries in Minnesota and its neighboring states (North and South Dakota, Wisconsin, and Iowa) cannot satisfy local demand for transportation fuels, and this shortfall in local supply is primarily met by inter-state transfers from other Midwestern states.
- The crude oil that transits Minnesota, via Line 3, can be expected, in part, to be processed in Midwestern refineries that supply petroleum product to the Five State Area, and thus to help meet the needs of the people of Minnesota and its neighboring states.
- Because the shortfall in the supply of transportation fuels in the Five State Area is primarily met by refineries elsewhere in the Midwest that receive much of their crude oil supply from the Enbridge Mainline, the Project helps ensure the adequacy and reliability of energy supply to the people of Minnesota and its neighboring states.<sup>3</sup>

The Muse Report analyzed the two public forecasts of Western Canadian crude oil production: the NEB and CAPP forecasts. The NEB provides Canadian crude oil production outlooks every other year. The CAPP releases forecasts annually, and the associated report contains a great deal of information regarding the basis for the Canadian crude oil production outlook and of crude oil market developments.

In Western Canada, the volume of individual grades (e.g., CND, LGT, HVY) of crude oil production differs from the volume of individual crude oil grades supplied to the market. Differences between crude oil supply and crude oil production are attributable to the following factors:

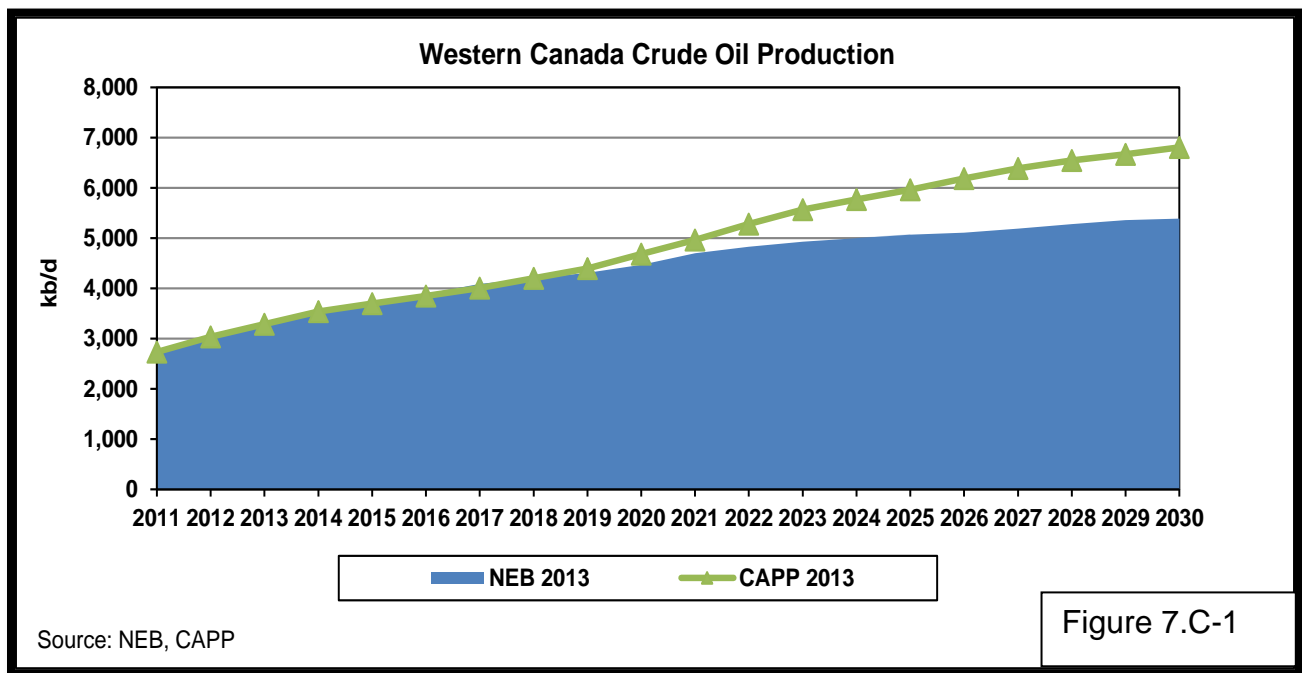
- The need to add diluent (including some light crude oil) to the heavy crude oil grades to enable them to be transported by pipeline, as in their natural state they are too viscous to be economically transported via pipeline.
- The considerable volume of heavy crude oil that is upgraded to a lighter, more valuable crude oil at a number of facilities in Western Canada. The upgrading of heavy crude oil to lighter crude oils in the Canadian upgraders changes the respective volume of light and heavy crude oil supplied to the market.
- The volumetric loss that typically occurs when a heavy crude oil is upgraded to a lighter crude oil. The magnitude of the volumetric loss depends upon the specific processing technology used in the upgrader.

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<sup>3</sup> Muse Report, pp. 4-5 (Appendix C).

As a result of the factors above, the assumptions used by individual forecasters regarding the amount of upgrader capacity added over time, the type of upgrading capacity, and the amount of light crude oil used as diluent will result in somewhat different forecasts of the volume of crude oil supplied to the market, even if the underlying crude oil production forecast is identical. For example, Figure 7.C-1 below (Figure 10 from the Muse Report) provides a comparison of the NEB 2013 Reference Case production forecast to the CAPP production forecast of the same year.<sup>4</sup>

**Figure 7.C-1: Muse Report Comparison of Western Canadian 2013 Crude Oil Production Forecasts**



Until about 2020, the NEB and CAPP production forecasts are very close. Post-2020, the NEB growth rate of crude oil production is less than that of CAPP, and by the end of the forecast period the NEB crude oil production volume is about 20 percent less than the CAPP production volume. Nonetheless, the most recent NEB forecast, which is the more conservative of the two, is projecting that between 2013 and 2030 crude oil production will increase by 2,100 kbpd.

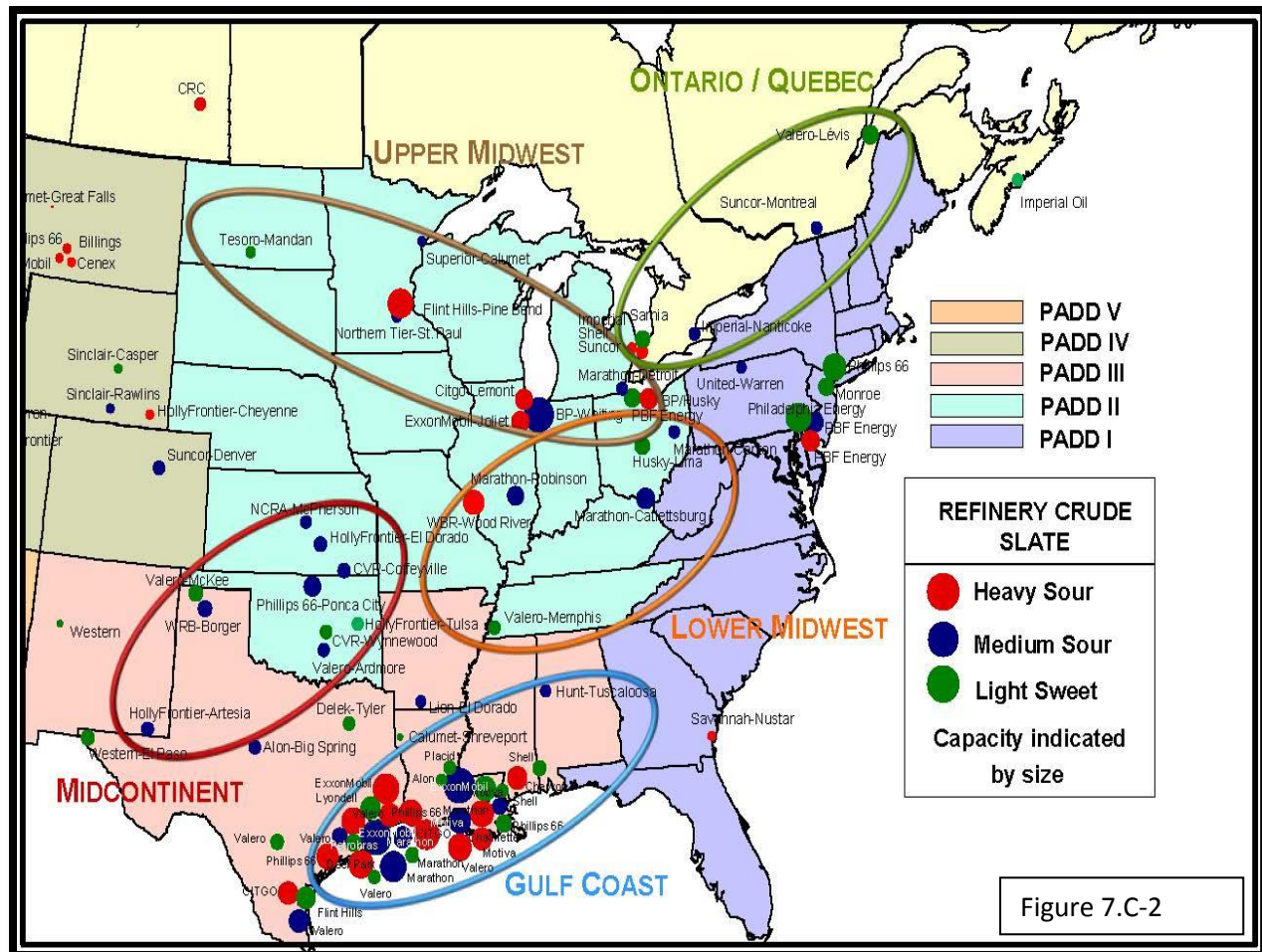
<sup>4</sup> The NEB report is: Canada's Energy Future 2013: Energy Supply and Demand Projections to 2035, November 2013 (available online at <https://www.neb-one.gc.ca/nrg/ntgrtd/fttr/2013/index-eng.html>). The data for the NEB crude oil production outlook were obtained from Appendix Tables A3.3 to the NEB report. The CAPP report is: Crude Oil: Forecast, Markets & Transportation, June 2013.

Although the CAPP and NEB forecasts differ in the details, they more broadly communicate the same message — the forward outlook for Western Canada is one of very large increases in crude oil production. As a practical matter, such increases must be transported to the market by some combination of pipeline and rail. The Project represents a small portion of the transportation capacity that will be required to move this oil to market.

**Demand for WCSB Crude Supply:**

The forecast provided on Enbridge's behalf in the Muse Report also assesses market demand for the Project by evaluating future throughput on the Enbridge Mainline System through an analysis of North American crude oil submarkets. As shown in Figure 7.C-2, there are five submarkets supplied with Western Canadian crude oil via the Enbridge Mainline System: the Upper Midwest, Lower Midwest; Ontario/Quebec; the Midcontinent, and the Gulf Coast.

Figure 7.C-2: Submarkets Accessible via the Enbridge Mainline System<sup>5</sup>



<sup>5</sup> Muse Report, p.20 (Appendix C).

The Muse Report aggregates the total refinery demand for crude oil in these five submarkets, as shown in Table 7.C-3.

Table 7.C-3 <sup>6</sup> Submarket Refinery Demand	
Submarket	Total Refinery Run Rate (kbpd) <sup>7</sup>
Upper Midwest (includes Minnesota's two refineries)	1,709.6
Lower Midwest	1,270.1
Ontario/Quebec	905.5
Mid-Continent	1,257.3
Gulf Coast	8,104.9
TOTAL	13,247

Muse then used its proprietary Muse Crude Market Optimization Model, which quantifies the expected throughput on the Enbridge Mainline. The Muse Crude Market Optimization Model, including its inputs and methodology, is explained in detail in the Muse Report.<sup>8</sup> As demonstrated in the Muse Report, the Project is needed and will be utilized as part of the Enbridge Mainline System.

In addition to the forecasts discussed above, which demonstrate the need for the Project, Enbridge's own forecast of apportionment before and after the Project shows that the Project will reduce apportionment to the Minnesota refineries. Apportionment, including its impacts on the Minnesota refineries, is discussed in more detail in Section 3.2.

Finally, the shipper's actions support the conclusion that the 760 kbpd is needed. The shippers have agreed to fund the \$7.5 billion replacement of Line 3 because they need access to additional capacity in order to alleviate apportionment. Alleviating apportionment and providing efficient and reliable access to WCSB supply provides significant benefits to Minnesota and the neighboring states.

<sup>6</sup> Muse Report, pp. 21-27 (Appendix C).

<sup>7</sup> Data from the EIA *Refinery Capacity Report*, June 25, 2014, available at <http://www.eia.gov/petroleum/refinerycapacity/>.

<sup>8</sup> Muse Report, pp. 28-29 (Appendix C).



## D. Effect of Changed Assumptions on Forecast

**A discussion of the effect on the forecast of possible changes in the key assumptions and key factors requested in item C:**

The forecast prepared by Muse could change based on a number of factors. These factors are discussed below.

First, the Muse Report makes the following assumptions about other pipelines proposed to move Western Canadian crude oil to market:

- The Keystone XL pipeline will go into service on January 1, 2017 with total volume commitments (combined with the existing Keystone pipeline) of 910 kbpd;<sup>9</sup>
- The Northern Gateway pipeline will go into service in 2019 with a capacity of 525 kbpd and volume commitments of 500 kbpd;<sup>10</sup> and
- The TransCanada Energy East pipeline will go into service in 2020 with capacity of 1,080 kbpd and volume commitments of 900 kbpd.<sup>11</sup>

As shown in the Muse Report, these projects are forecasted to have temporary but significant impacts on throughput in the Enbridge Mainline System.<sup>12</sup> If these pipelines are delayed or do not go into service, throughput on the Enbridge Mainline System, including the Project, can be expected to increase. This is not a remote possibility; TransCanada recently announced that the in-service date for Energy East will be 2020, rather than 2018 as originally forecasted. In addition, Enbridge has also announced delay in the in-service date of the Gateway project. Finally, the Keystone XL pipeline has been in its regulatory review process since late 2008 and is not yet approved for construction. If the Keystone XL pipeline is not built by 2017, then shippers with commitments on the Keystone XL pipeline will require access to alternative crude oil transportation systems. In that event, apportionment would increase on the Enbridge Mainline System.

The Muse Report also does not take into account the potential refinery expansion at the Flint Hills Refinery, as discussed in the direct testimony of Minnesota Department of Commerce witness Laura Otis related to Minnesota Pipe Line Company's application for a certificate of need for the Minnesota Pipe Line Reliability Project. In testimony, Ms. Otis reviewed evidence

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<sup>9</sup> Muse Report, p. 30 (Appendix C).

<sup>10</sup> *Id.*, p. 32.

<sup>11</sup> *Id.*, p. 33.

<sup>12</sup> *Id.*, Table 6, p. 38.



of efficiency upgrades underway at the Flint Hills Pine Bend Refinery, which could increase demand for crude oil by up to 45 kbpd.<sup>13</sup> An increase in demand from a Minnesota refinery would increase nominations on the Enbridge Mainline System, which could, in turn, result in increased apportionment on the Enbridge Mainline System for deliveries in Minnesota.

Furthermore, Enbridge's affiliate, NDPC, has also applied for a Certificate of Need and a Pipeline Route Permit for its Sandpiper Pipeline Project.<sup>14</sup> The Sandpiper Pipeline will carry light crude oil from the Bakken Formation to Clearbrook, Minnesota. At Clearbrook, the Sandpiper Pipeline will pick up volumes of light crude oil that are currently transported to Clearbrook by NDPC's Line 81 for onward transportation to Superior, Wisconsin, on the Lakehead System. The apportionment forecasts presented above in Section 3.2 assume that the Sandpiper Pipeline will be in-service by the time the Project is completed. If the Sandpiper Pipeline is not in service by that time, the Lakehead System will be required to transport the difference between the total volume shipped on Line 81 and the Line 81 deliveries to the Minnesota Pipe Line Company system at Clearbrook, Minnesota. In that event, apportionment of light crude oil is projected to increase on the Lakehead System.

Finally, other factors, such as an increase in crude oil exports from Canada by rail, could reduce demand for shipments on the Enbridge Mainline System.

## **E. Other Facilities Planned by Enbridge to Supply Forecast Demand**

**Considering the forecast, a discussion of other facilities, if any, planned by the applicant to supply the forecast demand.**

Enbridge does not have plans for any additional facilities in Minnesota beyond those under consideration by the MPUC at this time, including this Project and the North Dakota Pipeline Company, LLC's Sandpiper Project.

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<sup>13</sup> *In re Application of Minnesota Pipe Line Company, LLC for a Certificate of Need for the Minnesota Pipe Line Reliability Project to Increase Pumping Capacity on the Line 4 Crude Oil Pipeline in Hubbard, Wadena, Morrison, Meeker, McLeod and Scott Counties*, Direct Testimony of Laura B. Otis, p. 10-11, MPUC Docket No. PL5/CN-14-320, OAH Docket No. 68-2500-31889 (eDocket Doc. Id. 20151-106079-02).

<sup>14</sup> *In the Matter of the Applications of North Dakota Pipeline Company LLC for a Certificate of Need and a Pipeline Routing Permit for the Sandpiper Pipeline Project in Minnesota*, MPUC Docket Nos. PL-6668/CN-13-473, PPL 13-474.