Directors Brader and Grether, and fellow members of the Michigan Pipeline Safety Advisory Board:

After thoroughly reviewing Dynamic Risk's alternatives analysis, which we were not privy to before it became public, we have significant concerns stemming from the deviation from the written scope as well as our directions and assumptions versus what was delivered in draft form by the contractor. Below are brief overviews of some of the highest priority areas that need to be rectified in order for the final report to conform to the contract and reasonable expectations:

Flaws in Study Approach/Methodology

- **Failed to utilize a "worst-case spill" scenario to determine spill amounts, underestimating consequences of a failure**

The Dynamic Risk report states "the objective of the study is to establish realistic consequences of possible oil spill scenarios, and does not represent worst case scenarios." This baseline assumption does not adhere to the instructions and expectations from the Pipeline Safety Advisory Board (PSAB), nor the scope of work outlined in the Request for Information and Proposals. Section II-B clearly states that the analysis shall consider, for each alternative, the worst-case spill or release scenario consistent with the approach described in Part II-A of the Request for Information and Proposals for an Independent Risk Analysis for the Straits Pipelines issued by the State.

> "This would include identifying the "worst case discharge" consistent, at a minimum, with the definition of that term in 40 CFR 194.5 as "the largest foreseeable discharge of oil, including a discharge from fire or explosion, in adverse weather conditions." The identification of the "worst case" should also consider, consistent with best practices in high-hazard industries, the maximum potential release, before applying engineering and procedural controls intended to minimize releases. The identification of the "worst case" should also consider the most adverse foreseeable weather conditions including, but not limited to, storms and/or ice cover. The analysis would include, but not be limited to, consideration of the following:
> 1. the design and placement of the existing pipelines, control systems, leak detection methods, and shut-off valves to determine the various types of physical or operational failures or other potential hazards that could result in releases of oil or other products, including both sudden releases and longer-term releases that could be undetected using the existing systems ;
> 2. the types of products being transported and the maximum design flow rate;
> 3. the potential failure of release detection methods, control systems, or shut-off valves to operate as intended;
> 4. the quantity of the oil or other products that could be released at the maximum design flow rate before the flow was cut off; and
> 5. the quantity and fate of oil or other products remaining in the affected pipeline(s) at the maximum design flow rate after the flow is cut off."

The PSAB was assured that the regulatory definition and PHMSA assumptions for worst case spills, which have been shown to consistently and significantly underestimate risk, would be expanded upon to identify a true worst-case spill. Unfortunately, Dynamic Risk used estimates that fall below even this low level – well below what Enbridge submitted to the State of Michigan in a June 27, 2014 letter estimating

"the worst-case discharge at the Straits is 8,583 barrels, which takes into account pipe elevation as opposed to flat ground elevation." The failure to use a "worst-case spill" introduces systemic bias into the assessment and fails to fulfill the requirements of the scope of work. The original guidance should be adhered to in the final draft.

- **Failed to accurately assess spill risk**

Compounding the error of underestimating spill scenarios, Dynamic Risk systemically underestimated the risk of a spill occurring. By utilizing risk calculations that do not account for historic usage of the pipeline and the cumulative impact of rare events (like storms, sinking vessels, terrorism, etc.), Dynamic Risk systemically underestimates the possibility of a spill. At the very least, because the public will focus on the risk estimates, this section should be significantly expanded to explain why the probabilities of risks derived by the consultant may significantly underestimate the true risk of a release. It would also be advisable to explain how the scope of the risk analysis in this study is different from and less than the scope on the Risk Analysis study.

- **Failed to properly evaluate impacts of a spill**

Flawed economic impact methodology leads to the unreasonable conclusion that a spill would only cost $100-$200 million in damages. This conclusion defies logic and common sense, and is derived from a flawed methodological approach to evaluating impacts. How can a spill directly in the Great Lakes inflict damages one order of magnitude less than the Kalamazoo River spill and two orders of magnitude less than the BP Gulf oil spill? Enbridge's own estimates submitted to Attorney General Schuette predict the cost to be within the range of $450 million to $1 billion depending on the time of year and conditions. Unfortunately, the approach taken by Dynamic Risk systematically undervalues the economic, ecological and cultural assets of Northern Michigan. The mathematical approach fails to properly take into account major localized attributes like tribal interests and potential impacts, extremely limited resources in remote locations and the distance/time for proper response equipment as well as unique environmental challenges for clean-up from sensitive geological formations. Economics were based upon the spill size and the amount of onshore oiling (i.e., 20 miles of shoreline impacted in three counties). The deficiencies associated with identifying the worst case spill lead to significant undervaluation. Missing considerations in total damage costs include impacts to commercial shipping, tribal fisheries, the drinking water supply to Mackinac Island, tourism on Mackinac Island, critical species impacts, hunting and birdwatching associated with the coastal wetlands, even within the intact ecosystems located in the three counties identified as most impacted by Dynamic Risk. Spill cost was also calculated at the 95th percentile as opposed to 100%, which would represent the worst case spill scenario. These serious deficiencies must be corrected for the final report to have validity.

- **Specification of costs and risk**

The report often specifies costs without being clear about costs "to whom." Costs to Michigan residents are the relevant benchmark while private costs have a different utility. Risk evaluations were also not weighted evenly – risks were analyzed for the 4.5 miles of pipeline in the Straits while market impacts, socioeconomic impacts, etc. were analyzed for entire infrastructure. There's also a failure to devote study effort in proportion to threat category. The probability of releases due to mechanical damage and incorrect operations represent 96% of the total release probability as estimated by the consultant. That suggests that the predominant effort at considering and evaluating risk should have been devoted to

those possible causes and incidence of mechanical damage and incorrect operations. The report does not reflect a consideration of those threats commensurate with their contribution to total release probability. The risk for Alternative 5 in particular should be presented as the cumulative risk that a release will occur during a period of N years after Line 5 was placed in operation. Given the technical conclusion that the pipeline has a nearly indefinite life, the periods considered should be 100, 150 and 200 years. That risk should be calculated as 1 minus the probability that no release occurs in N successive years. Moreover, the calculation was supposed to be about the effective life of the pipeline. The risks and costs for each alternative should be calculated from terminal to terminal (Superior, Wisconsin to Sarnia Ontario). The risks for Alternatives 4 and 5 appear to be only the risk at the Straits, not for the full length of Line 5. For Alternative 6, the risk should be 0.00%, not "N/A," because the present risk posed by Line 5 will have been eliminated (recognizing there are likely very small risks arising during decommissioning).

- **Failed to consider the needs of Michigan and region; Comes from the perspective of Enbridge**

The report largely assumes (with some exceptions) that it is the state's responsibility to find a pathway for Enbridge Energy, Limited Partnership to deliver 540,000 barrels per day (bpd) (Line 5's current maximum capacity) of oil and natural gas liquids to export and domestic markets. However, the overall objective of the work was to provide an "independent, comprehensive analysis of alternatives to the existing Straits Pipelines, and the extent to which each alternative promotes the public health, safety and welfare and protects the public trust resources of the Great Lakes." In order to achieve this objective, Dynamic Risk must evaluate how much oil and natural gas liquids are actually annually delivered on Line 5 to Michigan (historically and at the present time). Without utilizing this number, which is far lower than 540,000 bpd, Dynamic Risk produced a draft report which describes alternatives from the perspective of Enbridge Energy as opposed to from the perspective of the state of Michigan, which is the client. With this flawed baseline, Dynamic Risk dismisses critical alternatives, such as alternative 2, due to lack of capacity to handle the oil and natural gas flows that are exported via Line 5. The final draft should begin with a calculation of how much oil and natural gas liquids are used in Michigan, and base all comparisons on this figure.

- **Premature Rejection of Alternative 2, Using Existing Infrastructure**

The consultant failed to perform a realistic analysis of this alternative because they did not consider that the oil pipeline system is dynamic and in the short to medium term would adjust to accommodate current Line 5 capacity. If Line 5 were to rupture tomorrow, most if not all of that oil and natural gas liquids would get to market by other means, just as the oil in Line 6b got to market in the months after the Marshall rupture. The system response to the Line 6b rupture should be assessed on how the pipeline network would respond to shifting oil and NGL transport from Line 5. Further, if Alternative 2 is deemed not feasible, then Alterative 6 should be deemed not feasible as well because realistically the 540,000 bbl per day presently crossing the Straits has to get to market somehow. The consultant's approach/logic would leave only some kind of crossing at the Straits as feasible. That is not a realistic or defensible conclusion.

- **Failed to consider multi-modal or mixed alternatives**

Given the comprehensive scope of the report, it is a missed opportunity to ignore the possible use of mixed alternatives. Such options are certainly feasible and some multi-modal alternatives could prove to be economically and environmentally beneficial to the citizens and public trust resources of Michigan.

Missing Information/Data Gaps

The draft alternatives analysis has very significant gaps or missing information which should be rectified before a final report is submitted, including:

- **Focus on citizen and tribal interest** – Throughout the report, Enbridge's private interests are the focus over the interests of Michigan residents, in particular tribal interest. While tribal interests, including tribal treaty rights, are mentioned on occasion, the contractor failed to consider the costs associated with alternatives directly affecting tribal interests. The final report should fully implement omissions that arise as part of the tribal consultation process.
- **Lack of analysis of the effective life of the existing pipelines** – The scope of work requires that **t**he analysis on maintaining the existing Straits Pipelines "shall also consider how long the existing pipelines can reasonably be operated without replacement as well as the course of action for replacement based on the estimated useful life of existing pipelines." The assumption that operation is indefinite is not valid for any piece of infrastructure, and is in direct conflict with the scope of work.
- **The analysis of constructing new pipelines failed to consider regulatory requirements and timeframes such as permits and land acquisition** – This is often a significant investment in time and resources. In addition, the inability to obtain necessary permits or acquire land could impact the feasibility of certain alternatives. If an alternative, while technically feasible, cannot be completed due to regulatory requirements, it must be removed from consideration.
- **Failure to fully consider impact from historic operation of Line 5** – Given the new data about excessive span length as well as underestimates of currents, this is a significant omission.
- **Failure to analyze number of anchor drops in Great Lakes** – Given that the draft report concluded that anchor drops are a key risk, the lack of any information about actual anchor drops in the Great Lakes is significant.
- **Incomplete consideration of costs for entire alternative** – As the case for risk, all costs should be considered on a terminal-terminal basis, not just for Michigan.
- **Incomplete presentation of results** – Risks and costs for each alternative should be presented on a terminal to terminal basis and then broken down by those within Michigan and those incurred elsewhere.
- **Lack of information about other pipelines** – In addition to flawed assumptions, the draft report dismisses the option of utilizing existing pipeline infrastructure due to a lack of available information on other pipelines since this report relies almost exclusively on Enbridge data. This leads to a flawed conclusion that utilization of existing pipelines is not feasible.
- **Failure to perform a comprehensive consideration of mechanical damage and incorrect operation threats in Alternative 5** – There are numerous possible sources of mechanical damage to the pipelines in or immediately adjacent to the Straits including ship groundings and sinking, loss of deck cargo, and heavy equipment operation in the immediate onshore area. Any one of these could damage both pipelines. The risk of all of these causes is additive and should be fully considered.
- **Failure to consider circumstances that would aggravate the consequences of a release** – In the case of the rupture in Alternative 5, it is assumed that the shut-off valves would close in 12 minutes. But operator error or equipment failure could extend this time significantly.

- **Make clear that the economic impacts are on top of the existing $1.50 Bbl toll** – The reader of the report is not always reminded that the costs per bbl. are in addition to the current cost to ship the oil. That reminder should be provided each time costs are discussed.
- **The consultant appears to have failed to consider a number of relevant and available information sources –**
    - **a)** Enbridge's response to the Attorney General's information request (E4_Straits_2014_Clean-up_Cost_Summary_524140_7.pdf available on the Attorney General's website), revealed Enbridge's estimate of a worst possible release is double the consultant's estimate and Enbridge's remediation costs estimates are up to 5 times greater. Consultant should have obtained and discussed the Enbridge study that generated those estimates.
    - **b)** Enbridge's third party assessment modeling the scenario of an anchor drop from a large lake freighter directly striking the pipeline, which is in direct relation to Dynamic's Risk conclusion regarding the greatest risk to the Straits pipelines.
    - **c)** Technical submission made to the Pipeline Taskforce and the PSAB by FLOW, Oil and Water Don't Mix, Straits Area Concerned Citizens, Sierra Club and other organizations. The PSAB was informed that these submissions were being provided to the consultant.
    - **d)** Cost and time to replace Line 6b, including the time and cost to tunnel Line 6b under the St. Clair River.

Other Considerations

- **Propane Market Analysis Lacking** – The report predicts a 10-30¢/gallon rise in propane costs if Line 5 does not deliver propane. It does not fully evaluate the fungibility of the propane market to make up for any loss due to Line 5's closure. The assumption of 3,000 bpd at winter peak for propane needs to be clarified with actual data on usage, as this assumption is higher than other published figures. Even so, the report notes that "this price change is similar to the year-to-year volatility experienced during normal seasonal fluctuations" (4-13) (i.e., it would not be noticed).
- **Tunneling Analysis Lacks Depth** – The data used to justify a surprisingly low cost for "tunneling" need to be clarified and verified. Other projects of this scale are at least one order of magnitude more expensive. There should also be a full review of the state and federal permitting process for such activities, including a detailed timetable on all permitting (state and federal) and construction. The same should be applied for the trench alternative.
- **Relevance placed upon Enbridge conclusions/explanations without independent validation or confirmation** – Nearly the entire report relies solely upon Enbridge's data and assumptions without a significant third-party verification.
- **Differences between freshwater and salt water** – The report relies upon salt water models without often delineating the differences in freshwater environments.
- **Present a range for each risk estimate as is done for cost estimates**
- **Insufficient Failure Database** – The draft report limited the analysis to only underwater pipeline failures to develop estimates of operator failure. The contractors should use all pipeline statistics or, more appropriately, safety statistics for the Enbridge system.
- **UP Propane Supply** – For Alternatives 2 and 6, the consultant should consider installing a new NGL pipeline within the decommissioned 30" pipeline to reduce the cost of a replacement, properly sized pipeline.

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