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December 14, 2021

Ms. Lisa Felice, Executive Secretary
Michigan Public Service Commission
7109 W. Saginaw Hwy.
Lansing, MI 48917

RE: MPSC Docket No. U-20763

Dear Ms. Felice:

Attached herewith for filing in the above-referenced matter, please find the ***Rebuttal Testimonies of Paul Turner, Paul Eberth, Amber Pastoor, Aaron Davis, Jeffry Bennett***, and ***Neil Earnest*** on behalf of Enbridge Energy, Limited Partnership.

If you have any questions with the attached, please do not hesitate to contact me.

Very truly yours,

Fraser Trebilcock Davis & Dunlap, P.C.

Michael S. Ashton

Michael S. Ashton
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Date: 2021.12.14 11:54:14 -05'00'

MSA/alj
Enclosures
Cc: All parties of record

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

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IN RE ENBRIDGE ENERGY, LIMITED PARTNERSHIP	)	
	)	
	)	**Case No. U-20763**
Application for the Authority to Replace and Relocate the Segment of Line 5 Crossing the Straits of Mackinac into a Tunnel Beneath the Straits of Mackinac, if Approval is Required Pursuant to 1929 PA 16; MCL 483.1 *et seq.* and Rule 447 of the Michigan Public Service Commission's Rules of Practice and Procedure, R 792.10447, or the Grant of other Appropriate Relief	)	
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REBUTTAL TESTIMONY

OF PAUL TURNER

On behalf of the Enbridge Energy, Limited Partnership

December 14, 2021

Q: Would you please state your name, title and business address?

A: My name is Paul Turner and my current position is Environmental Supervisor. My business address is 26 E. Superior Street, Duluth, MN 55802.

Q: Are you the same Paul Turner who filed direct testimony in this proceeding?

A: Yes.

Q: What is the purpose of your rebuttal testimony?

A: The purpose of my rebuttal testimony is to respond to various environmental issues relating to the construction of the tunnel raised by Staff and intervenors.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to better address certain potential environmental impairments?

A: Yes. Before I address each of her specific recommendations, let me provide overall view as to how Enbridge develops its plans to address the potential for environmental impairments. As an initial matter, Enbridge develops a baseline Environmental Protection Plan (EPP). This initial baseline EPP is Exhibit A-11 from pages 228 – 359. The purpose of an EPP is to outline construction-related environmental policies, procedures, and protection measures for construction and the EPP addresses typical circumstances that may occur during construction. The baseline EPP is intended to meet or exceed federal, state, and local environmental protection and erosion control requirements, specifications, and practices. Overtime, a baseline EPP may be revised to include specifics for a particular project. An updated version of the EPP for this project was produced in discovery to Staff and is part of Staff's Exhibit S-19 from pages 3 –59.

In addition, the United States Army Corps of Engineers (USACE) will prepare an Environmental Impact Statement (EIS) to ensure compliance with the National Environmental Policy Act (NEPA) and the EIS will evaluate potential impacts to, and mitigation measures for, environmental and cultural resources. Eventually, a detailed project-specific EPP will be developed after federal, state, and local authorizations have been obtained and prior to construction, in order to incorporate any permit conditions not specifically addressed in the earlier versions of the EPP. To ensure that Enbridge and its contractors comply with all applicable local, state, and federal regulatory requirements and permit conditions, Enbridge will develop a project-specific Environmental Training and Compliance Manual. This manual will be used to train construction personnel and establish guidelines for project-specific environmental protection measures that will meet or exceed applicable permit conditions and Enbridge standards.

It is within this context that Enbridge will develop the plans recommended by Ms. Mooney to better address the potential environmental impairments due to the construction.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the increase in noise generated from construction that may impact nearby residences and fauna?

A: Construction will be an intermittent, short-term noise source and steps will be taken to minimize and mitigate noise impacts to nearby residences and fauna.

The primary sound generation will be construction equipment and vehicular traffic into, on, and from the worksite. According to studies performed by the United States Department of Transportation (DOT), almost all construction equipment has a sound pressure level

between 75 and 85 decibels (dBA) at a distance of 50 feet. Additional noise impacts may occur if blasting is required. Blasting events would occur one to two times per day and would be limited to daylight hours during a 3-to-4-week period on the south side. Blasting activities are anticipated to produce a sound pressure less than 90 dBA at a distance of 50 feet (Federal Highway Administration 2021). For comparison, the sound pressure level of a typical vacuum cleaner to the person operating it is between 84 and 89 dBA. Sound attenuates (loses intensity) over distance. When noise is created by a source such as a backhoe, it attenuates at 6 dBA per doubling of distance from a source. So, if the backhoe has a sound pressure level of 80 dBA at 50 feet, it has a sound pressure level of 74 dBA at 100 feet, a sound pressure level of 68 dBA at 200 feet, and a sound pressure level of 50 dBA at 1,600 feet. Blasting would have a sound pressure level of 60 dBA at 1,600 feet. The construction workspaces excluding Boulevard Drive will be 2,400 feet or greater from the nearest residential structures on the north side; therefore, noise impacts at these residences as a result of construction equipment are anticipated to be approximately 50 dBA or less, which is comparable to the sound of a conversation. Intermittent noise levels due to blasting may be up to 57 dBA, comparable to the sound level of an alarm clock.

Residences within and adjacent to the south side workspaces have been purchased by Enbridge and will not be inhabited during construction or operation. The south side construction workspaces will be 350 feet or greater from the nearest residential structures; therefore, noise impacts at these residences are anticipated to be approximately 59 dBA or less, which is comparable to the sound level of an alarm clock.

Fauna in the area may be impacted by construction noise. Mobile fauna such as birds and mammals would likely relocate to other nearby suitable habitat and avoid the area once

construction activities commence. After construction is complete and temporary workspaces are restored, wildlife would be able to return to the area. Given the limited area and abundant adjacent habitat, the short-term disturbance of local fauna due to construction noise will not have population-level effects.

Enbridge will mitigate sound impacts to residences and fauna by implementing the following measures:

- Equipment will have muffled exhausts;
- Construction vehicles will minimize idle time to the extent practicable;
- Contractors will utilize sound control devices no less effective than those provided by the manufacturer and maintain equipment in accordance with manufacturer's recommendations;
- Equipment with the highest noise impact will be operated only when necessary;
- Equipment shields will be utilized at the contractor's discretion; and
- If blasting is required, blasting mats may be used as applicable.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the potential increase in dust/particulates that may impact nearby residences and fauna and possibly impact surface water?

A: Typical dust control measures are outlined in Enbridge's EPP. Additionally, dust control measures will be outlined in the stormwater pollution prevention plans and county erosion and sediment control permits that will be developed/obtained prior to construction. If site conditions at the time of construction necessitate additional mitigation, the contractors may develop and implement additional measures based on industry-standard practices for dust control at construction sites.

Several measures as needed will be used to control dust emissions. These measures will meet or exceed the dust control best management practices (BMPs) outlined in the

Michigan Department of Environment, Great Lakes, and Energy (EGLE) Nonpoint Source Best Management Practices Manual (2017). These measures include, but are not limited to:

- Watering access roads, storage piles and disturbed surfaces;
- Using temporary covers for stockpiles and other areas where vehicle traffic does not occur (e.g., mulch, vegetation, erosion control blanket, tarps, etc.);
- Placement of construction stone on unpaved areas, as practicable;
- Imposing speed restrictions for vehicles driving on unpaved areas; and
- Installing gravel tracking pads at entrances to the workspaces to help remove dirt from tires and tracks.

If blasting is required, additional dust mitigation will be implemented, including the use of fog cannons to spray atomized water across the excavation area. The excavation area may also be pre-soaked with water and blasting mats may be used, as necessary.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the increase in light generated from construction that may impact nearby residences, fauna, and the Headlands International Dark Sky Park located south and west of the southern workspace?

A: Light generated during construction activities will be limited to discrete times when 24-hour construction activities are required. During nighttime construction, temporary lighting would be used to ensure that specific work areas are provided with lighting that is sufficient to enable the workers to see hazardous conditions and avoid injury. To reduce impacts to residences and fauna:

- lighting will be downward-facing and include hooded lights to prevent skyglow;
- lighting will be of minimum necessary brightness while still allowing for required worker safety and security; and
- lighting will only be operated in areas of active construction.

Project-specific plans will be developed after applicable federal, state, and local authorizations have been obtained and prior to construction, in order to incorporate any permit conditions not specifically addressed in the current version of the EPP and incorporated as necessary in the project-specific Environmental Training and Compliance Manual.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the increase lighting resulting from operation of the tunnel (after construction is completed) which could have potential impacts to the Headlands International Dark Sky Park?

A: During operation of the tunnel, permanent low-level operational lighting would be installed as needed at the new ventilation building for security purposes. The addition of lighting at the ventilation building adjacent to the existing Mackinac Station will not represent a significant increase of light. To minimize and mitigate potential impacts at the Headlands International Dark Sky Park, the following measure may be implanted:

- lighting will be motion-detected;
- lighting will be of minimum necessary brightness for operational safety and security;
- lighting will be downward-facing and include hooded lights to prevent skyglow; and
- permanent perimeter lighting is not anticipated.

A permanent operational lighting plan will be developed prior to construction.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address potential for surface water impairments?

A: Yes. She raised three potential impacts which are:

1. Impacts such as dewatering operations during construction of the tunnel.
2. Impacts associated with construction equipment traffic.

3. Impacts associated with using lake water for hydrostatic testing of the pipe.

I will address each separately:

(1) If water is generated from trench dewatering, then it would be discharged within the construction workspaces using practices outlined in Section 16 of the EPP Staff Exhibit S-19.

Water generated from tunnel dewatering will be routed to the on-site water treatment system and discharged to the Straits via permitted outfalls. Water discharged via the outfalls will be tested in accordance with the EGLE Authorization to Discharge Under the National Pollutant Discharge Elimination System, Permit No. Mi0060278 (NPDES Permit), issued on January 29, 2021, Exhibit A-15. The NPDES Permit includes monitoring requirements and/or discharge limitations for numerous parameters. The permit authorizes discharge of tunnel construction water, tunnel drainage, and groundwater seepage. The effluent limitations and monitoring requirements specified in the permit were developed to prevent impairment of water quality. Exhibit A-16 is EGLE's Responsiveness Summary for the NPDES Permit that explains the requirements and limitations in the NPDES permit is to protect water quality standards. Enbridge will comply with all conditions, monitoring requirements, and discharge limitations in the NPDES Permit.

(2) Sediment tracking from construction traffic will be controlled using erosion and sediment controls, as outlined in Enbridge's EPP. During construction, the following measures will be implemented as appropriate:

- Access to the workspaces will be from public roadways and Enbridge-approved private access roads only. Vehicle tracking of soil from the construction site will be minimized by installation and implementation of BMPs such as stone pads, timber mats, reducing equipment/vehicle access to the construction workspaces where practicable (off-site parking), or equivalent. If such BMPs are not adequately preventing sediment tracking

onto public roads, street sweeping (or other equivalent means of collecting sediment) will be used.

- Temporary erosion control BMPs such as seeding, mulch (straw or hydromulch), and erosion control blanket will be installed as needed to provide stabilization of exposed soil and prevent erosion.
- Temporary sediment control BMPs such as silt fence, straw bales, and biologs will be installed prior to earth moving activities at the edge of the workspaces and in other areas as necessary to slow water leaving the site and prevent siltation of waterbodies and wetlands down slope or outside of the construction workspaces.
- Cat tracking may be implemented, based on site conditions, to reduce erosion potential by driving a bulldozer vertically up and down the slope, which results in the tracks being oriented horizontally; creating small speed bumps for water.

Additional BMPs may be implemented as required by the Emmet County and Mackinac County Part 91 soil & erosion control permits and in accordance with EGLE's Nonpoint Source Best Management Practices Manual. Adherence to the EPP and applicable permits will minimize potential impacts to surface waters as a result of erosion, including sediment from construction equipment traffic.

(3) The anticipated volume of water needed for completing the hydrostatic testing is approximately 943,600 gallons. Enbridge proposes to withdraw the water from Lake Michigan and register the withdrawal with EGLE. The proposed withdrawal water volumes will have a de minimis impact on the overall volume of the Great Lakes. Withdrawn water will be fully treated before being discharged via the outfalls. Water discharged via the outfalls will be tested in accordance with the NPDES Permit. The NPDES Permit includes monitoring requirements and/or discharge limitations for numerous parameters. The permit authorizes discharge of hydrostatic test water, and the effluent limitations and monitoring requirements specified in the permit were developed to prevent impairment of water quality. Enbridge will comply with all conditions, monitoring requirements, and discharge limitations in the NPDES Permit.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the potential for environmental impairments to local residences and fauna associated with construction?

A: Environmental mitigation measures related to noise, dust, and light impacts on residences and fauna have been addressed elsewhere in this testimony. In addition to those measures, Enbridge and its contractors will comply with all applicable local, state, and federal regulatory requirements and permit conditions; therefore, other impacts to residences or fauna are not anticipated.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the potential for air quality impacts associated with use of internal combustion engines during construction?

A: Emissions from diesel and gasoline-fueled vehicles and construction equipment will include criteria pollutants and greenhouse gases. Gasoline and diesel engines must comply with the U.S. Environmental Protection Agency (USEPA) mobile source regulations for on-road and non-road engines in 40 CFR Parts 85 to 90 and Parts 1033 to 1054. These regulations are designed to minimize emissions from all types of compression ignition and spark ignition engines. The USEPA requires manufacturers of on- and non-road engines to certify their products to engine emission standards based on the year of manufacture and develop manufacturers' recommendations for maintenance of the engines. Enbridge and its contractors will maintain all fossil-fueled construction equipment in accordance with manufacturer's recommendations to minimize construction-related emissions. On-site vehicle idle time while in the construction area will be minimized for all equipment, to the

extent practicable. Air emissions from the construction will be localized, intermittent, and short-term.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the potential for groundwater impacts?

A: Yes, she raised 5 concerns and I will address each separately. The five concerns are:

1. Impacts to surface drainage and groundwater recharge patterns altered by clearing, grading, trenching, and soil stockpiling activities, potentially causing minor fluctuations in groundwater levels and/or increased turbidity, particularly in shallow surficial aquifers.
2. Reduced infiltration and increased surface runoff and ponding due to soil compaction caused by heavy construction vehicles.
3. Impacts to groundwater during construction due to spills of hazardous materials from construction equipment.
4. Impacts to drinking water wells due to construction.
5. Impacts to shallow groundwater aquifers and groundwater quality during trenching, excavation, and backfilling maintenance activities.

1. Impacts to surface drainage and groundwater recharge patterns due to construction activities including clearing, grading, trenching, and soil stockpiling activities will be minor, temporary, and will not significantly affect groundwater resources. The tunnel and pipeline replacement segment will be constructed in accordance with measures outlined in the EPP, conditions in the Emmet County and Mackinac County Part 91 soil & erosion control permits, and in accordance with EGLE's Nonpoint Source Best Management Practices Manual. Adherence to the EPP and applicable permits will minimize potential impacts to groundwater as a result of construction activities.

2. Surface runoff may increase and infiltration of rainfall may be reduced temporarily due to compaction caused by heavy construction vehicles. These minor impacts will be temporary and will not significantly affect groundwater resources. The tunnel and pipeline

replacement segment will be constructed in accordance with measures outlined in the EPP, conditions in the Emmet County and Mackinac County Part 91 soil and erosion control permits, and in accordance with EGLE's Nonpoint Source Best Management Practices Manual. Adherence to the EPP and applicable permits will minimize potential impacts to surface runoff and ponding as a result of construction activities.

3. Construction will comply with all applicable local, state, and federal permit and regulatory requirements. Section 20 of the EPP: Spill Prevention, Containment, and Control Plan (Spill Plan) outlines construction procedures that will minimize impacts during construction. These plans will be updated as necessary to incorporate regulatory permit requirements.

Accidental spills or leaks of hazardous materials associated with vehicle fueling, vehicle maintenance, and material storage present the greatest potential contamination risk to groundwater during construction. Soil contamination resulting from these spills or leaks could introduce pollutants to the ground and surface water. Implementation of proper storage, containment, and handling procedures will minimize the risk of such releases. Enbridge's Spill Plan addresses preventative and mitigative measures that will be used to avoid or minimize the potential impacts of hazardous material spills during construction. Measures outlined in the Spill Plan include, but are not limited to:

- Spill prevention and response training for construction personnel;
- Regular inspections and testing of equipment to ensure that it is in good repair and inspection of hoses, pipes, valves, and tanks to ensure equipment is free of leaks;
- Prohibition of fueling and lubricating activities and hazardous material storage in or adjacent to sensitive areas;
- Secondary containment for storage of fuels, oils, hazardous materials, and equipment;

- Collection and disposal procedures for wastes generated during equipment maintenance;
- Emergency response procedures; and
- Standard procedures for excavation and off-site disposal of any soils contaminated by spillage.

The contractor(s) will designate a Spill Coordinator who will be responsible for implementing the planning and preventative measures described in the Spill Plan. Locations of fuel, oil, and hazardous material storage and secondary containment specifications will be determined prior to construction. The contractor(s) will have adequate spill response materials on-site and fueling vehicles will carry materials sufficient to control potential spills.

4. Drinking water wells within the workspaces include a Type III Public well, owned by Enbridge Northern Straits, within the north side workspace and nine private wells on Enbridge property within the south side workspace. The remaining nearest wells, per the EGLE online Water Well Viewer, are greater than 950 feet from the north side and south side worksites. All wells within the project workspaces are owned and maintained by Enbridge.

The nine private wells within the south side worksite will be plugged and abandoned per the Michigan Abandoned Water Well Plugging Manual (2012) prior to construction. The remaining Enbridge-owned well within the north side workspace will be protected during construction according to the procedures outlined below:

- Install construction fencing around drinking water wells;
- Prohibit fueling and lubricating activities and hazardous material storage within 100 feet of drinking water wells;

- Conduct pre- and post-construction water quality monitoring of drinking water wells, if appropriate.

In the event construction adversely affects the well, it will be restored to its former quality, to the extent practicable, or replaced.

Measures to protect drinking water wells from construction-related spills are described in the response to item 3 above.

5. As outlined above, impacts to groundwater due to project construction activities including trenching, excavation, and backfilling will be minor, temporary, and will not significantly affect groundwater resources. The project will be constructed in accordance with measures outlined in the EPP, conditions in the Emmet County and Mackinac County Part 91 soil & erosion control permits, and in accordance with EGLE's Nonpoint Source Best Management Practices Manual. Adherence to the EPP and applicable permits will minimize potential impacts to groundwater as a result of construction activities.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the potential for environmental impacts to surface soils, vegetation, and surface water due to storage and handling of fuels/hazardous liquids during construction and operation?

A: Construction will comply with all applicable local, state, and federal permit and regulatory requirements. Enbridge's Spill Mitigation Plan in Section 20 of the EPP outlines construction procedures that will minimize impacts during construction. (Staff Exhibit S-19 beginning at p. 29.) This plan will be updated as necessary to incorporate additional regulatory permit requirements.

Enbridge will minimize impacts to soils, vegetation, and surface water during construction by implementing Enbridge's EPP. Standards and procedures within the EPP include, but are not limited to:

- Locating equipment parking areas, equipment refueling areas, concrete coating activities, and hazardous material storage at least 100 feet from surface waters, unless unfeasible;
- Installing and maintaining temporary erosion and sediment control BMPs throughout construction and until final restoration is achieved; and
- Implementing the Spill Plan to help prevent spills from occurring and mitigating a spill or leak if it occurs during construction.

Accidental spills or leaks of hazardous materials associated with vehicle fueling, vehicle maintenance, and material storage present the greatest potential contamination risk to soils, vegetation, and surface water resources during construction. Soil contamination resulting from these spills or leaks could introduce pollutants to the ground and surface water. Implementation of proper storage, containment, and handling procedures will minimize the risk of such releases. Enbridge's Spill Plan addresses preventative and mitigative measures that will be used to avoid or minimize the potential impacts of hazardous material spills during construction. Measures outlined in the Spill Plan include, but are not limited to:

- Spill prevention and response training for construction personnel;
- Regular inspections and testing of equipment to ensure that it is in good repair and inspection of hoses, pipes, valves, and tanks to ensure equipment is free of leaks;
- Prohibition of fueling and lubricating activities and hazardous material storage in or adjacent to sensitive areas;
- Secondary containment for storage of fuels, oils, hazardous materials, and equipment;
- Collection and disposal procedures for wastes generated during equipment maintenance;
- Emergency response procedures; and
- Standard procedures for excavation and off-site disposal of any soils contaminated by spillage.

The contractor(s) will designate a Spill Coordinator who will be responsible for implementing the planning and preventative measures described in the Spill Mitigation Plan. Locations of fuel, oil, and hazardous material storage and secondary containment specifications will be determined prior to construction. The contractor(s) will have adequate spill response materials on-site and fueling vehicles will carry materials sufficient to control potential spills.

In addition to the measures identified above, Enbridge will comply with permits issued in accordance with the Michigan Natural Resources and Environmental Protection Act, 1994, P.A. 451 Part 31, Water Resources Protection and Part 91, Soil Erosion and Sedimentation Control.

Q: Do you have a response to Ms. Mooney's recommendation that Enbridge develop plans to address the potential for impacts to local flora and fauna due to the introduction of aquatic invasive animals and plants during construction?

A: Condition 14 of the EGLE Water Resources Division Permit requires Enbridge and its contractor(s) to take measures to minimize the risk of spreading terrestrial and aquatic invasive species where feasible. Exhibit A- 17. These measures include:

- Visually inspecting and removing any plants or mud from footwear (boots, hip-boots, and waders);
- Visually inspecting and removing and properly disposing of any plants and mud from field equipment (nets, shovels, rakes, etc.) and vehicles;
- Draining all water from vehicles and equipment, prior to leaving the site and before entering a new waterbody;
- Thoroughly drying equipment (5-7 days, if possible) between sites, when possible;
- Disinfecting vehicles and equipment between sites (e.g., diluted bleach solution, heated pressure washer), when possible. Disinfection should be conducted away from surface waters, where the disinfecting solution will not enter any storm sewers and/or surface waters.

- Thoroughly washing vehicles and boats between sites (e.g., drive-through car wash);
- Using only native plants and seed for restorations and best management practices; and
- If invasive aquatic or terrestrial plants are removed from a site, invasive plant material will be disposed of by bagging and transporting to a landfill, composting, or burning, as appropriate and in compliance with local and state laws.

Enbridge will comply with the EGLE permit conditions and will implement the above-listed mitigation measures to minimize the potential for introduction of aquatic invasive animals and plants during construction.

Q: Do you have a response to the tribal concerns presented in Staff Exhibit S-25 relating to the USACE process and the potential impacts to cultural resources?

A: The USACE will be preparing an EIS for compliance with NEPA and the EIS will evaluate potential impacts to cultural and historical resources. In consultation with Native American Tribes, the USACE will also assess potential impacts, effects, and proposed mitigation to those resources, if they exist within the area of potential effect, as part of the Section 106 consultation process under the National Historic Preservation Act (NHPA). Both the EIS and Section 106 processes allow for tribal participation.

Q: In your previous answer, what do you mean by the "area of potential effect"?

A: The "area of potential effect" in the Section 106 review process means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use to historic properties (including properties of cultural or religious significance to Indian tribes) if such properties exist. The area of potential effect is influenced by the scale and nature of an undertaking and may be different for different

kinds of effects caused by the undertaking. This is broader than the mere proximity to waters of the United States.

Q: Has the EGLE permit also addressed tribal concerns raised in Exhibit S-25 regarding a thorough review of potential impacts to cultural resources?

A: Yes. In Exhibit A- 17, the EGLE Water Resources Permit, imposes Special Condition 21 and it specifies that:

> "The Straits of Mackinac bottomland and shore are notable for the presence of historic properties, such as terrestrial and bottomland archaeological sites (including historic aircraft and shipwrecks), submerged paleo landscapes, cemeteries and isolated human burials, significant architecture and objects, historic districts, National Historic Landmarks, and traditional cultural properties and landscapes. The USACE has federal permitting authority over this project and is required to comply with Section 106 of the National Historic Preservation Act of 1966, as amended (Section 106). Section 106 requires federal agencies to consider the effects of their undertakings on historic properties in consultation with the State Historic Preservation Officer, consulting Tribes, and other stakeholders. Any adverse effects on historic properties must be avoided, minimized, or mitigated. The SHPO recommended additional survey to identify historic properties in the project area (November 10, 2020). This recommendation will remain under consideration during the Section 106 consultation process. Note that historic properties on state-owned land and the state-owned bottomland are the property of the State of Michigan. Archaeological surveys that may be proposed on state-owned land and the state-owned bottomland will require a Department of Natural Resources Permit for Archaeological Exploration on State-Owned Land."

Q: How has Enbridge been working to address concerns set forth in Staff Exhibit S-25 regarding the scope of cultural resource surveys?

A: Enbridge has addressed this concern by performing a desktop and Phase I cultural resources investigation. In addition, impacts to cultural resources are being more thoroughly addressed by the USACE as part of its EIS and Section 106 consultation processes. Enbridge has also been coordinating with the USACE with respect to cultural resource surveys.

The Phase I cultural resources survey reports have been submitted to the USACE, who will be conducting and completing Section 106 consultation process with the MI SHPO and Tribes. Enbridge will continue to work with the USACE to conduct appropriate additional surveys, if requested.

To that end, geophysical surveys of the workspaces on the north and south sides, where practical, were conducted in the summer of 2021. Additionally, Enbridge conducted additional marine archaeological surveys within the area of potential effect in the summer and fall of 2021. Tribal officials were present for portions of the geophysical and marine surveys. Enbridge will also be paying for an ethnographic study to be performed by a third-party under the direction of the USACE as part of the cultural resource evaluations that will be conducted as part of the EIS and Section 106 processes. Enbridge has completed these surveys in full compliance with published and industry accepted methodologies. The off-shore survey methodologies were approved by the USACE and the Michigan Department of Natural Resources – Michigan Historical Center, State Historic Preservation Office (MI SHPO).

Data from the geophysical and marine surveys is currently being processed and Enbridge will provide the results of these surveys to the USACE. The USACE will use these results in conjunction with any other data they deem necessary, including coordination with the Michigan Historical Center, State Historic Preservation Office (MI SHPO) and Native American Tribes to make a determination of potential effects of the proposed project on significant cultural and/or historic resources, including traditional cultural properties and landscapes. The USACE will publish the results in the EIS and record of decision for the

Individual Permit application. Tribes were invited to be cooperating agencies, which will allow them to have input throughout the EIS process.

Q: Do you have a response to the concern set forth in Exhibit S-25 relating to potential burial grounds located in the area of Outfall 002?

A: The Phase I cultural resource survey was conducted in the area of Outfall 002. A records review conducted as part of the Phase I surveys determined that an unverified site crosses into the workspace at Outfall 002.

The USACE has requested, and Enbridge has conducted additional surveys in this area, including geophysical and marine surveys in the location of the potential burial ground near Outfall 002. This included areas of both upland and wetland (waters of the US). Data from the geophysical and marine surveys is currently being processed and Enbridge will provide the results of these surveys to the USACE. As noted earlier, Tribal officials were present during the surveys and the Tribes are able to participate in the USACE process.

Q: Do you have any response to concerns raised in Exhibit S-25 regarding wetland surveys?

A: Wetland and waterbody field surveys were completed for the entire project area and results were submitted to EGLE and the USACE. At this time, no additional wetland and waterbody studies are required or have been requested by these permitting agencies.

Q: Do you have any response to concerns raised in Exhibit S-25 regarding the potential impact to sensitive habitats such as coastal alvar or Great Lakes cobble beach?

A: Coastal alvar is not present within the north or south side workspaces. Field surveys confirm a limestone cobble shore community along both the north and south shorelines with a sand and gravel beach community limited to a small portion of the north side workspace. Impacts to limestone cobble shore will be limited to a small footprint required for the construction of Outfall 1 on the south side and Outfall 3 on the north side. Exhibit A–18 is the EGLE Responsiveness Summary for the Water Resources Permit, and it discusses the Permit conditions and efforts to minimize impacts to coastal wetlands.

Q: Do you have any response to concerns raised in Exhibit S-25 raising regarding compliance with the state Great Lakes Submerged Lands Act?

A: Exhibit A- 15, the EGLE Water Resources Permit which includes authorization under Part 325 of the Great Lakes Submerged Lands.

Q: Do you have a response to a number of witnesses who raised concerns that construction activities may impact fishing, fish populations, and spawning areas, including lake whitefish or walleye?

A: The project will not have direct impacts on commercial fishing, fish populations or spawning areas, including lake whitefish and walleye populations. The proposed tunnel will extend below the lakebed between the north and south side workspaces. No disturbance of the lakebed of the Straits of Mackinac will occur (except for the small footprints of two 10 ft x 10 ft temporary water intake structures on each side of the Straits (400 sq ft total impact) which will be in place near the shoreline during the construction of the tunnel). No permanent impacts to the lakebed or associated aquatic habitats are proposed.

Water discharged to the Straits via permitted outfalls will be tested in accordance with the EGLE issued NPDES Permit. Exhibit A-15. The effluent limitations and monitoring requirements specified in the permit are designed to ensure that water quality standards are met and designated uses of Lake Michigan, which includes fish consumption, are protected. Exhibit A-16. The requirements in the NPDES permit are designed to protect commercial fishing and fish populations.

Q: Do you have a response to a number of witnesses who raised concerns that construction activities may impact wild rice?

A: Wild rice (*Zizania palustris* L.) was not identified within any of the workspaces during biological field surveys. Therefore, construction will not have direct impacts to wild rice.

Q: Do you have a response to a number of witnesses who raised concerns that construction activities impact common loon populations?

A: The project will not have direct impact on the common loon populations. While common loon (*Gavia immer*) individuals may be present in Lake Michigan intermittently, common loons are unlikely to breed or overwinter along the shorelines north and south of the Straits of Mackinac (Audubon Field Guide 2021). Individuals that may use the shoreline as stopover habitat may avoid the area due to construction and increased human activity.

Q: Do you have a response to a number of witnesses who raised concerns that construction activities impact sugar maple populations?

A: Construction will include removal of individual sugar maple trees but will not impact overall populations of sugar maple or maple syrup production. Sugar maple (*Acer*

saccharum) was identified within the south side workspace during biological surveys. These individual trees will be removed as part of site clearing for construction of the tunnel. Sugar maple is Michigan's most common tree species and the northern hardwood forest type in which sugar maple grows covers about 7 million acres in the state (MSU Extension 2017).

Q: Do you have a response to Mr. Donner's concerns regarding the volume and temperature of water discharged during construction and the potential for chemical contamination of the water?

A: During construction, water discharged via outfalls will consist of treated noncontact cooling water, tunnel construction water, tunnel boring machine intervention water, slurry treatment facility wastewater, tunnel drainage, groundwater seepage, and storm water. Hydrostatic test water will also be discharged intermittently during construction. A summary of the permitted discharge volumes during construction included in the table below.

Outfall	**Permitted Discharge (maximum) in million gallons per day (MGD)**
001A	5 MGD
001B	0.944 MGD
003	1 MGD

Water discharged to the Straits via permitted outfalls will be tested in accordance with the NPDES Permit and includes monitoring requirements and/or discharge limitations for numerous parameters, including acute toxicity, oil and grease, temperature, total suspended and total dissolved solids, dissolved oxygen, pH, and chlorides. The permit requires

additional sampling for hardness, metals, cyanide, total phenols, volatile organic compounds, acid-extractable compounds, and base/neutral compounds.

The permit authorizes discharge of treated wastewater, and the effluent limitations and monitoring requirements specified in the permit were developed to protect water quality standards. Exhibits A-15 and A-16. Water treatment additives proposed for use in the treatment process will be submitted to EGLE for review and approval.

Q: What is the anticipated chemical composition and volume of water discharged after the construction and during operation of the tunnel?

A: During operation, water discharged via outfalls will consist of groundwater and storm water. A summary of the permitted discharge volumes during operation is presented in the table below.

Outfall	**Permitted Discharge (maximum) in million gallons per day (MGD)**
001A	0.075 MGD
003	0.0015 MGD

Water discharged to the Straits via permitted outfalls will be tested in accordance with the EGLE NPDES Permit. The NPDES Permit includes monitoring requirements and/or discharge limitations for numerous parameters, including oil and grease, total suspended and total dissolved solids, pH, and chlorides. In addition, the permit requires additional sampling within for hardness, metals, cyanide, total phenols, volatile organic compounds, acid-extractable compounds, and base/neutral compounds.

The permit authorizes discharge of treated wastewater, and the effluent limitations and monitoring requirements specified in the permit were developed to protect water quality standards. Exhibits A-15 and A-16. Water treatment additives proposed for use in the treatment process will be submitted to EGLE for review and approval.

Q: Do you have a response to the testimony of Dr. Cleland and others that terrestrial cultural resources (prehistoric and historic), including native burial sites or settlements may be impacted by the construction of the tunnel and replacement pipe segment?

A: Enbridge has in part addressed this concern by performing a desktop and Phase I cultural resources investigation. In addition, impacts to cultural resources are being more thoroughly addressed in the USACE permit process as part of its EIS and Section 106 processes.

As part of its environmental review and examination of impacts on cultural resources, Enbridge conducted a desktop review, followed by Phase I cultural resources investigations to identify significant cultural resources that might be affected by the project. Significant cultural resources are those which are more than 50 years old and can include above ground historic structures, below ground archaeological sites, underwater archaeological sites, cultural landscapes, traditional cultural properties, or historic districts. Cultural resource consultants searched the files of the MI SHPO and the Office of the State Archaeologist (OSA) in order to identify cultural resource locations and investigations that have been previously recorded within a one-mile study area for the project.

In 2019 and 2020, cultural resource consultants conducted Phase I cultural resources surveys in the north side and south side study areas in accordance with MI SHPO standards. The Phase I surveys encompassed all areas with the potential to be disturbed by the construction as described at the time of the survey and was subsequently larger than the workspace to allow for potential changes to design.

In his direct testimony, Dr. Charles Cleland referenced 141 sites within the vicinity of the project and in the Straits. However, based on a records search conducted as part of the Phase I study, MI SHPO records show a total of 11 previously identified archaeological sites within one mile of the workspaces: these are one (1) unverified site on the north side, and five (5) unverified and five (5) verified sites on the south side of the Straits of Mackinac. Based on MI SHPO records, no previously recorded archaeological sites have been verified within the workspace; however, it may be possible that portions of three of the unverified sites cross into the workspace: sites 20EM11, 20EM12, and 20MK15. 20EM11 is listed as a precontact period village site and sites 20EM12 and 20MK15 are listed as precontact period burial mound sites.

During the Phase I surveys, one historic structure within the south side workspace, a residence (and modern outbuilding) at 6770 David Drive was identified within the workspace. The cultural resource consultant recommended the house at 6770 David Drive as not eligible for listing in the National Register of Historic Places (NRHP). Six archaeological sites (20MK543 through 20MK548) were identified during the surveys on the north side; however, only two of these are located within the Project workspace as shown in the table below. All six archaeological sites were recommended not eligible for listing in the NRHP. The locations of the three previously reported but unverified

archaeological sites (20MK15, 20EM11, and 20EM12) in SHPO records were not verified during the Phase I surveys.

CULTURAL RESOURCES IDENTIFIED DURING THE PHASE I SURVEY

Site #	Site Type	Site Association	Site Location	Within Workspace	NRHP Recommendation
6770 David Drive	House and Modern Outbuilding	Ca. 1965	South side	Yes	Not Eligible
20MK543	Recreation Camp or Trailer Location	Late 19th Century to Present	North side	Yes	Not Eligible
20MK544	Group of Features Associated with Line 5 Pipeline Construction	Late 19th Century to Present	North side	Yes	Not Eligible
20MK545	Structural Depressions former Cabins	Late 19th Century to Present	North side	No	Not Eligible
20MK546	Dump Site	Late 19th Century to Present	North side	No	Not Eligible
20MK547	Structural Depressions former Cabins	Late 19th Century to Present	North side	No	Not Eligible
20MK548	Lithic Scatter	Prehistoric	North side	No	Not Eligible

Enbridge has been coordinating with the lead federal agency, the USACE, during cultural resource surveys. Phase I cultural resources survey reports have been submitted to the USACE, who will be conducting and completing Section 106 consultation process with the MI SHPO and the Tribes. Enbridge will continue to work with the USACE to conduct appropriate additional surveys, if requested. To that end, geophysical surveys of the north and south side workspaces were completed in the summer of 2021. The survey data is

currently being analyzed and a report of the survey results will be submitted to the USACE. Tribal officials were present for the duration of the geophysical surveys. Enbridge will also be paying for an ethnographic study to be performed by a third-party under the direction of the USACE as part of the cultural resource evaluations in the EIS and Section 106 processes.

During construction, Enbridge will also implement an Unanticipated Discoveries Plan (UDP), Exhibit A-12, pages 98 -102. The UDP will be further developed and submitted to the USACE for review and approval prior to construction. Additionally, Enbridge, in coordination with the USACE, will create a Tribal Monitoring Plan which will be developed to ensure the on-going management and protection of any resources that may be encountered as Unanticipated Discoveries during construction.

Q: Do you have a response to the testimony of Dr. Cleland and others that underwater prehistoric sites, burials, or shipwrecks may be impacted by the construction of the Great Lakes Tunnel Project?

A: Tunneling beneath waterbodies is a common construction practice. The tunnel is being designed to avoid impacts to the bottomlands of the Straits. The tunnel is designed, constructed, operated, and maintained to meet or exceed federal, state, and local requirements. The tunnel will be constructed using a state-of-the-art pressurized face tunnel boring machine (TBM) which will be custom-designed and fabricated specifically for the Project. Approximately 21-foot inside-diameter tunnel will be constructed using the TBM, starting on the south side. A tunnel receiving shaft will be located on the north side of the Straits.

Direct impacts to bottomlands will not occur as a result of tunnel construction. The proposed tunnel will extend below the lakebed between the north and south side workspaces. No disturbance of the lakebed of the Straits of Mackinac will occur except for the small footprints of two 10 ft x 10 ft temporary water intake structures on each side of the Straits (400 sq ft total impact) which will be in place near the shoreline during construction. Depth of the tunnel will range from 60 feet below the lakebed near the shoreline to over 350 feet near the middle of the Straits, with most of the tunnel alignment located more than 75 feet below the bottom of the lakebed.

A vibration study was conducted by McMillen and Jacobs in January of 2021 to analyze potential impacts due to vibrations caused by the TBM during construction. The study noted that, for depths greater than 75 feet, peak particle velocity (PPV) vibrations from TBMs are on the order of 0.1 inches per second or less. A conservative estimate for vibrations that may cause impacts to very sensitive structures is 0.1 inches per second. Anticipated vibration levels could be close to 0.1 inches per second near the shoreline where the tunnel is less than 75 feet deep. The study noted that while impacts to sensitive sites on the lakebed are not likely to occur due to vibrations from the TBM, location-specific analyses could be conducted to verify potential impacts if sensitive sites are present in near-shore areas where the tunnel is less than 75 feet deep.

As part of the on-going USACE's Section 106 process, Enbridge conducted additional marine archaeological surveys in the Straits in the fall of 2021, including areas where the tunnel may be less than 75 feet deep of cover and where the temporary water intake structures will be placed. A third-party developed a marine survey plan which was reviewed and approved by the USACE and MI SHPO. Survey methodologies included

remote sensing survey utilizing multibeam echosounder, dual frequency side-scan sonar, total-field magnetometer, and subbottom profiler, in addition to remotely operated vehicle investigation for supplemental imagery of any identified targets of potential interest. Tribal officials were present for the duration of the marine archaeological surveys. Data will be analyzed, and results will be submitted to the USACE for their Section 106 review in consultation with MI SHPO and the Tribes. Raw data will also be submitted to MI SHPO, per permit conditions.

Construction of the tunnel will not result in direct impacts to bottomlands. Location-specific vibration analyses could be conducted to verify potential impacts if sensitive sites are determined to be present based on the conducted surveys. The USACE will determine how to address these issues as part of its EIS, where Tribes and others will have the opportunity to provide input.

Q: Do you have a response to Dr. Cleland's criticism of Enbridge with respect to the Bois Blanc Island and Enbridge's efforts to locate tower there?

A: Yes. First, the proposed project on Bois Blanc Island is irrelevant to and unrelated to Enbridge's efforts to construct a tunnel and it is located approximately 8 miles away from the closest workspaces for the tunnel. The Bois Blanc Island tower was proposed to better protect the Straits by monitoring ship traffic within the Straits to help ensure that ship traffic had anchors properly stowed. Second, given its scope there was never any federal requirement to perform an investigation of historic or cultural properties for this tower project. Third, despite no legal obligation to do so, Enbridge did have a Phase I Investigation performed and it confirmed that no historical properties (which would include

cultural resources) listed on the NRHP were located in the tower project area and it did not identify any archaeological resources, including precontact resources were in that project area.

Q: Do you have a response to Dr. Cleland's reference to a January 20, 2020 letter from Dr. O'Shea which references a purported environmental assessment and the assertion of the failure to disclose potential linear stone alignments which may relate to prehistoric use?

A: Yes. First, the Dr. Cleland's testimony and the January 20, 2020 letter (proposed Exhibit BMIC–35) on this matter is based on nothing but unsubstantiated statements of an unknown person. The letter suggests that Enbridge in performing its maritime archaeological assessment in support of its geotechnical survey project relating to drilling samples along the tunnel easement limited that review to shipwrecks. The letter asserts that an unnamed technician was only allowed to review side-scan sonar dataset for shipwrecks and no other cultural resources. Nothing is further from the truth. At no time did Enbridge impose such a limitation. In fact, proposed Exhibit BMIC–36 which is the actual maritime archaeological assessment shows that the review of the side-scan sonar dataset included review of more than shipwrecks. The assessment itself states: "SEARCH identified 32 acoustic contacts within the mosaicked imagery of the APE, including natural, pipeline-related, and unknown features. None of the 32 contacts are likely to represent a submerged cultural resource. SEARCH identified at least 10 natural features in the imagery, including rocks, sand ripples, and other geologic features." Exhibit BMIC-36 at pp. 31 –33. On its face, the assessment was in no way limited to shipwrecks.

Further, with respect to any claim that there is a linear stone alignment within the tunnel easement is unsubstantiated. There are those who claim to have knowledge of that particular feature, but no one has come forward and actually shown that it is within the tunnel easement or APE for this project. Nevertheless, Enbridge has just completed a maritime survey which was monitored by Tribal officials as part of the USACE process. This data is being processed and will be presented to the USACE and if cultural resources are present, then they will be addressed as part of that process.

Q: Does this conclude your rebuttal testimony?

A: Yes.

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

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IN RE ENBRIDGE ENERGY, LIMITED PARTNERSHIP	)	
	)	**Case No. U-20763**
Application for the Authority to Replace and Relocate the Segment of Line 5 Crossing the Straits of Mackinac into a Tunnel Beneath the Straits of Mackinac, if Approval is Required Pursuant to 1929 PA 16; MCL 483.1 *et seq.* and Rule 447 of the Michigan Public Service Commission's Rules of Practice and Procedure, R 792.10447, or the Grant of other Appropriate Relief	)	

REBUTTAL TESTIMONY

OF PAUL EBERTH

On behalf of the Enbridge Energy, Limited Partnership

December 14, 2021

Q: Would you please state your name, title and business address?

A: My name is Paul Eberth and my title is Director, Tribal Engagement, Public Affairs, Communication, & Sustainability. I am serving as a witness on behalf of Enbridge Energy, Limited Partnership ("Enbridge"). My business address is 26 E Superior St, Duluth, MN 55802.

Q: Would you please describe your educational background and work experience?

A: In 2001, I earned a Bachelor of Science degree in industrial engineering from the University of Minnesota Duluth. Since 2003, I have held various positions of increasing responsibility within Enbridge.

Q: Would you please describe your job responsibilities?

A: I am responsible for developing and implementing Enbridge's efforts to build effective, mutually beneficial relationships with the Indigenous people and communities near our operations and implementing Enbridge's Indigenous People's Policy within the United States. Enbridge is committed to fostering strong, respectful, long-term relationships with Indigenous nations and groups throughout North America and over the lifecycle of our assets. We believe that building, enhancing and sustaining these relationships is an operating expectation—and the right thing to do.

Q: What is the purpose of your rebuttal testimony?

A: The purpose of my testimony is to respond to various statements claiming that Enbridge does not honor or respect Tribal Nations or their treaty rights.

Q: Has Enbridge made a commitment to have strong relationships with Tribal Nations?

A: Yes. Enbridge is committed to fostering strong, respectful, long-term relationships with Indigenous nations and groups throughout North America. We believe that building, enhancing and sustaining these relationships is an operating expectation—and the right thing to do. Enbridge recognizes and respects Indigenous communities as distinct peoples, with their own cultures and priorities. Wherever our operations neighbor with Indigenous communities and intersect their tribal, treaty, and traditional lands, we seek to partner and engage with them to reduce our operational impacts and maximize the social and economic benefits we can bring.

Based on a shareholder resolution brought forward at Enbridge's 2017 Annual General Meeting, Enbridge committed publicly to expand reporting on the steps we are taking to: (1) implement our Indigenous Peoples Policy, and (2) integrate Indigenous rights sensitivities into our investment review processes through early identification across our different types of investments. A copy of Enbridge's Indigenous Peoples Policy is Exhibit A-19 and enhanced annual public reporting on Enbridge's engagement with Indigenous People began in 2018.

Q: Has Enbridge implemented its Indigenous People's Policy?

A: Yes. We engage in forthright and sincere consultation with Indigenous Peoples about Enbridge's projects and operations through processes that seek to achieve early and meaningful engagement so their input can help define our projects that may occur on lands traditionally used by Indigenous Peoples. For example, Enbridge has committed to achieving 3.5% representation within our workforce of Indigenous People by 2025. This would be up from our current percentage of 2.5%. A further example is that in our Great

Lakes Region, which includes the State of Michigan, all Great Lakes' Operations staff and regional support roles were strongly encouraged to undertake Indigenous awareness training in 2021 and Enbridge, as a whole, has committed to have all Enbridge employees and contractors undertake the Indigenous awareness training by the end of 2022. Another example of this commitment occurred in a recent project, where Enbridge spent $38 million dollars on wages with Indigenous people and $318 million dollars with Indigenous businesses. With respect to that project, Enbridge also spent $1.7 million dollars in community investment that directly supports the tribal communities along that project, and Enbridge provided workforce training for tribal members interested in working on the project.

Q: Based on the Indigenous Peoples' Policy did Enbridge meet with the 1836 Treaty Tribes?

A: Yes. For example, in 2018, Enbridge attended a meeting with all of the 1836 Treaty Tribes, including: Bay Mills Indian Community, Grand Traverse Band of Ottawa and Chippewa Indians, Little River Band of Ottawa Indians, Little Traverse Bay Bands of Odawa Indians, Sault Ste. Marie Tribe of Chippewa Indians. The attendees included Enbridge's V.P. of U.S. Operations and Enbridge's Director of the Great Lakes Region, Tribal Chairs from three of the Tribes, along with other Tribal representatives, and staff from the Chippewa Ottawa Resource Authority (CORA), which is a tribal authority consisting of the 1836 Treaty Tribes. Discussion at the meeting included the First Agreement Between Enbridge and Michigan (Exhibit A-8). Tribal treaty rights, and information sharing protocols.

Q: Did Enbridge offer to meet with tribes after Enbridge agreed with the State to construct the tunnel?

A: Yes. Exhibit A-20 is an example of the November 22, 2019, Letter from Enbridge's Director, Great Lakes Region sent to all the chairs of the CORA Tribes inviting them to attend a summit regarding ongoing activities in the Straits of Mackinac. The letter offered to discuss the following:

> • Participation in various anchor strike mitigation action plans and implementation, including direct input and participation by tribal participants.
>
> • Measures for tribal "eyes on the pipeline" and building the capacity of tribal staff and Enbridge staff to learn alongside one another and understand and participate in activities around the Straits.
>
> • Set in motion a larger set of conversations on the future utilizing Michigan tribal environmental knowledge, technology improvements, and how we find a way forward in a long-term energy conversation.
>
> • Set joint expectations on real staff interactions for information exchange and away from perceptions regarding publicity, checking boxes, etc. These relationships and field work opportunities would be those developed and grown through staff to staff engagement, work groups, and long-term structures for input, exchange, and sensitivity to many perspectives.

On January 9, 2020 and March 2, 2020, we sent invitations to the CORA Tribes and requested to meet to discuss with us the design for the tunnel. Exhibit A-21.

Before filing our Application in this proceeding, Enbridge's Project Manager sent another communication to the CORA Tribes, stating:

> "While we are filing applications with various regulatory agencies, it is of critical importance that I share with you that **this is not the end of our dialogue – it is only the beginning**.
>
> "While we file the project applications to move through the regulatory processes; I remain committed to working with you, as a Nation, to learn what I can; respond to your questions; and discuss how this project can be built. Your insights and perspectives on the project matter to us, and can help shape how we design, build and realize its completion." Emphasis in the original. (Exhibit A–22.)

Enbridge has sought and will continue to be open to tribal input with respect to the tunnel project.

Q: Have tribes participated in the regulatory process?

A: Yes. Tribes located in Michigan have filed comments in the Michigan Department of Environment, Great Lakes, and Energy (EGLE) permit process and Bay Mills Indian Community has filed an appeal with respect to one of the permits which is pending. Four tribes have also intervened to oppose this Application.

In addition, as part of the U.S. Army Corps of Engineers (USACE) permit process Enbridge invited 13 tribes to observe Enbridge's recent marine survey and geophysical cultural survey. The Little Traverse Bay Bands of Odawa Indians, Bay Mills Indian Community, and Sault Ste. Marie Tribe of Chippewa Indians through their tribal historic preservation offices observed portions of these surveys. We welcomed this participation and look forward to continuing to work with them to ensure resources are better protected.

While not required by the USACE process, as shown in Exhibit A-23 we had recently in the summer of 2021 extended invitations to observe both the collecting of additional geological data to establish soil and rock properties within our proposed work site on the south side of the Straits and a plant survey on the north side of the Straits. These invitations were not responded to.

We understand that Enbridge and tribes will not agree on everything. Nevertheless, Enbridge remains open to dialogue with tribes about the tunnel and other topics. Enbridge is committed to providing access to information on our projects and operations in Michigan

to tribes and also providing necessary capacity funding for tribal participation in our project activities to ensure tribes have the necessary resources for productive engagement.

Q: Does this conclude your rebuttal testimony?

A: Yes.

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

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IN RE ENBRIDGE ENERGY, LIMITED PARTNERSHIP	)	
	)	**Case No. U-20763**
Application for the Authority to Replace and Relocate the Segment of Line 5 Crossing the Straits of Mackinac into a Tunnel Beneath the Straits of Mackinac, if Approval is Required Pursuant to 1929 PA 16; MCL 483.1 *et seq.* and Rule 447 of the Michigan Public Service Commission's Rules of Practice and Procedure, R 792.10447, or the Grant of other Appropriate Relief	)	

REBUTTAL TESTIMONY

OF AMBER PASTOOR

On behalf of the Enbridge Energy, Limited Partnership

December 14, 2021

Q: Would you please state your name, title and business address?

A: My name is Amber Pastoor and my title is Manager Project Services. I am a manager responsible for the Straits Line 5 Replacement Segment or Project. I am serving as a witness regarding this Project on behalf of Enbridge Energy, Limited Partnership ("Enbridge"). My business address is 200, 425 1 Street SW, Calgary, AB T2P 3L8, Canada

Q: Are you the same Amber Pastoor who filed direct testimony in this proceeding?

A: Yes.

Q: What is the purpose of your rebuttal testimony?

A: The purpose of my rebuttal testimony is to respond to various issues relating to the construction of the tunnel and replacement pipe segment raised by Staff and intervenors.

Q: Do you agree with Dr. Stanton's description of the "no action" alternative set forth in her direct testimony?

A: No, I disagree with her description of a "no action" alternative. A true "no action" alternative is maintaining the status quo, which means the continued operation of the Dual Pipelines and not their closure. The Commission has already approved Enbridge's authority to construct, maintain and operate the Dual Pipelines in its 1953 Order (Exhibit A-3 at pp. 4, 5, and 9) and "no action" would mean the continuing operation of the Dual Pipelines.

Q: Do you agree with Dr. Stanton's testimony that the purpose of the Project can be accomplished by "shutting down the existing pipelines and taking no action to replace the pipelines with a new segment"?

A: I disagree. The purpose of the Project has always been to allow for the continuing operation of Line 5 which has been previously approved and determined to serve important public needs, and to make Line 5's already safe crossing of the Straits even safer. In part, the need for Line 5 is evidenced by the Commission's 1953 Order, as well as the Second Agreement where the State of Michigan recognized that "the continued operation of Line 5 serves important public needs." Exhibit A-10, at p. 1. In entering the Third Agreement, the State of Michigan agreed that Enbridge may continue to operate the Dual Pipelines until the replacement segment was located within the tunnel and in service. Exhibit A-1 at p. 4. The State of Michigan recognized that the completion of the Project "is expected to eliminate the risk of a release from Line 5 at the Straits." Exhibit A-1 at p. 4. Thus, the purpose of the Project has always been to allow for the continuing operation of Line 5 while making an already safe crossing of the Straits even safer.

Q: Has the Governor's Notice of Revocation and Termination of [the 1953] Easement referenced by Dr. Stanton altered the purpose of the Project?

A: No. The lawsuit pending before the U.S. District Court of the Western District of Michigan that was initiated by the State of Michigan, Governor, and Michigan Department of Natural Resources (collectively "State of Michigan") to enforce the Notice of Revocation and Termination was voluntarily dismissed by the State of Michigan on November 30, 2021 (see Case 1:20-cv-01142). Enbridge's own lawsuit, through which it seeks declaratory and injunctive relief to preclude the State of Michigan's attempts to shutdown Line 5, remains pending before the U.S. District Court of the Western District of Michigan, which has recently allowed Enbridge to file a motion for summary judgment (see Case 1:20-cv-01141). Enbridge also provided a written response to the issues raised by the notice, which

is my Exhibit A-24. In addition, the State of Michigan's Notice of Revocation and Termination caused the Government of Canada to formally invoke the dispute resolution provisions of Article IX of the 1977 Transit Treaty between the United States and Canada, where Canada is challenging Michigan's attempt to impede operation of Line 5. The treaty calls upon the United States and Canada to first negotiate a resolution of this dispute. If those negotiations fail, the treaty allows for either party to submit the dispute to a binding international arbitration.

It is also important to note that the Second Agreement (Exhibit A- 10), the Third Agreement (Exhibit A-1), the Tunnel Agreement (Exhibit A-5), and the Tunnel Easement (Exhibit A-6) remain valid and in effect, unaffected by the Notice of Termination and Revocation. Accordingly, Line 5's operation and the Project have been unaltered by the Notice of Termination and Revocation.[1] Enbridge is continuing to operate Line 5 in order to serve the public's needs and Enbridge is moving forward on its agreements with the State of Michigan to relocate the Line 5's Strait crossing within a tunnel to make an already safe crossing even safer.

Q: Do you have a response to Mr. Ponebshek pre-filed testimony at page 18 line 14 through page 19 line 2 recommending a detailed risk management plan to address geotechnical test bores and probe-hole testing ahead of the TBM as well as various inspections while the tunnel is being constructed?

A: Enbridge agrees with the importance of risk management, including inspection of the tunnel as it is being constructed. The tunnel construction is governed by the Tunnel

[1] The Governor's November 30, 2021 Press Release announcing the voluntary dismissal of the State's lawsuit stated that: "Today's action does not impact Enbridge's efforts to build a tunnel under the Straits of Mackinac."

Agreement (Exhibit A-5) which is entered into between Enbridge and the Mackinac Straits Corridor Authority pursuant to the statutory authority granted by Act 359. Enbridge has worked with the Corridor Authority in accordance with the Tunnel Agreement to manage and minimize risk in constructing the tunnel. For example, the Joint Specifications were developed using a risk-informed design process. This includes Joint Specification (317416) relating to the inspections of precast concrete segments prior to moving them into the tunnel and after being put into place. This Joint Specification also governs gasket materials, properties, testing, storage, and installation on segments. Enbridge will continue to work with the Corridor Authority in accordance with the Tunnel Agreement as it develops plans that include elements for managing risk as part of Construction Execution Plan, which is required by the Tunnel Agreement. It is anticipated that probe-hole testing ahead of the TBM will be addressed in the Construction Execution Plan.

As far as access to real time data gathered during construction, the Tunnel Agreement requires an Independent Quality Assurance Contractor who is unaffiliated with Enbridge to report to the Corridor Authority. The Independent Quality Assurance Contractor will have access to construction documents, monthly progress reports, and the construction sites. Exhibit A-5, p. 13 ¶7.8. Risk management is important to both Enbridge and the Corridor Authority and it is and will be continuously addressed within the framework created by Act 359 and the Tunnel Agreement.

Q: Does this conclude your rebuttal testimony?

A: Yes.

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REBUTTAL TESTIMONY

OF AARON DENNIS

On behalf of the Enbridge Energy, Limited Partnership

December 14, 2021

Q: Would you please state your name, title and business address?

A: My name is Aaron Dennis and my title is Engineer Specialist. I am serving as a witness on behalf of Enbridge Energy, Limited Partnership ("Enbridge"). My business address is 200, 425 1 Street SW, Calgary, AB T2P 3L8, Canada Calgary.

Q: Are you the same Aaron Dennis who filed supplemental direct testimony in this proceeding?

A: Yes.

Q: What is the purpose of your rebuttal testimony?

A: The purpose of my rebuttal testimony is to respond to various issues relating to the construction of the tunnel and replacement pipe segment raised by intervenors.

Q: Do you have a response to Mr. Cooper's pre-filed testimony at page 15 regarding his recommendation for heat treatment of the tunnel riser girth welds?

A: Enbridge does take into consideration heat treatment of its girth welds. For each project, Enbridge establishes a Welding Procedure Specification (WPS) that will require that the girth welds meet or exceed the strength, ductility, and hardness of the pipe used in the project. (See, Exhibit A-7, page 3 for the description of the pipe to be used this project.) This standard is established by Enbridge's own requirements, API 1104 – "Welding of Pipelines and Related Facilities," and applicable provisions of ASME/ANSI B31.4. The purpose of the standard is to ensure that girth welds are never a weak point in a pipeline. As part of the WPS, there will be an established preheat temperature which must be maintained for a specified time on each side of the weld joint until the completion of first

full pass. There will also be an interpass temperature range established that must also be maintained between passes.

The WPS will ensure that the standards for strength, ductility, and hardness are met through destructive sample testing in accordance with 49 CFR 195.214 Welding Procedures and API 1104 – "Welding of Pipelines and Related Facilities."

Given the thickness and quality of the pipe to be used in this Project and modern welding techniques, Enbridge fully expects to meet or exceed the strength, ductility, and hardness standard for the girth welds without using any additional post weld heat treatment (PWHT) or post thermal insulation. However, if the destructive testing of samples as required by 49 CFR 195.214 and API 1104 were to show that additional PWHT or post thermal insulation of the welds is required to meet the standard for strength, ductility, and hardness of the girth weld, then they would be included within the WPS.

Q: Do you have a response to Dr. Cleland's concerns about the construction of the Project causing a release from the Dual Pipelines?

A: The construction of the Project will not cause a release or otherwise impact the operations of the Dual Pipelines.

The construction activities on the north and south shores will not cause any impacts on the Dual Pipelines. The tunnel portal and shaft locations are safely offset from the existing pipeline, which minimizes any risk of construction impacts to the pipeline during portal and shaft excavations. Ground movements from the excavation will be limited by the excavation support systems as well as the distance, and will have no influence on the existing pipeline. Excavation-related vibrations are expected to be well below levels that

are tolerable to buried pipelines, but will be monitored to verify that stringent vibration limits are not exceeded. Construction of similar shaft/portal excavations is frequently performed adjacent to busy urban streets without damage to sensitive urban infrastructure – at distances much closer than the 140 ft (south) and 380 feet (north) planned for this project.

Construction of the tunnel under the Straits will be entirely in rock, by means of a pressurized face tunnel boring machine (TBM). The TBM supports the rock face during tunnel advance, and the precast concrete tunnel lining is installed inside a protective steel shield. The annular space between the excavated rock and the tunnel lining is filled with grout as the TBM advances, so there is no "lost ground" and no settlement.

At shallow depths in rock, TBM tunneling does result in small but measurable vibrations as the cutting tools advance through the rock. These vibrations can be estimated based on comparison with TBM case histories where vibration levels were monitored with seismographs. For the Project, in the areas of shallowest depth within a few hundred yards of the shoreline, vibrations (measured as peak particle velocity of the ground at the existing pipeline) are expected to be less than 0.05 inches per second (ips). This is two orders of magnitude lower than typical industry limits of 5 ips (US Bureau of Mines RE 9523, "Surface Mine Blasting Near Pressurized Transmission Pipelines"), and will have no adverse impact on the existing pipelines.

Q: Do you have a response to Mr. Rowdan's concern that there is a threat that untreated drilling fluid may be released into the Straits?

A: While it is unclear how Mr. Rowdan believes the untreated drilling fluid might enter the Straits, he seems to be confusing inadvertent returns (also known as frac-outs) (IRs) which might occur during a horizontal directional drill (HDD) process with a tunneling process. The mechanics of an HDD and a slurry TBM are very different.

One of the key differences between an HDD and tunneling is that throughout tunneling the slurry TBM imparts a low volume of drilling or slurry fluid at the rock/cutterhead interface. The slurry pressure at the face is closely monitored to maintain it at target levels which counterbalance but do not exceed the ground and groundwater pressures as the TBM advances. These slurry pressures will be closely controlled and automated fail-safe mechanisms will be in place to avoid pressure spikes and this pressure control avoids an IR.

In addition to the low volume of slurry fluid and the fail-safe mechanisms there are other key differences that help eliminate an IR during tunnelling. These include the installation of the precast tunnel lining and the annulus grouting as tunneling progresses, the transportation of the mixture of rock cuttings and slurry fluid being pumped within a closed system to the surface where the slurry fluid is separated, recycled, and reused, and the tunnel's depth of cover.

Q: Does this conclude your rebuttal testimony?

A: Yes.

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

****

IN RE ENBRIDGE ENERGY, LIMITED PARTNERSHIP	)	
	)	**Case No. U-20763**
Application for the Authority to Replace and Relocate the Segment of Line 5 Crossing the Straits of Mackinac into a Tunnel Beneath the Straits of Mackinac, if Approval is Required Pursuant to 1929 PA 16; MCL 483.1 *et seq.* and Rule 447 of the Michigan Public Service Commission's Rules of Practice and Procedure, R 792.10447, or the Grant of other Appropriate Relief	)	

REBUTTAL TESTIMONY

OF JEFFRY D. BENNETT

On behalf of the Enbridge Energy, Limited Partnership

December 14, 2021

Q: Would you please state your name, title and business address?

A: My name is Jeffry Bennett and my title is Senior Air Quality Engineer. I am serving as a witness on behalf of Enbridge Energy, Limited Partnership ("Enbridge"). My business address is 1001 Diamond Ridge, Suite 100, Jefferson City, Missouri 65109.

Q: Would you please describe your educational background and work experience?

A: I have a Bachelor of Science in Chemical Engineering from the University of Missouri – Columbia. Further, I have 28 years of experience in air quality management, permitting, control, and regulation including nearly 20 years with the Missouri Department of Natural Resources Air Program. Also, I have considerable expertise with emission inventory generation for use in ozone, $PM_{2.5}$, and regional haze modeling analyses. Specifically, I was the principal author of the St. Louis 1-hour and 1997 8-hour ozone and 1997 and 2006 $PM_{2.5}$ attainment demonstrations as part of the State Implementation Plans (SIPs) including development of the technical support documents for those plans. The technical support documents included creation and extensive quality assurance of base-year and future year air emission inventories for point, area, mobile, and non-road mobile sources. In addition, I have generated Greenhouse Gas Emission inventories for use in air quality construction permits using mass balance and accepted emission factors. Finally, my regulatory experience includes air quality analysis that were included as part of National Environmental Policy Act (NEPA) reviews.

Q: What is the purpose of your rebuttal testimony?

A: The purpose of my rebuttal testimony is to respond to the assertion made by Mr. Erickson that the differences in greenhouse gas (GHG) emissions associated with transporting oil by

rail compared to a pipeline are small.[1] He asserts that the difference is about 6 kg carbon dioxide equivalent (CO_2e) per barrel of crude oil and that represents an approximate increase of 1 million metric tons of CO_2e per year (6 kg CO_2e per barrel * 450,000 barrels per day * 365 days per year / 1000 kg per metric ton). My calculations for the operation of existing Line 5 conclude that just slightly over 200,000 metric tons CO_2e per year are emitted and that the increase for tunnel operations will amount to approximately 440 metric tons CO_2e per year. Assuming rail transportation is available, my calculations show the GHG emissions from shipping crude oil by Line 5 by rail depending on the route would result in 0.9 to 1.9 million metric tons CO_2e per year. This represents a 4-to-9-fold increase in GHG emissions for rail transport compared to relocating Line 5's Straits crossing within a tunnel. Overall, my analysis shows that from a GHG emission standpoint only, the best alternative would be the no action alternative where the Dual Pipelines continued to be operated. The next best alternative would be to relocate Line 5's Straits crossing within a tunnel. The worst approach by far among these three alternatives would be the use of rail transport.

Q: From a strict GHG emissions standpoint, what is the best alternative to the tunnel project?

A: From a strict GHG emissions standpoint, the best alternative would be a true no action alternative where the Dual Pipelines continued to operate. This would save the GHG emissions related to the construction and operation of the tunnel. To be clear, I am not advocating or recommending this approach, but if the only concern was GHG emissions

[1] Pre-filed Direct Testimony of Mr. Erickson at page 30.

then the best approach would be the status quo. Not constructing the tunnel would eliminate the relatively modest GHG emissions relating to the construction and operation of the tunnel.

Q: Have you determined if rail is a feasible alternative to relocating the Line 5 crossing within a tunnel?

A: No, I have not and neither has Mr. Erickson. For the purpose of my GHG emission analyses, I have simply assumed rail transport is a feasible alternative.

Q: How did you calculate the GHG emissions for rail?

A: First, I analyzed the GHG emissions to construct the loading facilities at or near Superior, Wisconsin and unloading facilities at Sarnia, Canada. These are the beginning and endpoints for Line 5. These loading facilities do not currently exist and consistent with the tunnel alternative, would need to be constructed. Next, I looked at the operational impact of shipping the amount of oil shipped on Line 5 by rail over the two possible routes. These routes are shown on Exhibit A-25. The northern route is approximately 1,750 miles and the southern route approximately 800 miles. Note that my analysis does not include the transfer of natural gas liquids (NGL) to Rapid River, Michigan which if transported by rail would further inflate the rail transport GHG emissions.

Q: What is the result of your analysis?

A: As shown on Table 1 below, the northern or southern rail routes result in significantly higher GHG emissions than relocating Line 5's Straits crossing within a tunnel. Table 1 compares the GHG impacts for the no action alternative (i.e., the status quo), the GHG

emissions for the tunnel construction as calculated by Mr. Erickson and tunnel operation along with the GHG emissions for rail (including the construction of the loading and unloading facilities), which I have calculated.

Table 1 Summary of GHG Emission Calculations

Source Type	No Action Alternative	Line 5 (including Tunnel)	Rail Alternative - Northern Route	Rail Alternative - Southern Route
Construction GHG Emissions (CO_2e total metric tons)	-	87,000*	11,657	11,657
Operational GHG Emissions (CO_2e metric tons per year)	207,311	207,755	1,888,403	881,467

*Erikson, page 11 and Table 1, page 14

When these transportation alternatives are compared, rail is by far the worst alternative under consideration from a GHG perspective whether it is over the northern or southern route. Exhibit A-26 contains the data and calculations relied upon in creating Table 1.

Q: Do you agree with Mr. Erickson's scope of including the production and use of fossil fuels in his analysis of whether rail is an appropriate alternative?

A: No, the scope of the GHG emissions analysis that includes the production and use of the transported products goes beyond the pipeline versus rail alternative question. Pursuant to the Greenhouse Gas Protocol, the emissions for this alternative comparison should only account for the GHG emissions related to the transport of the products and should not include either the GHG emissions caused by the producer of the product being shipped or the user of the product. For example, a parcel delivery service, such as Fed Ex, would be

assigned the GHG emissions for its operations and not assigned the GHG emissions that are caused in producing the good. Those are assigned to the producer of the product. Similarly, the delivery service is not assigned the GHG emissions that are caused by using the good. Those are assigned to the user of the good. Those same principles apply here. Enbridge does not own, produce, or use the product shipped on its pipeline. This is important because it allows for a sound comparison between differing transporters and transportation methods and allows decision makers to select the method that emit the least amount of GHG. Ultimately, it is reasonable to place the responsibility for the GHG emissions on the causer of those GHG emissions (i.e., the producer and consumer of the goods) and not on the shipper.

Q. Does this conclude your testimony?

A. Yes.

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of **ENBRIDGE ENERGY LIMITED PARTNERSHIP** Application of the Authority to Replace and Relocate the Segment of Line 5 Crossing the Straits of Mackinac into a Tunnel Beneath the Straits of Mackinac, if Approval is Required Pursuant to 1929 PA 16: MCL 483 1 et seq. and Rule 447 of the Michigan Public Service Commission's Rules of Practice and Procedure, R. 792.10447, or the Grant of other Appropriate Relief	§ § § § § § § § § § § § § § § § § §	Case No. U-20763

REBUTTAL TESTIMONY OF NEIL K. EARNEST

ON BEHALF OF
ENBRIDGE ENERGY LIMITED PARTNERSHIP

December 14, 2021

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REBUTTAL TESTIMONY
OF
NEIL K. EARNEST

I. INTRODUCTION

Q. Please state your name, current position, and business address.

A. Neil K. Earnest, President of Muse, Stancil & Co. ("Muse"). The business address is 5080 Spectrum Dr., Suite 600E, Addison, TX, 75001.

Q. Please provide an overview of your professional background.

A. I hold a Bachelor of Science in Chemical Engineering from Michigan State University, and a Masters of Business Administration from the University of Houston – Clear Lake. I am a Professional Engineer, in the discipline of Chemical Engineering, registered in the State of Texas. I have over 35 years of professional experience in the downstream sector of the energy industry, and I have testified in a number of regulatory proceedings, international arbitrations, and civil litigation proceedings. My expert qualifications are further set forth in my curriculum vitae attached as Appendix 1.

Q. What is Muse?

A. Muse is an employee-owned consultancy founded in 1983 that specializes in providing a combination of technical and economic consulting services concerning the downstream sector of the energy industry. Muse is headquartered in Addison, Texas (a suburb of Dallas), with additional offices in London, Houston, and Singapore.

Q. What is the purpose of your testimony?

A. I have been asked by Enbridge Energy Limited Partnership ("Enbridge") to provide rebuttal testimony that addresses various assertions regarding the impact of closing Line 5 and not constructing the Line 5 Straits of Mackinac tunnel (the "Project") made by Mr. Peter A. Erickson in his direct testimony dated September 14, 2021 (the "Erickson Report"). Appendix 2 provides a glossary of terms used throughput my report.

Q. What is Line 5 and what does it do?

A. Line 5 is a pipeline segment in the larger Enbridge Mainline pipeline system (the "Mainline"). Line 5 transports natural gas liquids ("NGLs") and several grades of light crude oil in discrete batches. The Line 5 pipeline begins at Superior, Wisconsin, and terminates at Sarnia, Ontario. A relatively small volume of Michigan crude oil is also received by Line 5 at Lewiston, Michigan. The NGLs are delivered to fractionators located at Rapid River, Michigan, and Sarnia. The continued operation of Line 5 is also necessary for the operation of the NGLs fractionator located at Superior. The Superior and Rapid River fractionators provide propane to local markets, and the large Sarnia fractionator provides propane and butanes to the regional market. The crude oil transported by Line 5 is delivered at either Marysville, Michigan, or Sarnia. From Marysville, refineries located in Michigan and northern Ohio can be accessed, and refineries in western Pennsylvania, Ontario, and Quebec can be accessed from Sarnia.

Q. What is the Enbridge Mainline and what does it do?

A. The Mainline originates in Alberta and has both receipt and delivery points in Alberta, Saskatchewan, Manitoba, and the Upper Midwest. In Ontario only deliveries are made. The Mainline transports a wide variety of crude oil grades, most of which are Canadian grades received in Western Canada. The Mainline receives lesser volumes of U.S. crude oils in Western Canada, Minnesota, and the Chicago area. The NGLs originate in Western Canada and are delivered only to the fractionators at Superior, Rapid River, and Sarnia. The Mainline also transports refined product in Western Canada.

II. OVERVIEW OF ERICKSON METHODOLOGY

Q. Please summarize the analytical methodology used by Mr. Erickson to support his conclusion that there are significant greenhouse gas emissions associated with the Project.

A. Mr. Erickson's methodology has the following steps:[1]

1. Estimation of the increase in U.S. and Canadian light crude oil **supply costs** due to the use of rail rather than Line 5;[2]

2. Calculation of the **volume** of U.S. and Canadian light crude oil that would **not** be produced due to the higher supply costs;[3]

3. Calculation of the increase in the average **global** marginal crude oil **supply cost** due to the higher U.S. and Canadian light crude oil supply costs;[4]

[1] To be clear, the steps are my labels for Mr. Erickson's methodology.
[2] Erickson Report, pg. 28, lines 13-18.
[3] Ibid., pg. 31, lines 7-16.
[4] Ibid., pg. 36, lines 7-16.

4. Calculation of the impact of the increase in global crude oil supply cost on the **global** crude oil **price**;[5]

5. Calculation of the impact of the increase in global crude oil price on **global** crude oil **demand**; and[6]

6. Calculation of the impact of the changed global crude oil demand and rail transportation usage (versus using Line 5) on global **greenhouse gas ("GHG") emissions**.[7]

Q. Do you have any overarching observations regarding Mr. Erickson's methodology?

A. Yes. Each step of Mr. Erickson's methodology must be correct for his estimate of the increased GHG emissions associated with the Project to be correct. However, the methodology used in Steps 1 and 3 is flawed. In addition, Mr. Erickson has made substantive mathematical errors in Steps 1, 2, 3, and 4. I also note that Mr. Erickson must further assume that if the Project is not completed, then Line 5 will be closed. My understanding is that the merits of that assumption are being addressed in various legal proceedings and pursuant to the dispute resolution provision set forth in the 1977 Agreement between the Government of the United States and the Government of Canada concerning Transit Pipelines, 28 U.S.T. 7449.[8]

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[5] Ibid., pg. 36, lines 16-17.
[6] Ibid., pg. 37, lines 8-12.
[7] Ibid., pg. 37, lines 12-13.
[8] See, *State of Michigan, et al., v. Enbridge Energy, Limited Partnership et al,* Case No. 1:20-cv-1142, W.D. Mich., Nov. 16, 2021, Opinion and Order (Honorable Judge Janet Neff).

III. ERICKSON STEP 1: ESTIMATION OF U.S. AND CANADIAN SUPPLY COST INCREASE

Q. What is the purpose of Step 1?

A. Step 1 is intended to estimate the supply cost implications of closing Line 5 on certain grades of crude oil. Evidently because Line 5 only transports light crude oil grades, Mr. Erickson limits his analysis to the impact on the supply costs for the conventional light crude oils produced in the Western Canadian Sedimentary Basin ("WCSB") and the Williston Basin.[9] The oil industry generally refers to the conventional Western Canadian light crude oil as "Mixed Sweet crude oil," and the production from the Williston Basin as "Bakken crude oil." Mixed Sweet crude oil is a blend of the production from a large number of individual fields located throughout Western Canada, primarily in Alberta, whereas Bakken crude oil is mostly produced in a fairly limited area in North Dakota.

Q. What is the stated basis for Mr. Erickson's view that closing Line 5 will increase the supply cost for Mixed Sweet and Bakken crude oil?

A. Mr. Erickson states that "*[t]akeaway capacity for crude oil from the greater Williston Basin has been constrained in the past, and likely will be constrained in the coming years.*"[10] Mr. Erickson further claims that a draft report by the Canada Energy Regulator ("CER") shows that "*Western Canada will have only about 100,000 bpd of spare capacity in the system by 2030.*"[11] Line 5 currently transports up to 460,000 barrels per day ("b/d") of crude oil (plus another

[9] Mr. Erickson collectively refers to these basins as the "greater Willison Basin," which is a term that is not used by the oil industry. See Erickson Report, pg. 28, lines 11-12.
[10] Erickson Report, pg. 33, lines 8-9. Bracket added.
[11] Erickson Report, pg. 33, lines 12-13.

80,000 b/d of NGLs). Because of these purported pipeline constraints, Mr. Erickson asserts that the closure of Line 5 will force crude oil producers to switch from pipeline to rail, at a significantly higher cost.[12]

Q. Are Mr. Erickson's claims regarding constraints in the pipeline takeaway capacity from the "greater Willison Basin" well founded?

A. No. As an initial matter, the CER draft report is discussing the takeaway capacity from Western Canada for Canadian crude oil, whereas Mr. Erickson includes both Canadian and U.S. (Bakken) crude oil in his "greater Willison Basin" region. Per his methodology, if Mr. Erickson desires to offer an expert opinion regarding the impact of the Project on Bakken crude oil production costs, he needs to consider the pipeline takeaway capacity from North Dakota. Mr. Erickson provides no analysis whatsoever concerning North Dakota pipeline takeaway capacity (or any other U.S. region). This is a substantive methodological flaw in Mr. Erickson's analysis and, as a consequence, he has no basis for any expert opinion regarding the impact of closing Line 5 on U.S. crude oil costs.

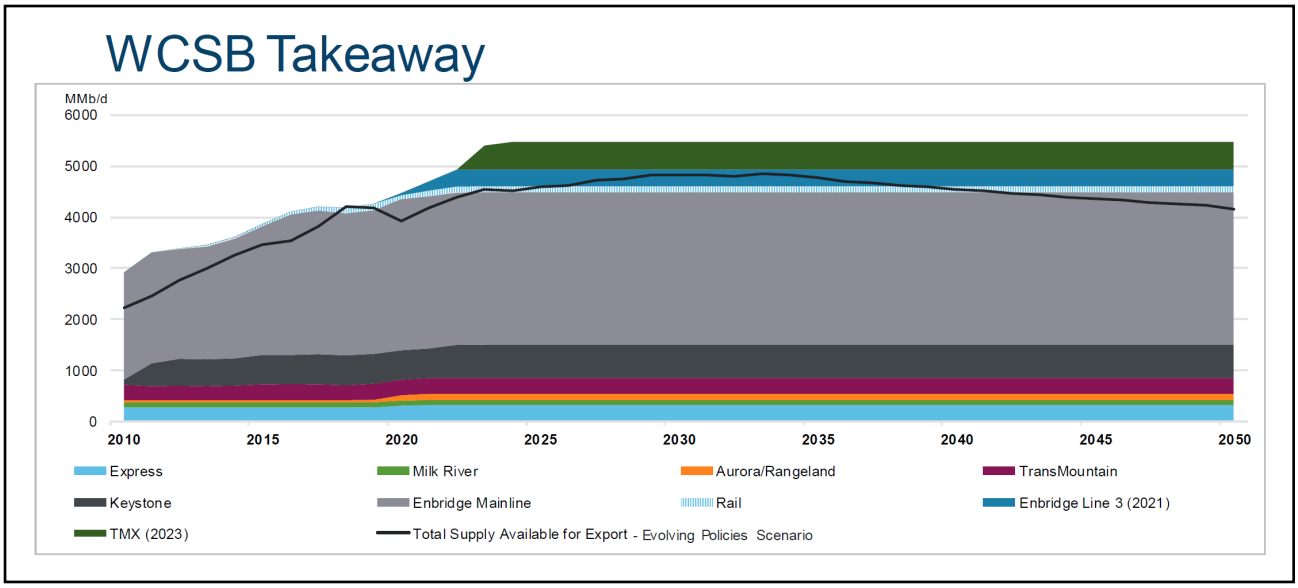
Q. Has Mr. Erickson appropriately characterized the CER draft report regarding the takeaway capacity from Western Canada?

A. No. The CER plainly is **not** in agreement with Mr. Erickson about the takeaway capacity in Western Canada. I provide as Figure 1 the CER graph that Mr. Erickson references in his report.[13] The CER is projecting that there will be about 500,000 b/d of spare capacity in 2030, not the 100,000 b/d that

[12] Erickson Report, pg. 28, lines 6-11; pg. 29, lines 5-6.
[13] Figure 1 is from CER Energy Futures 2021, Consultation on Preliminary Results, July 2021, pg. 9. The citation to this figure in the Erickson Report is found at pg. 33, footnote 53.

Mr. Erickson claims. The evidence that Mr. Erickson himself provides refutes his claim that closing Line 5 will increase the supply cost of Western Canadian crude oil because of pipeline capacity constraints. Consequently, Mr. Erickson does not have a basis for any claim for higher Canadian crude oil supply costs.

Figure 1



Q. Does Mr. Erickson explain his assessment that there is only 100,000 b/d of spare pipeline capacity in the system when the CER draft report indicates that there is 500,000 b/d of spare capacity?

A. At best, only somewhat cryptically. Mr. Erickson offers the following parenthetical expression: "*(and assuming continued delay in the Trans Mountain Pipeline expansion project to Vancouver, B.C.)*."[14] Referring back to the CER projection shown in Figure 1 above, the Trans Mountain Pipeline Expansion Project is identified in the legend box as "TMX (2023)", and is shown by the dark

[14] Erickson Report, pg. 33, lines 14-15. Parentheses in the original. The pipeline actually terminates at Burnaby, British Columbia, not Vancouver.

green area at the top. Mr. Erickson does not elaborate further on any basis for a continued delay.

Q. Is it reasonable to assume continued delay in the Trans Mountain Pipeline Expansion Project?

A. No. The Trans Mountain Pipeline is owned by the Canadian government, and the ongoing Trans Mountain Expansion Project is scheduled for mechanical completion in late 2022, with commercial operations commencing soon after.[15] As of June 30, 2021, construction was 29 percent complete, and total capital spending since project inception has totaled C$8.4 billion.[16] It should be noted that the Trans Mountain Expansion Project traverses only Canada, and its completion is entirely within the control of the Canadian government. Nonetheless, Mr. Erickson assumes that by even 2030 the Trans Mountain Expansion Project would not be completed in the circumstance where Line 5 has been closed. This assumption by Mr. Erickson that the Canadian government would not complete a major pipeline project that permits its natural resources to access the global crude oil markets in the circumstance where U.S. actions had closed Line 5, thus blocking Canadian natural resources from reaching markets in the Midwest and Eastern Canada by pipeline, is entirely without merit.

Q. Mr. Erickson states that "*where the Line 5 pipeline through the Straits of Mackinac is not replaced, more of the oil from Montana, North Dakota … would likely be transported by rail.*"[17] Has Mr. Erickson actually

[15] Trans Mountain Corporation Management Report, June 30, 2021, pg. 3.
[16] Ibid.
[17] Erickson Report, pg. 28, lines 6-8.

demonstrated that closing Line 5 will force Montana and North Dakota [Bakken] crude oil producers to switch from pipeline to rail?

A. No. Mr. Erickson has provided no analysis whatsoever concerning the transportation capacity constraints that may be faced by the Bakken crude oil producers. Mr. Erickson only speaks to, incorrectly, capacity constraints for Western Canadian crude oil producers. Per his methodology, if Mr. Erickson seeks to assert that the supply cost for Bakken crude oil will increase if Line 5 is closed, he must first demonstrate that the closure will force Bakken producers to shift from lower-cost pipelines to higher-cost rail.

Q. Is Line 5 a major transportation route for the Bakken crude oil producers?

A. Not particularly. Based upon my industry knowledge of crude oil flows and refinery activity in North America, I estimate that no more than about 100,000 b/d of Bakken crude oil is transported by Line 5. To put this into perspective, Bakken crude oil production peaked at 1,500,000 b/d in 2019, and is currently averaging about 1,100,000 b/d.[18] In addition, one of existing Bakken crude oil pipelines is being expanded. The Dakota Access Pipeline Line ("DAPL"), which connects North Dakota to the Midwest, expanded from 570,000 to 750,000 b/d in about August 2021.[19] The DAPL owners have plans to further increase the capacity of the pipeline to as much as 1,100,000 b/d.[20]

[18] Energy Information Administration ("EIA") Tight oil production estimates by play. Available at: https://www.eia.gov/petroleum/data.php.
[19] Energy Transfer Investor Presentation, September 2021, slide 13.
[20] AP News, *More oil shipped as Dakota Access Pipeline expansion starts*, August 6, 2021.

Q. Does this mean that if Line 5 is closed that additional rail transportation will not have to be used?

A. No. As the evidence Mr. Erickson has provided plainly demonstrates, the Western Canadian crude oil **producers** have pipeline transportation alternatives, and Mr. Erickson offers no evidence that the U.S. Bakken crude oil **producers** have pipeline transportation constraints. However, the U.S. and Canadian **refiners** that currently receive crude oil via Line 5 may have to use rail, to the extent that it is even possible, to transport crude oil to their refineries. However, in that case the rail cost will be borne by some combination of the refiners and their customers, not the crude oil producers.

Q. Since Mr. Erickson has not demonstrated that crude oil producers must shift from pipeline to rail, what are the implications for Mr. Erickson's estimate of the change in global GHG emissions?

A. Mr. Erickson's entire case has collapsed. If the U.S. and Canadian crude oil supply cost does not increase as a result of closing Line 5, the global crude oil production remains unchanged. Hence, closing Line 5 does not reduce global GHG emissions. In fact, global GHG emissions increase to the extent that the refiners use rail and the propane/butanes market needs must be met with rail and truck transportation.

Q. Do you have other observations about Mr. Erickson's Step 1?

A. Yes, if Mr. Erickson's assumption that rail must be used and paid for by the crude oil producers is hypothetically accepted, I have several more observations about Mr. Erickson's analysis of the supply cost curve for U.S. and Canadian light crude oil and the conclusions that he draws from the analysis.

Q. What is a crude oil supply cost curve?

A. Mr. Erickson's Figure 1 is a crude oil supply cost curve.[21] This specific supply cost curve provides the cumulative crude oil production by field for Mixed Sweet and Bakken crude oil ranked on the basis of the production cost by individual field. The supply cost curve can be used to theoretically ascertain the crude oil volume that would be economic to produce at any given crude oil price. Using supply cost data obtained from Rystad Energy, Mr. Erickson estimates that 2,457,387 b/d of Mixed Sweet and Bakken crude oil would be economic to produce at a crude oil price in 2030 of $53.00 per barrel ("/bbl").[22]

Q. How does Mr. Erickson calculate the impact of the use of rail transportation on the Mixed Sweet and Bakken crude oil supply costs?

A. Mr. Erickson estimates that the incremental transportation cost of rail versus pipeline to be $6.00/bbl.[23] As discussed in the previous paragraph, Mr. Erickson estimates that 2,457,387 b/d of light crude oil would be economic to produce at a crude oil price of $53.00/bbl. Of this 2,457,387 b/d, Mr. Erickson calculates that 285,976 b/d of light crude oil production would **not** be economic to produce if the supply cost increased by $6.00/bbl.[24]

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[21] Erickson Report, pg. 32.

[22] Erickson workpaper, Erickson_Line_5_analysis.xls, sheet [Williston_oil_supply]. Rystad Energy is a Norwegian consultancy that specializes in the provision of independent energy research and business intelligence. It is my understanding that Mr. Erickson has access to the Rystad Ucube, which is a licensed software program that allows an analyst to, among other things, extract crude oil supply costs at the individual field level.

[23] Erickson Report, pg. 28, lines 15-18.

[24] Erickson Report, pg. 31, lines 13-15. In his workpapers, Mr. Erickson estimates the lost production volume to be 285,976 b/d. See Erickson_Line_5_analysis.xls, sheet [Williston_oil_supply]. He apparently rounded this number to 290,000 b/d when discussing it in his report.

Q. Is this calculation correct?

A. No. Mr. Erickson has made an implicit assumption that the cost of production for 2,457,387 b/d of light crude oil production would increase by $6.00/bbl. However, Mr. Erickson tells us that Line 5 only transports about 450,000 b/d of crude oil.[25] If the $6.00/bbl cost increase is hypothetically assumed to be correct, then shifting 450,000 b/d of crude oil from pipeline to rail equates to a per barrel cost increase of:[26]

$$\frac{450{,}000\ b/d * \$6.00/bbl}{2{,}457{,}387\ b/d} = \$1.10/bbl$$

In addition, Mr. Erickson is not including all of the light crude oil that is produced in Western Canada. The Canadians also produce over 1,000,000 b/d of light synthetic crude oil.[27] Line 5 transports both light synthetic crude oil and conventional light sweet crude oil.[28] Accordingly, if the correct volume of light crude oil production is used and once again the $6.00/bbl cost estimate is hypothetically accepted as correct, the per barrel cost increase is:

$$\frac{450{,}000\ b/d * \$6.00/bbl}{3{,}457{,}387\ b/d} = \$0.78/bbl$$

[25] Erickson Report, pg. 20, lines 8-10.
[26] An alternative assumption for Mr. Erickson's cost calculation would be that the rail cost is borne only by the 285,976 b/d of at-risk crude oil production. However, this alternative assumption is entirely without merit. There is no market mechanism whereby the rail cost could be isolated to just the at-risk crude oil production.
[27] Per Statistics Canada data, there was 1,162,833 b/d of synthetic crude oil produced in Canada for January-July 2021. A small proportion is a heavy synthetic grade, and some light synthetic crude oil is blended into heavy crude oil grades. I estimate the light synthetic crude oil production volume that reaches the market to be about 1,000,000 b/d.
[28] Enbridge, FS_Without_Line5_econ_impact.pdf. Available at: https://www.enbridge.com/~/media/Enb/Documents/Factsheets/FS_Without_Line5_econ_impact.pdf.

IV. ERICKSON STEP 2: CALCULATION OF THE IMPACT OF HIGHER CRUDE OIL SUPPLY COSTS ON PRODUCTION

Q. What is the purpose of Step 2?

A. Step 2 seeks to calculate the impact on U.S. and Canadian crude oil production **volume** of the purportedly higher crude oil supply costs caused by closing Line 5 that are calculated in Step 1. The error that Mr. Erickson makes in Step 2 is independent of, and in addition to, the methodological error made in Step 1.[29]

Q. What are the implications of the corrected supply cost increase on the at-risk production volume of U.S. and Canadian light crude oil?

A. Assuming on a hypothetical basis that pipeline transportation is constrained and the cost of rail would be borne by **producers**, a supply cost increase of $0.78/bbl (as calculated in the preceding section) acts to decrease the volume of production of U.S. and Canadian light crude oil by 80 b/d, versus Mr. Erickson's estimate of 285,976 b/d. I make this calculation using the same supply cost curve found in Mr. Erickson's workpapers that he used for his estimate.[30] The global production of crude oil is, per Mr. Erickson's workpapers, approximately 88,800,000 b/d at a crude oil price of $53.00/bbl.[31] Consequently, a decrease in U.S. and Canadian crude oil production of 80 b/d does not meaningfully change

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[29] As stated earlier, the methodological error in Step 1 is it must be demonstrated that U.S. and Western Canadian crude oil **producers** have pipeline transportation constraints which would require them to bear the cost of rail transport if Line 5 is closed. Yet, Mr. Erickson's own evidence show that Western Canadian crude oil **producers** are not constrained and he makes no showing whatsoever that U.S. Bakken crude oil **producers** are constrained.

[30] See Earnest workpaper, Erickson_Line_5_analysis – Earnest Review.xls, sheet [Williston_oil_supply 0.78]. If the supply cost increase due to the use of rail is $1.10/bbl, rather than $0.78/bbl, the production decrease is 584 b/d. See Earnest workpaper, Erickson_Line_5_analysis – Earnest Review.xls, sheet [Williston_oil_supply 1.10]. Both estimates use Mr. Erickson's preferred crude oil price of $53.00/bbl.

[31] Erickson workpaper, Light_oil_cost_curve.xls, sheet [World].

the global crude oil supply cost (Erickson Step 3), the global crude oil price (Step 4), or the global production of crude oil (Step 5).

Q. What are the implications of this corrected crude oil production decrease on Mr. Erickson's estimate of global GHG emissions, assuming for hypothetical purposes that crude oil producers bear the burden of rail costs and his rail transportation costs are correct?

A. Once the at-risk crude oil production estimate is corrected, Mr. Erickson's case for increased global GHG emissions if Line 5 remains in operation once again collapses. Without a meaningful change in U.S. and Canadian crude oil supply volume, there is no change in global GHG emissions per his methodology. In fact, closing Line 5 acts to increase global GHG emissions to the extent that rail and truck is used to transport crude oil, propane, and butanes to the markets currently supplied via Line 5.

V. ERICKSON STEP 3: CALCULATION OF THE INCREASE IN GLOBAL MARGINAL CRUDE OIL SUPPLY COST

Q. What is the purpose of Step 3?

A. Step 3 is intended to estimate the impact on the **global** marginal crude oil **supply cost** due to the purportedly higher Canadian and U.S. crude oil supply costs.

Q. What are your observations regarding Step 3?

A. I have two. First, Mr. Erickson's cost calculations of the increase in the global marginal crude oil supply cost are incorrect. Secondly, Step 3 is inappropriate from the methodological perspective. To be clear, Mr. Erickson's argument that closing Line 5 will reduce global GHG emissions has already collapsed at his

Steps 1 and 2, as discussed above. I provide these observations regarding Step 3 to further highlight additional and substantive deficiencies in Mr. Erickson's overall analysis.

Q. What is the proper method to estimate the impact of closing Line 5 on the global marginal crude oil supply cost?

A. If one desires to estimate the impact of closing Line 5 on the global marginal crude oil supply cost, one will have to adjust the production costs for the affected U.S. and Canadian crude oil volumes at the field level (assuming that the production costs have been demonstrated to actually change), re-sort the global crude oil supply cost curve, and then determine how much the cost curve has shifted for a given global crude oil demand volume.

Q. Did Mr. Erickson use this methodological approach?

A. No. Instead, Mr. Erickson estimates the increase in the global marginal crude oil supply cost by first calculating the proportion that the at-risk volume in the U.S. and Canada (due to closing Line 5) represents of the marginal global crude oil supply volume. This estimated proportion is about 7 percent. Mr. Erickson next multiples the 7 percent by his estimated increase in the U.S. and Canadian light crude oil supply cost (the $6.00/bbl due to rail usage), which equals $0.44/bbl.[32]

Q. What is wrong with this approach?

A. Mr. Erickson's calculation of the 7 percent is almost totally arbitrary. This is because the estimated global marginal crude oil supply volume is based upon an

[32] See Erickson Report, pg. 36, lines 9-16. In his workpapers, Mr. Erickson uses $0.44/bbl for the marginal global crude oil supply cost increase, not the $0.40/bbl he discusses in his text.

unfounded, and undiscussed, assumption. Specifically, Mr. Erickson assumes that the global marginal supply volume is just the global supply that has a production cost between $47.00/bbl and $53.00/bbl.[33] Why a $6.00/bbl price band has been selected versus some other price band is not known. I do note that the $6.00/bbl price band equals Mr. Erickson's estimated incremental cost to transport crude oil by rail rather than Line 5. However, the purported incremental cost to ship Mixed Sweet and Bakken crude oil by rail versus Line 5 has no bearing whatsoever on the production cost of crude oils elsewhere in either North America or the world. In short, the $6.00/bbl price band used by Mr. Erickson to estimate the global marginal supply volume has no basis. Furthermore, the correct supply cost increase for U.S. and Canadian crude oils is not $6.00/bbl, but only $0.78/bbl.[34]

Q. What are the overall implications of these issues for Mr. Erickson's Step 3?

As is apparent from the above discussion, even if the correct cost numbers are hypothetically used, Mr. Erickson's methodology has an arbitrary element regarding the proportion that the at-risk supply volumes in the U.S. and Canada represent of the global marginal crude oil supply. This arbitrary element is a substantive methodological flaw that makes his conclusions invalid. Since Step 3 is flawed and unreliable, Mr. Erickson's ultimate conclusions regarding the impact of closing Line 5 on global GHG emissions are invalid.

[33] This observation is based upon my examination of Erickson workpaper Erickson_Line_5_analysis.xls, sheet [Williston_oil_supply] and Light_oil_cost_curve.xls, sheet [World].

[34] Assuming that Mr. Erickson's assertion that crude oil producers bear the cost of rail transportation is hypothetically accepted.

VI. ERICKSON STEP 4: CALCULATION OF THE INCREASE IN GLOBAL MARGINAL CRUDE OIL SUPPLY PRICE

Q. What methodology does Mr. Erickson use to calculate the increase in the marginal crude oil supply price?

A. Mr. Erickson's methodology uses the following formula:

$$\Delta Price = \frac{E_s}{(E_s - E_d)} * d_c$$

Where:

$$\boldsymbol{\Delta P} = Change\ in\ global\ crude\ oil\ price$$
$$\boldsymbol{E_s} = Elasticity\ of\ supply$$
$$\boldsymbol{E_d} = Elasticity\ of\ demand$$
$$\boldsymbol{d_c} = Rate\ of\ change\ in\ crude\ oil\ supply\ cost$$

In the above formula, a higher elasticity of supply value (E_s in the formula) acts to increase the change in the global crude oil price. All else equal, a larger change in the global crude oil price results in a greater change in GHG emissions.

Q. What is noteworthy about the above formula?

A. The formula itself is fine; the noteworthy aspect of Mr. Erickson's analysis is how he determines the variables used in the formula. It is my opinion that his choice of the crude oil price level used to calculate the elasticity of supply (E_s) value and the data set used to calculate the elasticity of supply value are inappropriate. Once again, as I did for Step 3, I am providing observations regarding Step 4 to further highlight additional and substantive deficiencies in Mr. Erickson's overall analysis.

Q. What is the issue with Mr. Erickson's choice of crude oil price level?

A. As Mr. Erickson plainly recognizes, the selection of the crude oil price level influences the elasticity of supply value (and the elasticity of demand value). To quote Mr. Erickson himself:[35]

> *Elasticities are not uniform; they demand on the oil price environment. For example, at very high oil prices, the oil supply curve is generally understood to be much steeper (fewer barrels of new oil supply available for each increment in oil price, i.e., low elasticity of supply) than at lower prices.*

Q. What crude oil price level has Mr. Erickson used?

A. For the region described by Mr. Erickson as the "greater Williston Basin," Mr. Erickson desires to use for the year 2030 a crude oil price forecast of $53.00/bbl that he found in a 2021 CER draft report.[36] However, of the 285,976 b/d of "greater Williston Basin" crude oil that is purportedly at-risk if Line 5 closes, 62 percent of the total at-risk volume is U.S. crude oil.[37] Mr. Erickson is plainly aware that in 2021 the U.S. EIA also released a crude oil price forecast, and for 2030 the EIA is projecting a crude oil price of $73.00/bbl.[38] If only one of the price forecasts must be selected, it is my opinion the EIA price forecast is the appropriate one because it is Mr. Erickson's assessment that over half of the at-risk crude oil is produced in the U.S. A reasonable alternative would be to use a weighted average of the CER and EIA price forecasts. Mr. Erickson's selection of the lowest available price forecast (i.e., the draft CER

[35] Erickson, et. al., *Why fossil fuel producer subsidies matter*, 6 February 2020, pg. 2 of the Supplemental information. Parenthesis in the original.
[36] Erickson Report, pp. 30-31, lines 21-1.
[37] Erickson workpapers, Erickson_Line_5_analysis.xls, sheet [Williston_oil_supply].
[38] Erickson Report, pp. 34-35, lines 22-2.

price forecast), irrespective of its suitability, has acted to increase his estimate of the elasticity of supply value and ultimately inflate his estimate of the GHG emission impact.

Q. What is the issue with the data set Mr. Erickson uses to estimate the elasticity of supply value?

A. Mr. Erickson tells us that "*the elasticity of supply estimate of 0.6 is taken directly from the slope of the oil supply [cost] curve, as assembled by the oil industry consultancy Rystad Energy, for prices in the $50 per barrel to $70 per barrel range*…"[39] An examination of Mr. Erickson's workpapers indicates that this statement is a mischaracterization, because the 0.6 elasticity of supply estimate was calculated specifically at a price of $70.00/bbl, and the average elasticity of supply for a $50.00 to 70.00/bbl price band is higher.[40] Mr. Erickson explains that an "*elasticity of supply of 0.6 is consistent with a fairly "flat" oil supply curve characteristic of the* ***current oil price outlook***."[41] Mr. Erickson also argues that his selected $53.00/bbl price forecast "*is the* ***most up-to-date and relevant*** *for the greater Williston Basin. A forecast of $53 per barrel is also similar to the outlook of oil consultancy Rystad Energy…*"[42] Why Mr. Erickson uses a $70.00/bbl oil price to estimate the elasticity of supply value when purportedly the

[39] Erickson Report, pp. 38-39, lines 21-1. Brackets added. In his report, Mr. Erickson identifies the source of the elasticity of supply value (the 0.60) as from "Erickson et al, 2020" at pg. 39, line 1. The response to discovery request ENB-ELPC-38 confirms that "Erickson et al 2020" is: *Why fossil fuel producer subsidies matter*, by Erickson, Asselt, Koplow, Lazarus, Newall, Oreskes, and Supran, 6 February 2020. The Supplemental information section of this paper indicates that the Rystad Energy data set is a mid-2016 vintage.

[40] Erickson workpaper Rystad_elasticity_calcs.xls, provided in response to discovery request ENB-ELPC-40.

[41] Erickson Report, pg. 38, lines 11-12. Quotation marks in original. Emphasis added.

[42] Erickson Report, pg. 34, lines 13-14. Emphasis added.

most up-to-date and relevant oil price forecast is $53.00/bbl is not known or apparent. Furthermore, Mr. Erickson uses a **2016** crude oil supply cost data set from Rystad Energy to estimate his elasticity of supply value (the 0.6), even though Mr. Erickson has access to a **2021** crude oil supply cost data set from Rystad Energy. The 2021 data set is used by Mr. Erickson to estimate the U.S. and Canadian crude oil volume that is at-risk if Line 5 is closed.

Q. What is the impact of using a 5-year-old crude oil supply cost data set on the elasticity of supply calculation?

A. As I explained above, using the 2016 Rystad Energy data set results in an elasticity of supply estimate of 0.6 at a crude oil price of $70.00/bbl. Using the 2021 Rystad Energy data set found in Mr. Erickson's workpapers, I calculate an elasticity of supply value of 0.05 at a crude oil price of $73.00/bbl.[43] I use the same elasticity of supply calculation method used by Mr. Erickson. If a crude oil price forecast of $53.00/bbl is used, the elasticity of supply value is 0.21 (again using the 2021 Rystad Energy data set).[44]

Q. What are the implications of the differing elasticities of supply values on Mr. Erickson's estimate of the impact of closing Line 5 on the change in the global crude oil price?

A. They are significant. Mr. Erickson calculates that closing Line 5 will increase global crude oil prices by $0.29/bbl, using his estimated increase of the global marginal crude oil supply cost of $0.44/bbl.[45] Hypothetically adopting

[43] See Earnest workpaper: Erickson_Line_5_analysis – Earnest Review.xls, sheet [World_oil_supply Elasticity].
[44] Ibid.
[45] Erickson Report, pg. 36, lines 16-17. Mr. Erickson's estimate of the marginal global crude oil supply cost increase (the $0.44/bbl) is obtained from his workpapers. See Erickson_Line_5_analysis.xls, sheet [Net GHGs].

Mr. Erickson's $0.44/bbl cost estimate, an elasticity of supply value 0.05 results in a crude oil price increase of only $0.06/bbl (using the formula shown above).[46] Mr. Erickson has overstated the pricing impact by about 380 percent. If an elasticity of supply value of 0.21 is used, the resultant crude oil price increase is $0.18/bbl, which is an overstatement of about 60 percent.[47]

VII. CONCLUSIONS

Q. Please summarize your key conclusions.

1. Mr. Erickson has failed to demonstrate that U.S. and Canadian crude oil producers are subject to constrained pipeline takeaway capacity, which is a necessary precondition for Mr. Erickson's conclusion that the crude oil producers will incur higher rail transportation costs if Line 5 is closed. In contrast, the evidence submitted by Mr. Erickson demonstrates that the Western Canadian crude oil producers are not constrained by pipeline takeaway capacity, and Mr. Erickson has provided no evidence regarding pipeline capacity constraints for the U.S. crude oil producers. If the crude oil producers do not experience a cost increase, Mr. Erickson's entire case for a change in global GHG emissions collapses.

2. If it is nonetheless hypothetically accepted that rail must be used and the crude oil producers bear the cost, the resultant supply cost increase for

[46] See Earnest workpaper: Erickson_Line_5_analysis – Earnest Review.xls, sheet [Net_GHGs w 0.05 Elasticity].
[47] Ibid., sheet [Net_GHGs w 0.21 Elasticity].

the U.S. and Canadian crude oil producers is $0.78/bbl, not the $6.00/bbl claimed by Mr. Erickson.

3. A supply cost increase of $0.78/bbl reduces U.S. and Canadian crude oil production by 80 b/d. The impact of a reduction of this magnitude on the global crude oil market is negligible. Once again, Mr. Erickson's entire case for a change in the global GHG emissions has collapsed.

4. Irrespective of what the appropriate U.S. and Canadian crude oil supply cost increase would be if Line 5 is closed, Mr. Erickson has made mathematical and methodological mistakes regarding the resultant impact on the global marginal crude oil supply cost that also make his results flawed and invalid.

5. Irrespective of what the appropriate increase in the global marginal crude oil supply cost would be if Line 5 is closed, Mr. Erickson has made substantive mistakes regarding the calculation of the elasticity of supply value that also make his results flawed and invalid.

APPENDIX 1 - CURRICULUM VITAE

NEIL K. EARNEST

SUMMARY OF EXPERIENCE:

Mr. Earnest has over 35 years of experience focused on the downstream sector of the energy business, and has played key roles in major international arbitrations, multi-billion-dollar downstream asset acquisitions, and Canadian crude marketing and upgrading programs totaling hundreds of thousands of barrels per day. As a consultant, he has worked on a broad range of assignments around the world with an emphasis on asset acquisition and divestitures, crude and refined product marketing analyses, expert testimony in support for highly complex arbitrations and major pipeline projects, and project feasibility assessment. Mr. Earnest began his career at Phillips Petroleum Company, where he spent 11 years in a variety of roles at Phillips' largest refinery and petrochemical plant and in corporate planning/engineering. Mr. Earnest is currently the President of Muse.

REPRESENTATIVE CONSULTING EXPERIENCE:

Asset Acquisition and Divestitures

Mr. Earnest has frequently headed Muse's teams that have assisted clients contemplating downstream acquisitions or divestitures. Over the years, dozens of detailed valuations of North American refineries for a variety of clients have been completed. Representative engagements follow:

1. Provided a detailed technical and economic assessment of the range of options available to a Canadian heavy crude producer commencing a downstream integration strategy. Assistance included board-level presentations and assistance negotiating the purchase-sales agreements and the joint-venture operating agreements.

2. Developed a detailed valuation of the combined sales value of the European downstream assets of a major oil company. Included projecting refinery cash flow considering the evolving environmental, product demand, and product specification issues in Europe.

3. Provided economic, technical, and LP modeling assistance to a corporate team considering entry into the Asia-Pacific refining industry.

4. Conducted due diligence of, and assessed the potential for, investment in four state-owned African refineries.

5. Assisted a U.S. client considering the merger of their refining assets with another refiner. The assistance included an assessment of the competitive position of the potential merger partner and potential synergies.

Market, Strategic, and Competitive Analysis

Have provided a broad range of market and competitive analyses in support of client strategy objectives. Clients include pipeline companies, refiners, and crude producers. Representative examples include:

1. Assisted a number of Canadian crude producers with their long-range investment and market development strategies, including detailed market and potential customer assessments, for their synthetic and heavy sour crude programs.

2. For several refiner clients, provided a detailed assessment of their refinery competitive position versus domestic and foreign competition.

3. Generated a detailed assessment, considering multiple market scenarios, of the expected prices for a range of potential synthetic crude formulations that was instrumental in finalizing the design basis for a multi-billion-dollar Canadian oil sands upgrader.

4. Provided the market analysis in support of a new proposed product pipeline in the Rockies.

5. Assisted several clients with quantifying the value of their equity crude to specific purchasers. The purchasers were either being considered for term contracts or were large volume buyers.

6. Provided the Government of Alberta, Ministry of Energy, detailed analysis of the technical attributes, from the refiner's perspective, of extra-heavy crude oil blends as well as an assessment of their value in potential markets.

Project Feasibility and Technology Assessment

Representative project and technology assessment analyses include:

1. Provided a detailed assessment of the value of a biomass-sourced, partially upgraded feedstock to the refining industry on behalf of the biofuel manufacturer. This assistance included extensive analysis of the suitability and value of the individual fractional components of the bio-feedstock to the typical Gulf Coast refiner, and assessing the economic benefits to the biofuel manufacturer of adding additional desulfurization

and hydrogen-addition process technologies. The client ultimately constructed a commercial-scale plant.

2. Provided a detailed technical and economic assessment of a heavy crude partial upgrading technology on behalf of a potential investor in the technology company. Later acted as the independent engineer to certify the performance tests for the commercial demonstration plant. The certification was one of the pre-conditions for the sale of the technology company to the investor.

3. Provided a technology assessment of six extra-heavy crude oil partial-upgrading technologies. The technologies ranged from variations on fairly conventional refinery process technologies to super-critical water cracking schemes and sodium-based desulfurization technologies. The engagement included a ranking of the technologies on an economic, technical feasibility, and readiness for commercialization basis.

4. Assisted a major Canadian heavy crude oil producer with the selection of the process technology for the conversion of extra-heavy crude oil to light synthetic crude oil. The engagement included the detailed technical and economic assessment of competing process technologies.

5. In-depth evaluation of resid upgrading options for a large Middle East refinery. The assistance included the detailed LP modeling of the alternatives.

6. Assisted a South American client with process optimization in connection with a major upgrade of their lube manufacturing facilities.

7. Performed the detailed technical and economic analysis of the overall merits of constructing a new resid FCC unit on behalf of a South American refiner.

Expert Testimony

1. Private Arbitration (1998): Koch Shipping Inc., Koch Supply & Trading Company, and Koch Refining Company, L.P. v. Mobil Shipping and Transportation Company.

2. Provided expert report, in 2006, on behalf of Enbridge Pipelines regarding the market demand for Canadian crude oils and quantified the benefits that would flow to Illinois and other U.S. consumers regarding the Southern Access Pipeline. Report filed with the Illinois Commerce Commission.

3. Provided expert report and direct testimony before the National Energy Board (Canada) regarding the Southern Lights Project, on behalf of Enbridge Pipelines, Inc., with hearings held in Calgary, Alberta, in 2007.

4. Expert report and direct testimony before the National Energy Board (Canada) regarding the Alberta Clipper Project, on behalf of Enbridge Pipelines, Inc., with hearings held in Calgary, Alberta, in 2007.

5. Provided expert report, in 2007, on behalf of Enbridge Pipelines to the National Energy Board (Canada) regarding the crude supply and demand for Ontario and Montréal refineries.

6. Provided expert reports, in 2007, to the U.S. Federal Energy Regulatory Commission on behalf of Enbridge Pipelines regarding the expected utilization of the Southern Access Extension pipeline, as well as other non-rate shipper benefits that ensued from the commissioning of the pipeline. Also provided written affidavit in response to intervener's expert.

7. Provided direct testimony, in 2008, before the Minnesota Public Utilities Commission regarding the Alberta Clipper Project, on behalf of Enbridge Pipelines, Inc.

8. Direct testimony, in February 2008, before the International Court of Arbitration, with hearings held in Zurich, Switzerland, on behalf of Louis Dreyfus S.A.S. (Respondent) against Ronald W. de Ruuk, as Bankruptcy Administrator for Holding Tusculum B.V., (Claimant). Testifying expert at hearings on behalf of the respondent regarding the value of the Wilhelmshaven, Germany, refinery. Also, co-authored valuation report and responses to claimant's experts.

9. Provided expert report, in May 2009, and oral testimony to the International Court of Arbitration on behalf of Mobil Cerro Negro, Ltd (Claimant) against Petroleos de Venezuela, SA regarding the expropriation of assets.

10. Expert report and direct testimony before the National Energy Board (Canada) regarding the Keystone XL Project, on behalf of Enbridge Pipelines, Inc., with hearings held in Calgary, Alberta, in 2009.

11. Provided expert and reply report, in 2009, on behalf of Enbridge Pipelines to the National Energy Board (Canada) regarding the medium-term prospects for Line 9 in westbound service.

12. Provided expert and reply reports, in 2010 and 2011, to the International Centre for Settlement of Investment Disputes on behalf of Venezuelan Holdings B.V., et.al. (Claimant) against the Bolivarian Republic of Venezuela, and oral testimony at the hearing held in Paris in 2012 regarding the expropriation of assets.

13. Provided expert oral testimony in 2011 on behalf of Enbridge Inc. to the National Energy Board (Canada) regarding the Southern Lights Pipeline.

14. Provided expert report, in 2011, on behalf of Enbridge Bakken Pipeline Company to the National Energy Board (Canada) regarding the market prospects for North Dakota crude oil.

15. Submitted export report in January 2012 to the Michigan Public Service Commission regarding the public need and local economic benefits of Enbridge Line 17, on behalf of Enbridge Pipelines (Toledo) Inc.

16. In 2011, submitted expert and rebuttal reports to the U.S. Federal Energy Regulatory Commission on behalf of Enbridge Pipelines regarding the Southern Lights Pipeline followed by oral testimony at the hearing in Washington, D.C., in 2012.

17. Provided expert and rebuttal reports to the Joint Review Panel (Canada) regarding the Northern Gateway Pipeline project, followed by oral testimony at hearing held in Edmonton, Alberta in September 2012, on behalf of the Northern Gateway Pipeline.

18. Provided expert report to the National Energy Board (Canada) regarding the market prospects for the Enbridge Edmonton-to-Hardisty pipeline project in November 2012, followed by direct testimony in October 2013, on behalf of Enbridge Pipelines.

19. Provided expert report, rebuttal, and surrebuttal testimony in 2013 and 2014 before the Minnesota Public Utilities Commission regarding the Line 67 Station Expansion Project – Phase 2, on behalf of Enbridge Pipelines, Inc.

20. Provided expert report and rebuttal testimony in 2014 to the U.S. Federal Energy Regulatory Commission on behalf of North Dakota Pipeline Company LLC regarding the Sandpiper pipeline.

21. In June 2014, provided written and oral expert testimony in the English High Court of Justice – Commercial Court, on behalf of Innospec Inc. versus Jalal Bezee Mejel Al-Gaood & Partner regarding issues in the Iraqi refining sector.

22. Provided expert and rebuttal testimony to the National Energy Board (Canada) regarding Trans Mountain Pipeline nomination verification procedures in 2014, on behalf of Tesoro Canada.

23. Provided expert reports and oral testimony in August 2014 through January 2015 before the Minnesota Public Utilities Commission regarding the Sandpiper Pipeline Project on behalf of North Dakota Pipeline Company LLC.

24. Provided expert report and rebuttal report, followed by oral testimony at trial in February, 2016, in the U.S. District Court for the Central District of California, on behalf of Southern California Edison Company versus ExxonMobil Oil Corporation. The dispute concerned an electrical outage at a refinery.

25. Provided reply report in October 2014, followed by oral testimony in February 2017, to the International Centre for Settlement of Investment Disputes on behalf of ConocoPhillips Petrozuata B.V., et.al. (Claimant) against the Bolivarian Republic of Venezuela regarding the expropriation of assets.

26. Provided an expert report in November 2014 to the National Energy Board (Canada) regarding the expected utilization of the Enbridge Mainline for the Enbridge Line 3 Replacement Program.

27. Provided expert report and oral testimony in June and December, 2015 to the ICC International Court of Arbitration on behalf of Wallis Trading Inc. versus SGS Societe Generale de Surveillance SA for a case regarding issues relating to a collateral management agreement at an Albanian storage facility.

28. Provided expert report in September 2015 to the National Energy Board (Canada) regarding the expected utilization of and the Canadian crude oil producer benefits from the Trans Mountain Expansion Project.

29. Provided expert report to the U.S. Federal Energy Regulatory Commission in November 2015 on behalf of Colonial Pipeline Company regarding revisions to its Rules and Regulations tariff.

30. Provided an expert report and oral testimony in May and December 2016 to the ICC International Court of Arbitration on behalf of ConocoPhillips Petrozuata B.V., et.al. (Claimant) versus Petróleos de Venezuala, S.A. regarding the expropriation of assets.

31. Provided an expert report in August 2017 in the U.S. District Court for Montana, on behalf of Northwestern Energy versus ExxonMobil Oil Corporation. The dispute concerned an electrical outage at a refinery.

32. Provided expert, rebuttal, surrebuttal, and supplemental surrebuttal reports in 2015 and 2017, followed by oral testimony, to the Minnesota Public Utilities Commission regarding the utilization and market impact of the Enbridge Mainline for the Enbridge Line 3 Replacement Program, on behalf of Enbridge Pipelines, Inc.

33. Provided expert and rebuttal reports in 2017 to an AAA Arbitration proceeding on behalf of NARL Refining Limited Partnership versus BP

Products North America regarding technical and economic issues related to a crude oil toll processing contract.

34. Provided an expert report, reply report, and oral testimony in 2017-2019 to the ICC International Court of Arbitration on behalf of the Republic of Turkey versus the Republic of Iraq regarding a dispute concerning Kurdish crude oil exports.

35. Provided an expert report in 2018 to the ICC International Court of Arbitration on behalf of Phillips 66 Company versus PDVSA. The dispute concerns the appropriate valuation methodology for a Venezuelan heavy sour crude oil.

36. In 2019 and 2020, provided an expert and reply report in a private expert proceeding regarding the appropriate protocol to value the crude oils shipped on a North Sea crude oil pipeline, followed by oral testimony. The parties involved included a number of North Sea crude oil producers.

37. In 2019, provided an expert report in the Superior Court of the State of Washington on behalf of the City of Tacoma, Washington – Department of Public Utilities versus U.S. Oil & Refining. The dispute concerned an electrical outage at a refinery.

38. In 2019, provided an expert report in the High Court of Justice Business and Commercial Courts of England and Wales – Commercial Court on behalf of JSC Antipinsky Refinery versus VTB Commodities Trading DAC. The dispute concerned a toll processing agreement at the Antipinsky refinery.

39. In 2019, provided an expert and reply report to the Canada Energy Regulator on behalf of Enbridge Pipelines, Inc., regarding the Canadian Mainline Contracting Application. Oral testimony was provided in 2020.

40. In 2020, provided an expert report and oral testimony to the Federal Energy Regulatory Commission on behalf of Colonial Pipelines Company versus a number of its shippers. The report and testimony addressed various industry issues in a market-based rate proceeding.

41. In June 2020, provided an affidavit in support of Enbridge Energy, LP versus Dana Nessel, Attorney General of the State of Michigan in the Circuit Court for the 30th Judicial Circuit, Ingham County. The affidavit addressed various issues concerning the potential shutdown of a pipeline.

42. In 2020, provided expert and reply reports in the United States District Court, Eastern District of Pennsylvania, in support of the Eddystone Rail Company, LLC versus Bridger Logistics LLC, et al. The dispute concerned a number of issues about a crude oil rail unloading and transloading facility.

WORK EXPERIENCE:

Muse, Stancil & Co. 1991 - Present
Current Position: President

Phillips Petroleum Company 1981-1991
Positions:
Process Senior Engineer
Economics Engineer
Staff Process Engineer

EDUCATION:

B.S. Chemical Engineering - 1981
Michigan State University
M.B.A. - 1986
University of Houston – Clear Lake

PROFESSIONAL REGISTRATION:

Chemical Engineer, Texas, #75398

PUBLICATIONS/PRESENTATIONS:

1. *"Refinery-Profitability Statistics Begin"*
Oil & Gas Journal
January 2001

2. *"Canadian Crude Market Outlook"*
Alberta Department of Energy Workshop #2
March 2002

3. *"View from the Market: The Refiner's Perspective"*
CERI 2003 World Oil Conference
January 2003

4. *"Traditional Markets and New Opportunities"*
CERI 2004 World Oil Conference
March 2004

5. *"Independent Views on Markets for Oil Sands and Pipeline Capacity"*
TD Newcrest Oil Sands Forum 2004
July 2004

6. *"Independent Views of Markets for Oil Sands and Pipeline Capacity"*
2004 National Petrochemical & Refiners Association
July 2004

7. *"The Canadian Crude Market"*
   2005 Canadian Crude Oil Conference
   September 2005

8. *"The Canadian Crude Market"*
   3rd Annual Canadian Oil Sands Summit
   January 2006

9. *"Bigger is Better"*
   4th Annual Oil Sands Forum – Oil Sands Market Overview
   July 2006

10. *"U.S. Market for Canadian Crude – Oil Sands Market Overview"*
    Crude Oil Quality Group General Meeting
    November 2006

11. *"Future Markets for Canadian Crude"*
    4th Annual Canadian Oil Sands Summit
    January 2007

12. *"Canadian Crude Market Outlook"*
    3rd Annual Enbridge Mid-Continent Shippers Conference
    January 2007

13. *"New Market Outlook for Canadian Crude"*
    42nd Annual Enbridge Jasper Conference
    June 2007

14. *"Canadian Oil Market – Opportunities and Challenges"*
    5th Annual Canadian Oil Sands Summit
    January 2008

15. *"Canadian Crude Market and Outlook"*
    Argus US/Canada Asphalt Conference 2008
    April 2008

16. *"Oil Sands Integration with the U.S. Market – A Revised Perspective"*
    20th Annual Canadian Crude Oil Conference
    September 2008

17. *"The Economy and Oil Demand: Where are They Taking the Oil Market?"*
    CERI 2009 Oil Conference
    April 2009

18. *"Oil Sands Integration with the Global Markets – A Revised Perspective"*
    TD Newcrest London Oil Sands Forum 2009
    January 2009

19. *"Oil Sands Integration with the Global Markets"*
TD Newcrest Canadian Unconventional Oil Forum 2009
July 2009

20. *"Implications of Expanding Canadian Pipeline Infrastructure"*
Argus Americas Crude Summit 2010
January 2010

21. *"Counter-Party Risk"*
TD Newcrest – Unconventional Oil & Gas Forum
July 2010

22. *"U.S. Downstream in the New Economic Reality"*
Annual Canadian Crude Oil Conference
September 2010

23. *"The Road to Recovery"*
Argus 4th Annual Americas Asphalt Summit
March 2011

24. *"Crack Spreads are Back: Which PADDs Stand to Benefit and How Long Will It Last?"*
TD Securities – Unconventional Energy Conference
TD Newcrest – 2011 Calgary Unconventional Energy Conference
July 2011

25. *"Overall Market Landscape for Canadian Crude Oil"*
Argus – Americas Crude Summit 2012
January 2012

26. *"Canadian Crude Landscape and Market Expansion Prospects"*
Argus – Americas Asphalt Summit 2012
March 2012

27. *"The Changing Crude Supply Landscape – The Refiner's Perspective"*
TD Securities
July 2012

28. *"Rail vs. Pipeline: What Projects are Being Developed to Accommodate Growing Shale Crude Production?"*
Argus Americas Crude Summit
January 2013

29. *"Implications of the North American Oil Renaissance"*
American Fuel & Petrochemical Manufacturers
January 2013

30. *"Implications of the Evolving North American Crude Supply Outlook"*
TD Securities – 2013 TD Calgary Energy Conference
July 2013

31. *"Implications of the Evolving North American Crude Supply Outlook"*
AICHE –5th Southwest Process Technology Conference
October 2013

32. *"Renaissance of the North American Energy Sector"*
Lloyds Register – Energy Conference
October 2013

33. *"Changing Topography of U.S. Crude"*
Argus – Americas Crude Summit 2014
January 2014

34. *"Canadian Tidewater Access – Implications for the U.S."*
American Fuels & Petrochemical Manufacturers Annual Meeting 2014
March 2014

35. *"Dealing with an Oversupply of Light Crudes in a World of Heavy Crude Refineries"*
Canadian Energy Research Institute 2014 Oil Conference
April 2014

36. *"Update on Market Access by Pipeline"*
Argus Canadian Crude Summit 2015
June 9, 2015

37. *"North American Crude Market Outlook"*
Enbridge 50th Annual Liquids Pipelines Conference 2015
June 11, 2015

38. *"Crude Oil Market Dynamics for 2016"*
Canadian Heavy Oil Association Annual Luncheon
January 7, 2016

39. *"Survival Outlook for Canadian Oil"*
8th Argus Americas Crude Summit
January 21, 2016

40. *"Light Transportation Fuels – Supply-Demand Outlook and Implications for Logistical Infrastructure"*
Argus Americas Motor Fuels Summit
January 17, 2018

41. *"Headwinds for the Russian Refining Industry"*
IP Week Conference – *Re-Engineering the Oil and Gas Operating Models:*

An Industry in Transition
February 22, 2018

42. *North American Shale and Heavy Barrel Competition – The Latin American Competition*
Argus Canadian Crude Summit
May 1, 2018

APPENDIX 2 - GLOSSARY

b/d	barrels per day
/bbl	per barrel
CER	Canada Energy Regulator
DAPL	Dakota Access Pipeline Line
EIA	Energy Information Administration
Enbridge	Enbridge Energy Limited Partnership
Erickson Report	Peter A. Erickson direct testimony
GHG	greenhouse gas
Mainline	Enbridge Mainline system
Muse	Muse, Stancil & Co.
NGLs	natural gas liquids
PADD	Petroleum Administration for Defense District
the Project	Line 5 Straits of Mackinac tunnel
TMX 2023	Trans Mountain Pipeline Expansion Project
WCSB	Western Canadian Sedimentary Basin

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

IN RE ENBRIDGE ENERGY, LIMITED PARTNERSHIP	)	
	)	
	)	**Case No. U-20763**
Application for the Authority to Replace and Relocate the Segment of Line 5 Crossing the Straits of Mackinac into a Tunnel Beneath the Straits of Mackinac, if Approval is Required Pursuant to 1929 PA 16; MCL 483.1 *et seq.* and Rule 447 of the Michigan Public Service Commission's Rules of Practice and Procedure, R 792.10447, or the Grant of other Appropriate Relief	)	

CERTIFICATE OF SERVICE

A. Louise Johnson hereby certifies that on the 14th day of December 2021, she served by electronic mail on the persons identified in the attached service list and electronically filed with the Michigan Public Service Commission in the above docket the ***Rebuttal Testimonies of Paul Turner, Paul Eberth, Amber Pastoor, Aaron Davis, and Jeffry Bennett*** on behalf of Enbridge Energy, Limited Partnership and its ***Proof of Service***.

/s/ A. Louise Johnson

A. Louise Johnson

A. Louise Johnson

Digitally signed by A. Louise Johnson
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