

STATE OF MICHIGAN  
BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

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

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**REBUTTAL TESTIMONY OF  
DANIEL M. COOPER ON REMAND**

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On behalf of the Mackinac Straits Corridor Authority

March 10, 2023

1 **Q: WOULD YOU PLEASE STATE YOUR NAME, TITLE, AND BUSINESS**  
2 **ADDRESS?**

3 A: My name is Daniel M. Cooper. I am a Senior Principal Engineer with HT  
4 Engineering, Inc. (“HTE”). My business address is 2591 44<sup>th</sup> Street SE, Suite  
5 102, Grand Rapids, Michigan 49512.

6 **Q: ARE YOU THE SAME DANIEL M. COOPER WHO FILED DIRECT**  
7 **TESTIMONY AND SUR-SUR-SURREBUTTAL TESTIMONY IN THIS**  
8 **PROCEEDING?**

9 A: Yes.

10 **Q: DID YOU HAVE A CHANCE TO REVIEW YOUR PREVIOUS**  
11 **TESTIMONY BEFORE SUBMITTING REBUTTAL TESTIMONY**  
12 **TODAY?**

13 A: Yes.

14 **Q: IS THERE ANYTHING ABOUT YOUR PRIOR TESTIMONY THAT**  
15 **YOU WISH TO CHANGE TODAY?**

16 A: No.

17 **Q: WHAT ELSE DID YOU REVIEW BEFORE GIVING THE REBUTTAL**  
18 **TESTIMONY YOU ARE ABOUT TO GIVE TODAY?**

19 A: I reviewed the following documents:

- 20
  - The Michigan Public Service Commission July 7, 2022, order that the
- 21 record in this case be reopened to receive testimony, exhibits, and
- 22 rebuttal as described in the order.

- 1 • Testimony of John Godfrey and Exhibit A-29 filed October 21, 2022, on  
2 behalf of Enbridge Energy, Limited Partnership
- 3 • Testimony and Exhibits of Ray Philipenko, Aaron Dennis and Steven  
4 Bott filed January 17 and 18, 2023, on behalf of Enbridge Energy,  
5 Limited Partnership
- 6 • Testimony and Exhibits of Richard B. Kuprewicz and Brian J. O'Mara  
7 filed February 3, 2023, on behalf of Bay Mills Indian Community.

8 **Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

9 A. The purpose of my testimony is to respond to the Testimonies of Richard B.  
10 Kuprewicz and Brian J. O'Mara filed on behalf of Bay Mills Indian Community  
11 in this Proceeding on February 3, 2023. I am responding specifically to Mr.  
12 Kuprewicz's evaluation of probability assessment as a tool to improve pipeline  
13 safety and to Mr. O'Mara's assertion that, in the event of a leak, the proposed  
14 pipeline would discharge product at the pipeline's maximum operating  
15 pressure of 1440 psi.

16 **Q: DO YOU AGREE WITH MR. KUPREWICZ'S STATEMENTS AT PAGE**  
17 **6, LINES 8-11 OF HIS DIRECT TESTIMONY ON REMAND THAT**  
18 **ENBRIDGE'S APPROACH TO RISK ASSESSMENT "FINDS NO**  
19 **SUPPORT IN FEDERAL PIPELINE REGULATIONS" AND "IS**  
20 **INCONSISTENT WITH THE PURPOSE OF THE FEDERAL**  
21 **INTEGRITY MANAGEMENT REGULATIONS"?**

22 A. No.

1 **Q. WHY NOT?**

2 A. Numerous aspects of the federal safety standards for hazardous liquid  
3 pipelines in 49 CFR Part 195, including the integrity management regulations  
4 of § 195.452 and § 195.454, require risk-based decision making. To make risk-  
5 based decisions, you must first assess the risk of pipeline operation. While 49  
6 CFR Part 195 does not generally require risk assessment for design and  
7 construction (the one exception is § 195.260(c) regarding valve locations), risk  
8 assessment is an important tool for evaluating the safety benefits of design and  
9 construction measures that an operator might take, over and above the  
10 minimum federal standards, to enhance safety.

11 **Q. WHY WOULD AN OPERATOR TAKE DESIGN AND CONSTRUCTION**  
12 **MEASURES THAT EXCEED FEDERAL STANDARDS?**

13 A. 49 CFR Part 195 prescribes minimum safety standards for hazardous liquid  
14 pipelines. These standards cannot anticipate every situation encountered in  
15 pipeline design and construction. When an operator encounters threats to  
16 pipeline integrity or consequences of pipeline failure that are greater than  
17 those anticipated by Part 195, a prudent operator will consider measures to  
18 provide extra safety. Such an approach is entirely consistent with the federal  
19 integrity management regulations' risk-based approach to pipeline safety.  
20 The tunnel and replacement pipeline project proposed by Enbridge in this  
21 proceeding illustrates this approach. In 2017 the State of Michigan  
22 commissioned Dynamic Risk to conduct a detailed assessment of the risk of a

1 Line 5 product release into the Straits of Mackinac. Dynamic Risk reported  
2 that a new tunnel crossing would eliminate primary threats to Line 5 and  
3 reduce the risk of a product release into the Straits to “negligible” levels.  
4 (Exhibit No ELP 24 ). Enbridge evaluated Straits crossing alternatives in 2018,  
5 confirmed a tunnel as the optimal risk-reduction measure, and agreed to  
6 proceed with project design and construction. (Exhibit No A-9). The federal  
7 pipeline safety standards do not require placement of the pipeline in a tunnel,  
8 but risk assessment indicates that doing so will provide significant safety  
9 improvements compared to the existing dual 20” pipelines installed on the  
10 lakebed.

11 **Q. DO YOU AGREE WITH MR. KUPREWICZ ON PAGE 6, LINES 13-16 OF**  
12 **HIS DIRECT TESTIMONY ON REMAND THAT “...ASSIGNMENT OF**  
13 **PROBABILITY ESTIMATES TO KNOWN, IDENTIFIED RISKS**  
14 **DURING A PERMITTING PROCESS IS DANGEROUS BECAUSE IT**  
15 **INVITES COMPLACENCY. AN OPERATOR WHO ADOPTS THIS**  
16 **APPROACH TO THE CONSTRUCTION AND OPERATION OF A**  
17 **PIPELINE WILL INEVITABLY DRIVE THE LINE TOWARD**  
18 **FAILURE.”?**

19 **A.** I do not agree. By carefully understanding risks, an operator can better drive  
20 the line toward safety by taking appropriate risk reduction measures. Risk has  
21 two components: probability and consequence. If you do not understand the  
22 probability of an event, you cannot determine its risk even if you know its

1 consequence. Rigorously assessing the level of “known, identified risks during  
2 a permitting process” allows the operator and permitting agency to  
3 intelligently consider preventive and mitigative measures for risk reduction. I  
4 see this as diligence, not complacency.

5 **Q. DO YOU AGREE WITH MR. KUPREWICZ’ STATEMENTS AT PAGE 10,  
6 LINES 18-22 OF HIS DIRECT TESTIMONY ON REMAND THAT  
7 “ALTHOUGH THE FEDERAL REGULATIONS DO ALLOW AN  
8 OPERATOR TO USE QUANTITATIVE RISK ASSESSMENT AS A TOOL  
9 IN ITS INTEGRITY MANAGEMENT PROGRAM TO MANAGE RISKS,  
10 THE FEDERAL REGULATIONS DO NOT PERMIT AN OPERATOR TO  
11 USE QUANTITATIVE RISK ASSESSMENT TO CONDUCT A  
12 PROBABILITY ANALYSIS THAT DISMISSES KNOWN RISKS AS  
13 HIGHLY UNLIKELY AND ESSENTIALLY SUGGESTS THAT THE  
14 RISKS CAN BE IGNORED.”?**

15 A. No.

16 **Q. WHY NOT?**

17 A. The quantitative risk assessment methods used by Enbridge follow industry  
18 standard approaches for estimating numerical probabilities and risk. These  
19 methods are described by American Petroleum Institute Recommended  
20 Practice 1160 *Managing System Integrity for Hazardous Liquid Pipelines* and  
21 American Society of Mechanical Engineers Standard B31.8S *Managing System  
22 Integrity of Gas Pipelines*.

1 Mr. Kuprewicz falsely suggests Enbridge is ignoring risks that are highly  
2 unlikely. Rigorously analyzing and assessing risk is quite different from  
3 ignoring it. For example, the proposed tunnel and replacement pipeline could  
4 be damaged by an offshore oil and gas drilling rig operating in the Straits of  
5 Mackinac. However, the probability of this is low since oil and gas drilling in  
6 the Great Lakes is prohibited by state and federal law. Therefore the tunnel  
7 and pipeline can be considered safe with regards to oil and gas well drilling  
8 threats even though it is not designed to be drill bit-proof.

9 Risk assessment and risk-based decision making are similarly employed to  
10 achieve safety targets in other industries with high-consequence failure  
11 potential, such as aviation and nuclear power production<sup>1</sup>. In each case,  
12 rigorous threat identification and risk assessment are used to determine  
13 preventive and mitigative measures required to drive the risk of failure to  
14 acceptably low levels.

15 **Q. WHAT IS YOUR RESPONSE TO MR. KUPREWICZ'S OPINION AT**  
16 **PAGE 6, LINES 20-23 OF HIS DIRECT TESTIMONY ON REMAND**  
17 **THAT "THE ENBRIDGE WITNESSES ARE MINIMIZING THE**  
18 **ENGINEERING RISKS OF THE PROPOSED TUNNEL PROJECT BY**  
19 **ASSIGNING MISLEADING NUMERIC PROBABILITY VALUES TO**  
20 **CERTAIN EVENTS WHICH, IN TURN, COMMUNICATES A FALSE**

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<sup>1</sup> See the United States Department of Transportation Federal Aviation Administration Integrated Oversight Philosophy web page <https://www.faa.gov/about/initiatives/iop> and the United States Nuclear Regulatory Commission Risk Assessment in Regulation web page at <https://www.nrc.gov/about-nrc/regulatory/risk-informed.html>.

1           **SENSE TO THE COMMISSION AND THE PUBLIC THAT THE**  
2           **PROPOSED PROJECT IS ‘SAFE.’”?**

3    A.    I do not share Mr. Kuprewicz’s opinion. He identifies four reasons for  
4           considering Enbridge’s numeric probability values to be misleading. I respond  
5           below to each of his four reasons, each of which lack merit for the reasons  
6           stated:

7           **1. Mr. Godfrey’s probability analysis<sup>2</sup> is “flawed, misguided, and**  
8           **dangerous” with “no basis in federal pipeline safety regulations.”**  
9           **(P11, L20-22)**

10          Risk assessment, including probability analysis, is a necessary tool for risk-  
11          based decision making. The analysis described by Mr. Godfrey’s report,  
12          rather than being “flawed, misguided, and dangerous,” follows industry  
13          standard methods to estimate probability, which require identifying the  
14          events or conditions that might lead to a loss of system integrity and how  
15          likely these events or conditions are to occur. This type of rigorous analysis  
16          leads toward safety, not danger. As discussed above, the need for risk  
17          assessment—including probability analysis—and risk-based decision  
18          making is well established in federal pipeline safety regulations.

19          **2. “Mr. Godfrey’s reliance on PHMSA data is methodologically flawed**  
20          **and inconsistent with the data’s intended purpose.” (P11, L23; P12,**  
21          **L1; and P13)**

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<sup>2</sup> See Mr. John Godfrey’s direct testimony and accompanying report entitled “Probability of Failure Analysis” filed in this matter on behalf of Enbridge Energy, Limited Partnership on October 21, 2022.

1 Mr. Kuprewicz expresses concern that Mr. Godfrey uses PHMSA data in  
2 his analysis without considering the quality of the data. However, Mr.  
3 Godfrey clearly considered data quality, and even excluded PHMSA data in  
4 favor of other sources where appropriate. For example, Mr. Godfrey's report  
5 states on page 4:

6 "For external corrosion, Pipeline and Hazardous Materials Safety  
7 Administration (PHMSA) reportable incident data were reviewed to  
8 determine if a failure frequency could be calculated from the data  
9 considering failures that occurred as a result of atmospheric corrosion  
10 of pipe designed and installed above ground. However, there were too  
11 many uncertainties in the reported cause of the failures and/or pipe  
12 installation to identify similar conditions to the Line 5 Replacement  
13 Segment. For example, coated above-grade pipe at a pipeline facility  
14 would be considered similar; however, failures that occurred on exposed  
15 pipe at a crossing that had originally been buried was not considered  
16 similar. After the PHMSA data was excluded, data related to offshore  
17 pipelines were reviewed as atmospheric or seawater environments were  
18 considered to be closer to conditions in the tunnel than a buried soil  
19 environment."

20 I also disagree with Mr. Kuprewicz's assertion that Mr. Godfrey cherry-  
21 picked data to support his conclusions. My review of Mr. Godfrey's analysis  
22 suggests he carefully used similar failure scenarios to accurately estimate

1 failure probabilities. For example, Mr. Godfrey’s report states on page 3,  
2 Section 3.2:

3 “The probability of failure for each selected FMEDA scenario was  
4 estimated using publicly available data. The data was sorted for similar  
5 pipeline configurations, vintage, size, and operation as the Line 5  
6 Replacement Segment (e.g., sorted by modern, large diameter pipe in  
7 hazardous liquids service).”

8 This type of sorting follows industry standard practice, providing an apples-  
9 to-apples comparison of failure scenarios.

10 **3. “Mr. Godfrey’s probability analysis does not alleviate concerns**  
11 **about a failure of the pipeline at the girth welds or heat-affected**  
12 **zones.” (P12, L1-3 and PP 14-18)**

13 As I previously testified in my Sur-Sur-Surrebuttal testimony on behalf of  
14 the Mackinac Straits Corridor Authority on January 24, 2022, the issues  
15 raised in the Joint Industry Report about girth welds in Grade X-70 pipe  
16 are not applicable to the Enbridge pipeline design in the Tunnel. First, the  
17 replacement pipe segment in the Tunnel will not experience the same  
18 longitudinal strain as a pipeline buried in the ground. A buried pipeline is  
19 subject to strain created by ground movement and the interaction of  
20 thermal or pressure-related expansion and contraction of the pipe with  
21 frictional forces between the pipe and surrounding soil. No such  
22 environment exists for the replacement pipe segment within the Tunnel.

1 The replacement pipe segment in the tunnel is not buried and is not subject  
2 to ground movement or frictional forces and the temperature in the tunnel  
3 will be relatively stable. When the replacement pipe segment does expand  
4 or contract due to temperature or pressure changes, it will be on supports  
5 with rollers which will allow the replacement pipe segment to expand or  
6 contract freely toward or from the expansion loops located outside the  
7 tunnel. This is an entirely different environment and does not impose the  
8 type of longitudinal stress and strain experienced by buried pipe.

9 Second, as set forth in the Joint Industry Report (BMC-43), Enbridge states  
10 that it has already implemented the Joint Industry Report's  
11 recommendations intended to eliminate under-matched girth welds and  
12 minimize weld heat-affected zone softening. Since the replacement pipe  
13 segment will not be subject to the longitudinal strain of a buried pipeline  
14 and Enbridge states it has adopted the recommendations in the Joint  
15 Industry Report (BMC-43) with respect to under-matched girth welds and  
16 heat-affected zones, the Commission should not be concerned by the  
17 proposed use of Grade X-70 pipe in the Tunnel Project.

- 18 **4. "Mr. Godfrey's report does not alleviate concerns about reliance on**  
19 **Enbridge's Computer (sic) Pipeline Monitoring (CPM) System and**  
20 **how human error creates a risk of catastrophic event within the**  
21 **tunnel." (P12, L4 and P19 through P25, L16)**

1 Enbridge's Computational Monitoring System (CPM) and planned  
2 combustible gas detection systems will meet or exceed industry leak  
3 detection standards and the requirements of 49 CFR Part 195, § 195.134.

4 In estimating the probability of future events based on historical data,  
5 human error is accounted for because its impact on past events will be  
6 similar to its impact on future events.

7 **Q. DO YOU AGREE WITH MR. KUPREWICZ'S OPINION AT PAGE 26,**  
8 **LINE 21 AND PAGE 27, LINE 5 OF HIS DIRECT TESTIMONY ON**  
9 **REMAND THAT ENBRIDGE UNDERSTATES THE PROBABILITY OF**  
10 **PRODUCT RELEASE AND AN EXPLOSION IN THE PROPOSED**  
11 **TUNNEL?**

12 A. I do not agree. Mr. Kuprewicz states, "As a certified experienced process safety  
13 management engineer, I have observed too many situations where the three  
14 factors come together resulting in catastrophic explosions." However, he offers  
15 no explanation of his observed situations, how they compare with the proposed  
16 pipeline and tunnel, what safety measures were in place, and what events and  
17 causes led to product release and ignition. His conclusions based on anecdotal  
18 evidence do not follow the industry best practice of using rigorous risk  
19 assessment and management to achieve pipeline safety.

20 **Q. ON PAGE 27, LINES 7-20 OF HIS DIRECT TESTIMONY ON REMAND,**  
21 **MR. KUPREWICZ STATES, "BASED ON MY REVIEW OF EXHIBIT**  
22 **BMC-60, IT APPEARS THAT REPRESENTATIVES OF ENBRIDGE**

1 DISCUSSED THE USE OF PROBABILITY CALCULATIONS TO  
2 ARTICULATE THE UNLIKLIHOOD OF CERTAIN EVENTS  
3 OCCURRING. THIS EXCHANGE (E.G., “THE STATE WANTS TO HEAR  
4 ONE IN A MILLION”) SUPPORTS MY POSITION THAT ENBRIDGE  
5 WITNESSES ARE ASSIGNING MISLEADING NUMERIC  
6 PROBABILITY VALUES TO CERTAIN EVENTS WHICH IN TURN, IS  
7 USED TO COMMUNICATE A FALSE SENSE TO THE COMMISSION  
8 AND THE PUBLIC THAT THE PROPOSED PROJECT IS SAFE.”  
9 WHAT IS YOUR RESPONSE?

10 A. I disagree with this stated opinion. Mr. Kuprewicz reaches a false conclusion  
11 caused by his misinterpretation of Exhibit BMC-60. That exhibit contains  
12 someone’s written notes from a meeting that occurred on January 17, 2018,  
13 regarding evaluation of Line 5 Straits of Mackinac crossing alternatives. I  
14 attended that meeting as a State of Michigan-employed pipeline safety expert.  
15 On page 17 of the Exhibit, my comments were summarized as:

16 “Not sure a HAZOP will give the state what it wants”. It will identify  
17 concerns, but the state wants to hear, “the HDD has a one in a million  
18 risk, tunneling has a one in 500000, DynRisk talked about risk in terms  
19 of dollar value...Avoid that, and talk about risk in probability. State  
20 doesn’t care about the dollar value associated with risks” “Can include  
21 the cost in the decision, but don’t state it in terms of money”.

1 In these comments, I recommended to Enbridge risk units to be used for  
2 reporting probability of failure analysis results. The values stated, which  
3 include one in 500,000 for a tunnel (not one in a million), were examples of the  
4 recommended units. Mr. Kuprewicz concludes I was communicating safety  
5 targets the State of Michigan would find acceptable. This was not the case.

6 **Q: IN HIS DIRECT TESTIMONY ON REMAND AT PAGE 16, LINE 6**  
7 **THROUGH PAGE 18, LINE 7, BRIAN J. O'MARA OPINES THAT, IN**  
8 **THE EVENT OF AN EXPLOSION OR FIRE WITHIN THE PROPOSED**  
9 **TUNNEL, PRODUCT LEAKING FROM THE PIPELINE AT ITS**  
10 **MAXIMUM OPERATING PRESSURE (MOP) OF 1440 PSI COULD**  
11 **REACH THE WATERS OF THE STRAITS. WHAT IS YOUR**  
12 **RESPONSE?**

13 A. Mr. O'Mara's opinion is based on incorrect information. He states, "Product  
14 being released while the pipeline was still being pumped would have a force of  
15 1440 psi which is several times greater than the pressure of a fire hose  
16 (typically 116-290 psi) and would easily jet away the highly fractured and  
17 brecciated rock and sediments overlying the tunnel." But Enbridge states the  
18 pipeline will operate at pressures well below the line's 1440 psi MOP. Enbridge  
19 Witness Steven Bott's Exhibit A-32 dated January 17, 2023, states on page 4  
20 of 5 that the maximum steady-state pressure will be 463 psi and transient  
21 surge pressure (a one in 10 years occurrence) will be 750 psi. Enbridge is  
22 designing the pipe in the tunnel for a 1440 psi MOP to increase the factor of

1 safety. The lower operating pressure would reduce leaking fluid flow rate and  
2 velocity, reducing the potential for jetting away rock and sediments.

3 **Q: HOW DOES MR. O'MARA'S RELIANCE ON THIS INCORRECT**  
4 **ASSUMPTION AFFECT HIS OVERALL OPINION ON THIS TOPIC?**

5 A: Operating pressure lower than that assumed by Mr. O'Mara reduces the  
6 probability that product leaking from the pipeline could reach the waters of  
7 the Straits.

8 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

9 A: Yes, it does.