10.0 PROJECT ALTERNATIVES

Minn. R. 7853.0540
Minn. R. 7853.0600
Minn. R. 7853.0610
Minn. R. 7853.0620
Minn. R. 7853.0630
Minn. R. 7853.0640

The applicant shall provide information pertaining to the alternatives that have been considered:

Pursuant to Minn. R. 7853.0540, 7853.0610, 7853.0620, 7853.0630, and 7853.0640, Enbridge provides the alternatives that were considered in place of the Project. The Project purpose is to replace the Minnesota portion of the existing Line 3 to address integrity issues and restore its historical operating capabilities to provide shippers with reliable and efficient crude oil transportation. In order to do this, the Project must connect to other portions of Line 3 being replaced in adjacent states and connect at Enbridge's facility at Clearbrook, Minnesota. The existing Line 3 crosses from North Dakota into Minnesota in Kittson County and then traverses Minnesota to make deliveries at both Clearbrook, Minnesota, and Superior, Wisconsin. To align with the remaining Line 3 replacement segments and continue to meet the needs of shippers served by Line 3, the Project must meet these geographic requirements. Accordingly, when Enbridge developed the Project, Enbridge determined the initial limitations on the Project to be:

- **The Project must cross into Minnesota in Kittson County**. The Project must cross into Minnesota in Kittson County, Minnesota, and connect with the segment of Line 3 being replaced in North Dakota, which ultimately connects to the Canadian portion of the Replacement Project.
- **The Project must interconnect with other Enbridge pipelines at and make deliveries to Clearbrook**. The Project must connect to the existing Enbridge Clearbrook Terminal in Clearbrook, Minnesota, so that Line 3 can both deliver crude oil to Minnesota Pipe Line Company's system, which interconnects at Clearbrook and delivers to Minnesota refineries, and other Enbridge pipelines.
- **The Project must exit Minnesota in Carlton County**. The Project must exit Minnesota in Carlton County, Minnesota, and connect with the segment of Line 3 being replaced in Wisconsin, which then connects to existing Enbridge facilities at Superior, Wisconsin. Continued delivery to the Enbridge facilities in Superior is essential so that volumes transported on the Project can be injected into the Lakehead System for delivery to refineries in Wisconsin, the greater Midwest, and beyond.

In addition, as discussed in more detail in Section 3, due to the extensive maintenance program required on Line 3, and with the support of Enbridge's shippers, the Project replaces the pipeline, including pump stations, which will restore the pipeline's historical operating capabilities. An alternative that does not meet these requirements would not meet the primary purpose of the Project. With these requirements in mind, Enbridge considered and rejected the following as alternatives to the Project:

I. **No Action.** Enbridge considered continuing to conduct integrity digs and repairs as needed to safely operate the existing Line 3, albeit under self-imposed pressure restrictions. Enbridge determined that the Project as proposed is less intrusive to landowners and the environment over the long-term. In addition, at some point, it may become economically infeasible to continue to operate the existing Line 3 due to the increasing intensity of maintenance activities required to keep the existing pipeline operational, and Enbridge may take it out of service. This would result in significant impacts to Enbridge's shippers, including the Minnesota refineries, who would have to obtain crude oil via other means. Furthermore, the continued application of other maintenance methods will not restore the operating capability of Line 3, which is a necessary outcome of the Project. (See Sections 3 above and 10.1 below for more details.)

II. **Rail.** In the event Line 3 is taken out of service because it has become infeasible to operate, the 760 kbpd to be transported by the Project would likely be shipped via rail. As discussed in more detail below, there is no existing rail system in place to transport an additional 760 kbpd to Line 3's delivery points. It would take at least 12,000 rail tank cars to transport 760 kbpd under normal operating conditions, resulting in significant socioeconomic, environmental, and safety impacts.[1] In cases of disrupted rail operation caused by high demand, environmental conditions, or reduced line capacity, the demand for cars increases. Each one day increase in the total estimated round trip increases the tank car fleet requirement by 10.4 percent or 1,265 tank cars. Thus, transporting 760 kbpd via rail is not a feasible alternative, especially in the short run as it will take time and significant investment to build additional train units, loading and unloading train facilities at the various refineries, and additional rail tracks. (See Section 10.2 below for more details.)

III. **Trucking.** As discussed in more detail below, there is no trucking system in place to transport 760 kbpd to Line 3's delivery points. The cost and infrastructure required make it unlikely that such a trucking system could be developed. Thus, trucking is not a feasible alternative. (See Section 10.3 below for more details.)

[1] The 12,000 tank car estimate is based on a four day loaded trip, with another four days to return the empties, and time to load and unload the cars.

IV. **Existing or Planned Pipeline.** In the event Line 3 is taken out of service, the 760 kbpd to be transported by the Project could not be shipped via other existing Enbridge pipelines or third-party planned pipelines. Existing Enbridge pipelines do not have the capacity to transport an additional 760 kbpd. Third-party planned pipelines do not make deliveries in Minnesota or PADD II. (See Section 10.4 below for more details.)

A discussion of each is provided below.

10.1 NO ACTION

10.1.1 ALTERNATIVE

Minn. R. 7853.0540

A. Description

A description of the alternative, including:

If Line 3 is not replaced, Enbridge would continue to conduct maintenance and integrity digs as needed to safely operate the existing Line 3. Enbridge rejected No Action as an alternative because the increasing frequency of integrity digs forecasted to maintain Line 3 over the next several years will result in on-going, year-after-year impacts to landowners and the environment along the existing Line 3. Further, with its current pressure restrictions and potential for future outages during maintenance and repair, the existing Line 3 will not be able to provide the necessary transportation capacity to serve shipper demands, resulting in increased apportionment on the Enbridge Mainline System. Moreover, at some point continuing the dig and repair program would be impractical and economically infeasible, resulting in Enbridge taking Line 3 out of service which would further reduce the available capacity and increase apportionment.

1) Design & Geographical Area

A discussion of the design and the geographical area affected:

Under No Action, Enbridge would conduct maintenance and integrity digs based upon the results of its on-going inspections of the existing Line 3. The geographical area affected would consist of the intensive number of integrity digs existing Line 3 corridor.

To understand the geographical area impacted by No Action Alternative, it is important to know how integrity digs are undertaken. Prior to undertaking an integrity dig, Enbridge identifies environmental resources in the integrity dig area, obtains the appropriate permits and consults with the appropriate agencies. Once all the appropriate permits are obtained, Enbridge will notify the landowners and coordinate with various agencies and departments, as needed. Enbridge will then access the site to survey the pipe and locate any other utilities in the vicinity

of the dig site. Brush or trees may be cleared from the site, as needed, and topsoil stripped and the site prepared for the excavation. An area up to approximately 160 feet long, 75 feet wide, and 10 feet deep is typically excavated around the pipeline. The pipe is then visually and physically inspected, and repaired as needed. Repair routinely consists of welding a metal sleeve around and re-coating the existing pipeline. This work typically takes seven to ten days to complete.

Equipment used includes a backhoe or similar excavator, and trucks to transport personnel, equipment and soil. Erosion control measures, such as silt fencing and straw bales, are installed as needed prior to soil disturbance in accordance with Enbridge's EPP (Appendix M). The soil erosion control structures are maintained by Enbridge personnel. Upon completion of the work, preconstruction contours are restored to the extent practicable, and the site is seeded and mulched, as necessary and in consultation with the landowner. Temporary erosion control structures are removed after new growth has been established and the site has been stabilized.

If trench dewatering is required, the discharges from dewatering at each location take place in a well-vegetated upland area using Best Management Practices (BMPs) such as geotextile filter bags and/or straw-bale dewatering structures. If an upland area is not available, discharge may occur into a nearby wetland or waterbody using the same BMPs and dewatering practices.

The right-of-way is seeded as soon as possible after backfilling, weather permitting. Permanent revegetation involves preparing the seedbed and seeding disturbed areas. Specific seed mixes, application rates and seeding dates taken into account recommendations of state and federal agencies and landowner requests, as appropriate. A post-reclamation survey is conducted to verify revegetation, and reseeding or other restoration activities may occur, if necessary.

2) In-Service Date

Line 3 is currently in-service. However, under No Action, Line 3 service will be interrupted much more frequently than in the replacement case to accommodate maintenance and integrity work that will take place year-after-year. These interruptions in service reduce the reliability of the Enbridge Mainline system and exacerbate apportionment.

3) Operation

A discussion of the method of operation:

Under No Action, Line 3 would continue to operate in the same manner as it currently operates. It would continue to be subject to Enbridge's voluntary pressure restrictions and require an extensive dig and repair program to continue with year-over-year landowner and environmental impacts.

4) Cost

It would cost, on average, between $30 million and $40 million per year to maintain the existing U.S. portion of Line 3 using integrity digs. Comparatively, maintaining the fully replaced Line 3 is expected to cost approximately $2 million per year.

5) Economic Life

The economic life of the existing Line 3 is difficult to predict but would be assessed yearly as the integrity plan was updated to reflect the newest information.

6) Reliability

No Action would be less operationally reliable than the Project. First, Enbridge would need to periodically take Line 3 out of service in order to conduct needed maintenance and integrity work. Second, Line 3 would continue to be subject to voluntary pressure restrictions and thus would not be operating at its full operating capabilities.

B. Summary of No Action

A summary of the conclusions reached with respect to the alternative and the reasons for its rejection:

On-going maintenance and integrity digs were not considered to be an acceptable alternative to the Project. Although the existing Line 3 could continue to be safely operated with on-going maintenance, there are a number of significant drawbacks to No Action, including:

- Continuing to conduct frequent integrity digs is not only costly, but also intrusive to landowners along Enbridge's rights-of-way whose property, agricultural operations, and businesses may be affected by on-going, year-after-year maintenance activities;
- Line 3 is currently operating at a flow rate well below the level at which it was designed to operate, which leads to system constraints and inefficiencies; and

- Relying strictly on integrity digs and repairs would not adequately address the issues of operational reliability and underutilization due to the imposition of pressure restrictions.

After considering these factors, Enbridge and its shippers determined that the Project is the best option. First, the Project will be less intrusive to landowners and the environment over the long-term. Second, the Project will result in the return of Line 3 to its historic operating capabilities, which is necessary to reduce apportionment. Third, the Project will address issues of operational reliability and enable flexibility in allocating light and heavy crude to Line 3. These conclusions are supported by the fact that shippers support the Project because of its increased operational reliability and ability to meet shipper demand. For further discussion, see Section 3.0.

10.1.2 INFORMATION REQUIRED

Minn. R. 7853.0600

Each applicant shall provide environmental data for the proposed facility and for each alternative discussed in response to part 7853.0540, to the extent that such data is reasonably available. Environmental data for each pipeline considered shall conform to the format given in parts 7853.0600 to 7853.0640. Information for each of the other types of alternatives considered shall include:

A. a list of the natural and cultural resources, as given in part 7853.0610, subpart 2, items G to K, that would be directly impacted; and

B. a discussion of those applicable areas of environmental concern that are detailed in parts 7853.0620 to 7853.0640.

The environmental impacts of No Action, which would involve continued, year-after-year integrity digs, are discussed in the sections that follow.

10.1.3 LOCATION

Minn. R. 7853.0610

The location of the No Action Alternative is the existing Line 3 right-of-way.

10.1.4 WASTEWATER, AIR EMISSION, AND NOISE SOURCES

Minn. R. 7853.0620

Subpart 1: Point Discharges to Water

Indicate the location, route, and final receiving waters for any discharge points. For each discharge point indicate the source, the amount, and the nature of the discharge (provide quantitative data if possible):

Potential discharges related to pipeline integrity maintenance include hydrostatic test water discharges and trench dewatering discharges. These discharges could occur at any point along Line 3, depending on the locations of future maintenance and integrity work. All discharges would be implemented in accordance with Enbridge's EPP (Appendix M) and permits issued by the appropriate regulatory agencies. Enbridge would obtain an Individual National Pollution Discharge Elimination System (NPDES)/State Disposal System (SDS) permit for the discharges of hydrostatic test water (and for construction stormwater discharges; see Section 9.0 below). Enbridge would evaluate potential hydrostatic test water sources and discharge locations as described in Section 9.0. The need for trench dewatering would depend on local weather conditions, groundwater conditions, and construction constraints. Trench dewatering would be conducted in accordance with applicable permit requirements.

Subpart 2: Area Runoff

Indicate the area from which runoff may occur, potential sources of contamination in the area, and receiving waters for any runoff:

Stormwater discharges related to pipeline excavation could occur at any point along the existing Line 3 pipeline, depending on the locations of future maintenance and integrity work. As described in Section 9.0, Enbridge would develop Stormwater Pollution Prevention Plans (SWPPPs) and/or other measures as required, implement appropriate erosion control measures during and after excavation to minimize erosion and sedimentation, and evaluate the potential for encountering contaminated groundwater or contaminated soils at excavation locations.

Subpart 3: Point Sources of Airborne Emissions

Estimate the quantity of gaseous and particulate emissions that would occur during full operation of the pipeline from each emission source and indicate the location and nature of the release point:

Airborne emissions from operation of Line 3 are predominantly limited to volatile organic compounds (VOC) from crude oil that flows into and out of floating roof tanks (such as those located at the Clearbrook Terminal) and fugitive VOC emissions from piping, pumps, and fittings. Emissions from the Clearbrook Terminal for No Action are similar when compared to the Project, although there may be a small increase in VOC emissions from the Clearbrook Terminal due to the potential increased through put of the storage tanks. Emissions from other aspects of the pipeline (fugitive emissions from pumps, flanges, etc.) would not be significantly different. Indirect greenhouse gas emissions are generated as a result of using purchased electricity to run the pumps that provide the pressure needed to move the crude oil in the pipe.

Subpart 4: Noise

Indicate the maximum noise levels (in decibels, A scale) expected along the route. Also, indicate the expected maximum increase over ambient noise levels:

The maximum noise levels expected at the location of each integrity dig, as well as the expected maximum increase over ambient noise levels, are the same as those described for the Project in Section 9.0 (7853.0620, subp. 4).

10.1.5 POLLUTION CONTROL AND SAFEGUARDS EQUIPMENT Minn. R. 7853.0630

Subpart 1: Air Pollution Controls

Indicate types of emission control devices and dust control measures that would be used:

Integrity digs may result in fugitive emissions from the excavation and maintenance process. The emissions could include dust from disturbed soil and exhaust from construction and maintenance equipment. Based on past experience, Enbridge does not believe that these fugitive emissions would result in the violation of any applicable ambient air quality standard.

Where appropriate, Enbridge ensures that dust control measures are implemented during maintenance and integrity digs, such as applying water to stabilize soils, reducing vehicle speeds, and maintaining equipment in good operating conditions and with proper emission control equipment.

Line 3 currently is capable of flowing into tankage at the Clearbrook Terminal. Emissions are currently controlled at the Clearbrook Terminal tanks through the use of floating roofs. Several of the tanks are also subject to federal New Source Performance Standards found in 40 C.F.R. 60 Subpart Kb. Continued daily operation of the existing Line 3 would continue to be subject to the same air pollution control requirements to which the Clearbrook Terminal is currently subject.

Subpart 2: Water Pollution Controls

Indicate types of pollution control equipment and runoff control measures that would be used to comply with applicable state and federal rules, regulations, and statutes:

Enbridge has implemented standardized erosion control and restoration measures to minimize and mitigate adverse environmental effects from maintenance and integrity digs. Enbridge will continue to comply with all applicable local, state and federal regulations.

Erosion control measures are outlined in the EPP (Appendix M) and include, but are not limited to: minimizing surface disturbance; restoration of disturbed areas, including revegetation; decompaction of soil to minimize runoff after integrity digs; avoiding integrity digs during wet conditions, if possible; use of sediment barriers; and installation of berms where required.

The EPP also describes construction techniques and control measures used to perform integrity digs and maintenance in wetlands or other waters, including maintaining stream flow; use of bridges; use of mats, ramps, and other erosion control measures; and revegetation.

Subpart 3: Oil Spill, Fire, & Explosion Safeguards

Describe measures that would be taken to prevent oil spills, fires, and explosions or to minimize the environmental impact of a spill, a fire, or of an explosion:

Enbridge has implemented restrictions to minimize the risk of a spill during integrity digs. Oil spill, fire, and explosion safeguards have been implemented for Line 3 and would be similar to those planned for the Project and described Section 9.0 (7853.0630, subp. 3) of this Application. The following spill prevention measures apply to integrity dig sites:

1) The primary safety concern at an integrity dig is an inadvertent line strike during the excavation phase of the dig. Control measures to prevent line strikes include:
    - 4-way sweeps of work area to identify the pipeline of concern, adjacent pipelines, and other utilities or features in the work area that may be contacted or cause the pipeline to be contacted if a strike occurs;
    - Potholing at a minimum of two locations within ten feet of the pipe to confirm positive (visual) identification of the pipeline and to confirm pipe orientation before excavating;
    - Conducting no mechanical excavation within one foot of the pipe; and
    - Presence of a spotter at all excavation work to direct the machine operator and avoid line strikes.
2) In some cases, the line is shut down or the pressure is decreased while work on the pipe occurs. This determination is made by the Enbridge pipeline integrity

team based on the nature of the work and product in the line at the time the work is performed.

3) The Enbridge Control Center is notified when work is occurring on the pipe and is prepared to immediately shut down the pipe if any pressure loss is detected in the vicinity of the work.

All integrity dig contractors are trained to report any signs of release (petroleum odor, presence of oil, impacted soil or water), and the pipeline is shut down when these signs are encountered.

Subpart 4: *Other Safeguards & Controls*

Indicate any other equipment or measures, including erosion control, that would be used to reduce the impact of the pipeline. Indicate the types of environmental monitoring, if any, that are planned for the facility and describe relevant environmental monitoring data already collected:

Enbridge monitors areas disturbed by maintenance and integrity digs to ensure that proper revegetation has occurred. In addition to planting and monitoring vegetation in disturbed areas, Enbridge works with landowners to ensure that lands are restored. Erosion control and other mitigation measures are described in the EPP (Appendix M).

10.1.6 INDUCED DEVELOPMENTS

Minn. R. 7853.0640

Subpart 1: Utility Use

Indicate the extent to which the facility would create or add to the need for expanded utilities or public services:

An on-going integrity dig and repair program would not result in expanded utilities as it would continue to flow the same volume of crude as today. However, there may be a need for additional public services as additional inspections by MNOPS would be expected along the entire line as digs are undertaken.

Subpart 2: Water Use

Indicate the amount of water that would be appropriated for use in connection with the pipeline, the expected source of water, and the manner in which the water would be used:

Water may be required during maintenance digs to perform hydrostatic testing of a pipe segment, construct an ice road, dust suppression, or other construction activities. Water may be obtained from a municipal source or a nearby surface water source. If water is to be obtained from a surface water source, Enbridge would seek a MNDNR water appropriation permit, as appropriate, and comply with the conditions outlined in this permit.

Subpart 4: Vehicular Traffic

Estimate the amounts and types of vehicular traffic that would be generated by the facility due to construction activity and, later, operational needs:

For the most part, day-to-day operational traffic related to Line 3 is not noticeable. Some increased traffic will occur in localized areas of pipeline maintenance and integrity work. Vehicular traffic may be impacted by maintenance and integrity work in the event an integrity dig needs to be done at a road crossing, as traffic may need to be diverted or traffic lanes reduced.

Subpart 5: Agriculture

Estimate the number of farms and the number of acres of cropland and pasture land that would be affected by the construction of the pipeline. Indicate known circumstances with regard to the pipeline that would tend to reduce agricultural productivity along the route. Estimate the amount of excavation, backfilling, grading, soil compaction and soil mixture, and ditching to be done in farm fields. Estimate the number of drainage ditches to be impacted by the pipeline:

Agricultural land accounts for 670 acres (or 39 percent) of the area along the existing Line 3; however, since the specific locations of integrity work is unknown, the number of farms and the number of acres of cropland and pasture land that would be affected cannot be determined. Maintenance and integrity work may impact agricultural land use within the Line 3 ROW, including center-pivot irrigation system use, planting, or harvesting, depending on the season. Unlike construction of a new pipeline, these impacts will not be limited to one growing season; rather, Enbridge would continue to conduct maintenance and integrity work as needed on an on-going basis to ensure the continued safe operation of Line 3. Landowners would be compensated for crop losses and other damages caused by maintenance and integrity activities.

Subpart 6: Relocation of Persons

Estimate the number of people that would have to relocate if the pipeline were constructed:

No Action is not anticipated to result in the relocation of persons.

10.2 RAIL ALTERNATIVE

10.2.1 ALTERNATIVE

Minn. R. 7853.0540

A. Description

A description of the alternative, including:

Currently, Minnesota refineries obtain all of their heavy crude oil supplies from the Lakehead System. If Line 3 is taken out of service because it becomes economically infeasible to operate, shippers, including the Minnesota refineries, would have to obtain crude oil from other sources, such as third-party railways. Because of the location of rail infrastructure and crude oil receipt and delivery points, much of the crude oil that would have been transported by the Project will nonetheless continue to travel to and across Minnesota. Utilizing rail would have significantly greater socioeconomic and environmental impacts compared to the Project.

The 760 kbpd to be transported by the Project would be 17 percent of total rail tonnage in Minnesota. Estimated Project volume is 44 million tons per year; Minnesota total tonnage for 2012 is 253 million.[2] Thus, it is uncertain that rail could actually deliver the entire capacity of the Project. In any event, sufficient rail tanker capacity does not currently exist to transport 760 kbpd. Transporting 760 kbpd via rail would require the construction by third parties of rail car loading and off-loading facilities. In addition, construction of new lateral above-ground rail service lines would be required. The increased traffic on current lines, as well as new rail lines, would pose additional risk and impact to landowners and the public.

1) Design & Geographical Area

A discussion of the design and the geographical area affected:

In order to transport the 760 kbpd of crude oil to be transported by the Project,[3] a fleet of rail cars would be required as detailed in Table 10.2.1.A.1-1 below:

[2] Draft Minnesota State Rail Plan, March 2015, Figure 2.2, Page 2-39.

[3] The annual average capacities used for Clearbrook and Superior are the equivalent of the average annual capacities expected to be transported Line 3 after the Project is completed.

Table 10.2.1.A.1-1 Rail Requirements – 760 kbpd	
Crude Oil Volumes	760 kbpd
Per Railcar Capacity	600 barrels
Number of Railcars Required for Loading per Day[4]	1267
Days/Trip – One Way[5]	4 days
Number of Railcars in Transit, Loaded	5068
Number of Railcars Returning Empty[6]	5068
Number of Railcars Loading/Unloading[7]	2028
Total Railcars	12,164 (5068+5068+2028)

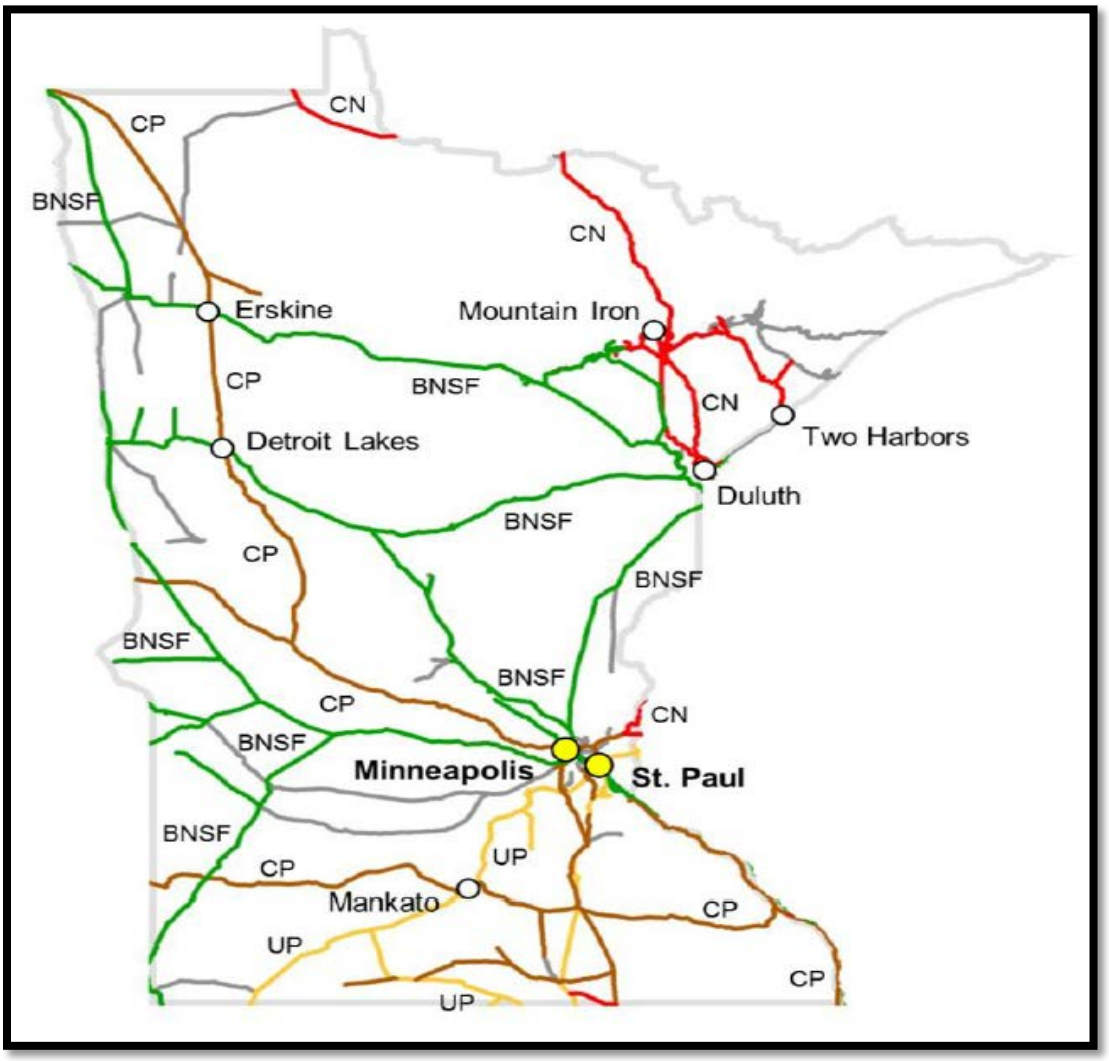
As set forth in Table 10.2.1.A.1-1 above, at least 12,164 rail tank cars would be required to transport 760 kbpd from Hardisty, Alberta, Canada to Clearbrook, Minnesota and Superior, Wisconsin.[8] Weather conditions would impact these numbers. For each day of increase in the estimated total base cycle time of 9.6 days, an additional 1,265 cars are required to support the total demand of 760 kbpd since tank cars make fewer trips in a year as cycle time increases.

[4] Number of rail cars tied up in transit during 4 day trip (1,267 loaded trains per day x 4 days in transit).
[5] To travel from Hardisty, Alberta, Canada to either of the Minnesota Refineries.
[6] The empty return trip also takes four days; total time in transit (loaded and empty) is eight days.
[7] Assumes that loading and unloading is 20 percent of transit time, or .8 days each.
[8] The travel time and freight charges to move a rail tank car from Hardisty, Alberta, Canada to Superior, Wisconsin is approximately the same as to move a rail tank car from Hardisty, Alberta, Canada to one of the Minnesota refineries.

In order to facilitate the rail operation, significant spur lines, rail sidings, and terminal facilities would have to be constructed by third parties at Hardisty, Clearbrook, Superior, or any other potential destinations. In addition, substantial upgrades to and on-going maintenance of the connecting railways would be required.

Figure 10.2.1.A.1-2 below shows current rail routes through Minnesota which could be used to transport the volumes that would otherwise have been transported via the Project:

Figure 10.2.1.A.1-2: Railroad Routes in Minnesota[9]



[9] Association of American Railroads, "Freight Railroads in Minnesota," Rail Fast Facts for 2011. Class I railroads are labeled. Regional, local, terminal, and switching railroads are shown in gray.

2) In-Service Date

Enbridge believes that it is impossible for terminal facilities at Hardisty, Clearbrook, and Superior to be constructed by third parties on the same timeline as the Project. Enbridge does not know if the number of rail cars required is available, nor does Enbridge have an estimate of the time that would be required to manufacture them. Locomotives, tank cars for crude oil, and operating personnel are all scarce resources in the railroad industry, and most major carriers are already scrambling to secure enough of each to deal with record rail traffic volumes. In addition, new safety regulations, which will require the retrofitting or replacement of many existing rail cars, will likely result in a tank car backlog, temporarily reducing carrying capacity and delaying the ability to acquire new tank cars. It is expected that it will take between 18 months and two years to work off the tank car backlog. Finally, Enbridge does not have an estimate of the time required for third parties to construct the necessary upgrades associated with the railway infrastructure.

3) Operation

A discussion of the method of operation:

Transporting 760 kbpd via rail would be highly labor intensive, with a significant workforce required at each terminal location to allow for the constant loading and off-loading requirements and rail car operation.

4) Cost

Enbridge is not aware of any rail operation capable of transporting the annual capacity of 760 kbpd required and is therefore unable to provide cost comparisons. The rail costs could be anticipated to be in the hundreds of millions of dollars per year range, without considering the cost of new rolling stock and necessary infrastructure facilities.

5) Economic Life

Considering the mileage that the rail cars would incur in steady service, Enbridge estimates that the economic life of a rail car would not exceed 10 to 15 years. The rail loading and off-loading terminals would have an estimated economic life of 25 years.

6) Reliability

Rail is subject to delays related to accidents and incidents, weather-related delays, delays caused by scheduling conflicting rail traffic, and a significant mechanical and maintenance requirement based on the number of rail cars involved in the operation. Thus, transporting crude by rail is less reliable than the Project.

Transporting crude oil by rail has increased because of the urgent need for additional pipeline infrastructure and transportation capacity.[10] However, the cost is significantly higher, and the risk of rail accidents is approximately nine times higher than that of a pipeline.[11] Rail accidents result in fires and/or explosions about two times more frequently per barrel of oil transported per mile.[12]

There are a number of new regulatory initiatives that could impact the availability of rail to transport the crude oil that would otherwise have been transported by the Project. On August 1, 2014, PHMSA issued a Notice of Proposed Rulemaking in coordination with the Federal Railroad Administration (FRA), proposing revisions to the United States Hazardous Materials Regulations (HMR) (*see* 49 C.F.R. Parts 171-180).[13] PHMSA has submitted its proposed final regulations to the U.S. Office of Management and Budget for final approval. The U.S. DOT is projecting that the final regulations will be published by May 12, 2015.[14] The proposed regulations aim to improve rail safety by making changes to tank car construction, train speed limits, and routing of crude oil trains. If implemented, the revised regulations would require improvements in tank car standards and set new operational requirements for high-hazard flammable trains (HHFTs), including a possible reduction in operating speeds and requiring a rail routing risk assessment. Trains carrying 20 or more tank carloads of crude oil are classified as HHFTs. Because they will require some rail tank cars to be retrofitted or taken out of flammable rail service, the new regulations can be expected to have a significant impact on the availability of tank cars after they take effect. The costs to modify the fleet of crude oil tank cars to satisfy the new regulations would further increase the cost per barrel to transport crude oil by rail. In addition, the proposed speed restrictions could be expected to increase congestion on key main lines.

B. Summary of Rail

A summary of the conclusions reached with respect to the alternative and the reasons for its rejection:

Insufficient rail tanker capacity and facilities exist to transport the 760 kbpd that would be transported by the Project. Using rail would require the construction by third parties of rail car

[10] Crude Oil Forecast, Markets, and Transportation Report, Canadian Association of Petroleum Producers (CAPP) (June 2014), pp. 22, 31-33. CAPP has forecasted that crude oil volumes transported by rail will increase from about 200 kbpd in late 2013 to around 700 kbpd by 2016.

[11] *See* RITA, Bureau of Transportation Statistics, Table 2-3: Transportation Accidents by Mode.

[12] *Allegro Energy Group as posted on the Association of Oil Pipelines website*, comparison based on calculated rates per ton-mile.

[13] *See* 79 FR 45015 – NPRM (Aug. 1, 2014), *available at* http://www.gpo.gov/fdsys/pkg/FR-2014-08-01/pdf/2014-17764.pdf.

[14] U.S. Department of Transportation, "Report on DOT significant Rulemakings. March 2015", http://www.dot.gov/regulations/report-on-significant-rulemakings.

loading and off-loading facilities and rail cars. In addition, construction of new lateral above-ground rail service lines would be required and would pose additional risk and impact to landowners and the public. Although rail tanker cars are a vital part of the short-haul distribution network for crude oil, pipelines are a safer and more economic transportation alternative. The potential in-service date of additional truck-to-rail, rail tanker car, rail line, and off-loading capacity is not known. Further, the reliability of crude by rail in northern climates is compromised by periodic restriction in truck traffic required to deliver crude oil to rail facilities due to winter storms and spring road restrictions or other weather-related or road capacity restrictions. For these reasons, rail is not a feasible alternative to the Project.

10.2.2 INFORMATION REQUIRED Minn. R. 7853.0600

Each applicant shall provide environmental data for the proposed facility and for each alternative discussed in response to part 7853.0540, to the extent that such data is reasonably available. Environmental data for each pipeline considered shall conform to the format given in parts 7853.0600 to 7853.0640. Information for each of the other types of alternatives considered shall include:

A. a list of the natural and cultural resources, as given in part 7853.0610, subpart 2, items G to K, that would be directly impacted; and

B. a description of those applicable areas of environmental concern that are detailed in parts 7853.0620 to 7853.0640.

The environmental impacts of transporting 760 kbpd of crude oil via rail are discussed in the sections that follow.

10.2.3 LOCATION Minn. R. 7853.0610

Table 10.2.1.A.1-1 above lists the number of rail cars that would be needed to transport the crude oil to be transported by the Project. Moving the same volume of crude oil by rail as the Project would require the construction of a new railroad link in Minnesota, including loading facilities either in Minnesota, North Dakota, or Canada, and rail car unloading facilities in Minnesota or Wisconsin. Transporting 760 kbpd of crude oil via rail in Minnesota would, at a minimum, require full rail transportation from western Minnesota to eastern Minnesota, requiring new or improved rail line.

If loading or unloading were to occur in Minnesota, the construction necessary for such loading and unloading facilities would require new land acquisition. The construction process would have environmental impacts, as would the increased and constant flow of rail cars traveling through Minnesota. Environmental impacts of crude oil by rail would likely include habitat and wetland loss during construction of additional rail facilities and fugitive emissions from constant train engine operation.

Impacts to natural and cultural features cannot be described because Enbridge does not operate rail lines in Minnesota and thus has not identified a feasible rail route through Minnesota, or preferred loading and unloading options. Acquiring this information would be unreasonable under the current circumstances.

10.2.4 WASTEWATER, AIR EMISSION, AND NOISE SOURCES Minn. R. 7853.0620

Subpart 1: Point Discharges to Water

Indicate the location, route, and final receiving waters for any discharge points. For each discharge point indicate the source, the amount, and the nature of the discharge (provide quantitative data if possible):

The rail alternative would require the construction by third parties of rail car loading and off-loading facilities, including the construction of new above-ground lateral service lines to reach the rail cars. Construction activities associated with building a rail car loading and off-loading facility are not anticipated to require any point discharges to water.

Subpart 2: Area Runoff

Indicate the area from which runoff may occur, potential sources of contamination in the area, and receiving waters for any runoff:

Area runoff adjacent to the constructed rail car loading and off-loading facilities would increase as a result of the rail alternative. Such facilities would not be constructed by Enbridge, and locations of such facilities have not been identified; accordingly, receiving waters for any runoff are not known.

Subpart 3: Point Sources of Airborne Emissions

Estimate the quantity of gaseous and particulate emissions that would occur during full operation of the pipeline from each emission source and indicate the location and nature of the release point:

Airborne emissions would come from two sources. First, the loading and off-loading facilities would emit fumes during the loading and off-loading process. Second, airborne emissions may come from storage tanks.

Additional gaseous and particulate emissions would occur from train engines, as shown below in Table 10.2.4.3-1

Table 10.2.4.3-1

Rail Alternative Airborne Emissions

Emission Source Description	Pollutant Emissions (tpy)					
	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	GHG (CO_2e)
Railroad diesel combustion emissions (760 kbpd)	67,069	6,604	799	1,651	1,601	2,522,921

- Emissions are calculated based on the total rail distance traveled per year in ton-miles based on the estimated weight of full and empty tank cars in transport each day.
- Emissions from loading/off-loading of crude oil have not been included.
- This transportation method would require the construction of large rail car loading and off-loading facilities in Hardisty, Alberta; Clearbrook, Minnesota; and Superior, Wisconsin.

Subpart 4: Noise

Indicate the maximum noise levels (in decibels, A scale) expected along the route. Also, indicate the expected maximum increase over ambient noise levels:

Noise levels related to the construction of rail car loading and off-loading facilities, as well as construction of new lateral above-ground rail service lines, would be similar to those described for the Project in Section 9.0. However, since such facilities would be constructed by third parties, and the locations of such facilities are unknown, information regarding the maximum

noise levels, and the increase over ambient noise levels, of such facilities during construction or operation is not available.

Rail operation would be in compliance with the Railroad Noise Emission Standards established in 29 C.F.R. Part 210 and, therefore, would not exceed 96 decibels. However, the increased rail traffic could increase the noise along the respective rail routes every day of the year.

10.2.5 POLLUTION CONTROL AND SAFEGUARDS EQUIPMENT Minn. R. 7853.0630

Subpart 1: Air Pollution Controls

Indicate types of emission control devices and dust control measures that would be used:

Air pollution controls for construction related to the construction of rail car loading and off-loading facilities, as well as construction of new lateral above-ground rail service lines may be similar to those described for the Project. Enbridge anticipates that the rail transporters will obtain the necessary permits for operation of the additional trains.

For operation of the rail alternative, additional air pollution controls would be required for crude oil loading facilities. Loading of crude oil into rail cars generates a significant amount of VOC emissions, and the loading operations would require the use of add-on pollution control equipment such as a Vapor Combustor Unit (VCU), Vapor Recovery Unit (VRU), or similar equipment.

Subpart 2: Water Pollution Controls

Indicate types of pollution control equipment and runoff control measures that would be used to comply with applicable state and federal rules, regulations, and statutes:

The risk of water pollution from the rail alternative comes from daily operations at the loading and off-loading facilities, as well as from accidents during transportation.

Water pollution at the loading and off-loading facilities could result from spills caused by loading and off-loading operations or from general surface runoff.

Subpart 3: Oil Spill, Fire, & Explosion Safeguards

Describe measures that would be taken to prevent oil spills, fires, and explosions or to minimize the environmental impact of a spill, a fire, or of an explosion:

Pipelines are safer and more reliable than other forms of crude oil transportation, including rail. According to safety and accident statistics provided by the U.S. DOT, pipelines result in fewer spillage incidents and personal injuries than rail.[15]

The loading and off-loading facilities would need to be equipped with spill containment and fire suppression equipment, as well as potentially with vapor recovery systems. Specific details of these systems are not available to Enbridge.

Rail safety is regulated by the Federal Railroad Safety Administration, which is part of the U.S. DOT, and includes divisions governing the following:

- Hazardous material transportation;
- Locomotive and freight car safety inspections;
- Operating practices, including carrier and employee training, safety rules, hours of service, accident reporting, and employee qualifications;
- Track signals; and
- Federal track safety standards.

Rail transportation would be subject to federal safety regulations and industry standards.

Subpart 4: Other Safeguards & Controls

Indicate any other equipment or measures, including erosion control that would be used to reduce the impact of the pipeline. Indicate the types of environmental monitoring, if any, that are planned for the facility and describe relevant environmental monitoring data already collected:

It is likely that inspections of the rail car loading and off-loading facilities, as well as construction of new lateral above-ground rail service lines would be conducted. Transportation of crude oil via rail would contribute to air and noise pollution levels. Enbridge does not foresee any current measures to reduce these impacts.

[15] *See* Manhattan Institute. Pipelines are Safest for Transportation of Oil and Gas. June 2013. *Available at* http://www.manhattan-institute.org/html/ib_23.htm.

10.2.6 INDUCED DEVELOPMENTS

Minn. R. 7853.0640

Subpart 1: Utility Use

Indicate the extent to which the facility would create or add to the need for expanded utilities or public services:

Electrical power would be required at the loading and off-loading facilities. However, these facilities would be designed and constructed by third parties, and Enbridge is unable to estimate the required electrical power.

Rail would require, at minimum, the construction of new lateral rail service lines.

Subpart 2: Water Use

Indicate the amount of water that would be appropriated for use in connection with the pipeline, the expected source of water, and the manner in which the water would be used:

No water use is anticipated in Minnesota.

Subpart 3: Vehicular Traffic

Estimate the amounts and types of vehicular traffic that would be generated by the facility due to construction activity and, later, operational needs:

Impacts to vehicular traffic would be created by trains crossing roadways. If the crude oil trains were concentrated on a single route, every road along the rail route with an at-grade crossing would have over 2,500 rail tank cars, or approximately 24 trains, crossing each day, at all times of the day, throughout the year. This would cause traffic delays. For example, a typical crude oil unit train comprised of three locomotives and 102 railcars traveling at 55 mph will occupy a two-lane crossing for about 80 seconds. Because trains are required to travel at reduced speeds through developed areas, the traffic delays will likely be of longer duration. The same crude oil train traveling at 40 mph will occupy the crossing for approximately 110 seconds. An increase of 24 trains through developed areas translates into 44 minutes of additional road delay every day.

Subpart 4: Agriculture

Estimate the number of farms and the number of acres of cropland and pasture land that would be affected by construction of the pipeline. Indicate known circumstances with regard to the pipeline that would tend to reduce agricultural productivity along the route. Estimate the amount of excavation, backfilling, grading, soil compaction and soil mixture, and ditching to be done in farm fields. Estimate the number of drainage ditches to be impacted by the pipeline:

Construction of new lateral above-ground rail service lines has the potential to significantly affect agricultural lands. Permanent right-of-way would be required for any new rail line and, if routed through agricultural lands, would have permanent effects on agricultural productivity. Similarly, rail loading and unloading facilities, if located in agricultural land, would permanently convert agricultural land to industrial use. Estimates on the number of farm, acres of cropland and pasture land, and number of drainage ditches affected would be dependent upon establishing a route.

Daily operations of the rail alternative would not be expected to impact agricultural operations other than through traffic delays caused by increased trains traveling through agricultural areas and crossing roads each day in each direction. Crude oil volumes would also compete with agricultural commodities for limited rail transport capacity. Minnesota has the sixth largest agricultural industry in the country, and much of the industry relies on rail to get product to market because it generally ships goods that are heavy, bulky, and relatively low in value per ton.[16] Increased rail congestion due to crude-by-rail shipments has already impacted key Minnesota industries, and, without additional capacity, it will continue to do so. For instance, a study from the University of Minnesota found that, between March 2014 and May 2014, transportation problems (i.e., rail delays) cost Minnesota growers approximately $100 million.[17]

[16] 2010 Minnesota State Rail Plan, at 3-11, *available at* http://www.dot.state.mn.us/planning/railplan/finalreport/MNRailPlanFinalReportFeb2010.pdf.

[17] Minnesota Basis Analysis, Report for the Minnesota Department of Agriculture, Edward Usett, University of Minnesota, July 10, 2014.

Subpart 5: Relocation of Persons

Estimate the number of people that would have to relocate if the pipeline were constructed:

Enbridge is unable to determine whether persons would need to be relocated under the rail alternative because no third party has developed a detailed plan and route to ship 760 kbpd.

10.3 TRUCKING ALTERNATIVE

There is simply insufficient tanker trailer truck capacity to transport the capacity of 760 kbpd of crude oil that would be moved by the Project, and creation of such a trucking system is infeasible. In order to transport the 760 kbpd of crude oil to be transported by the Project, a fleet of tractors and trailers would be required as detailed in Table 10.3-1 below:

Table 10.3-1
Truck Requirements – 760 kbpd

Crude Oil Volumes	760 kbpd
Per Truck Capacity	200 barrels
Number of Trucks Required	3,800
Mileage Per Trip – Each Way	920 to 1,100 miles
Days/Truck – Loaded Trip	3 days
Days/Truck – Empty Trip	3 days
Days to Load Truck	0.2 days
Days to Unload Truck	0.2 days
Total Cycle Time (days from load to next load)	6.4 days
Total Trucks (Trucks/Day * Cycle Time)	24,320

As set forth above, 24,320 trucks would be required to transport 760 kbpd to Clearbrook, Minnesota or Superior, Wisconsin.

In addition, truck transportation is less reliable than the Project because truck traffic is affected by weather conditions, mechanical failures, manpower shortages, and road maintenance or closures. In addition, trucks have a significantly higher rate of accidents, affecting the safety of drivers and the public, than pipelines.

Since it would not be possible to transport 760 kbpd of crude oil via truck, trucking could not meet the requirements of the Project and was not considered further.

10.4 EXISTING OR PLANNED PIPELINE ALTERNATIVES

10.4.1 Proposed Pipelines

Enbridge identified the following pipeline projects that have been proposed to transport crude oil from the WCSB: Northern Gateway Project; Trans Mountain Pipeline Expansion; Energy East Pipeline Project; and Keystone XL Pipeline. None of these proposed projects will deliver crude oil to Clearbrook, MN, or Superior, WI. Specifically, the Northern Gateway, Trans Mountain Pipeline Expansion, and Energy East Pipeline projects do not enter the United States. Similarly, the Keystone XL Pipeline does not cross Minnesota and will not provide needed pipeline capacity to refineries in Minnesota, Wisconsin, the greater Chicago area, or other Midwest refineries. Because none of the proposed projects will meet the need of the Project, they were not considered further.

10.4.2 Expansion of Existing Enbridge Pipelines in the Enbridge Mainline System

Enbridge cannot expand the capacity of one or more of the existing pipelines on the Enbridge Mainline System to transport additional volumes of crude oil from the WCSB to Superior, Wisconsin. The MPUC issued a Certificate of Need to Enbridge for the Line 67 Phase 2 Project on November 7, 2014, allowing Line 67 to operate at its full annual average capacity. Line 67 is anticipated to be fully utilized, without the additional volumes that would be required if Line 3 were taken out of service. Line 67 was the only pipeline in the Enbridge Mainline System capable of providing expanded capacity to Superior, Wisconsin. Accordingly, expansion of the Enbridge Mainline System is not a viable alternative to the Project.