



Protecting the Common Waters of the Great Lakes Basin
Through Public Trust Solutions

February 9, 2018

Ms. Heidi Grether Director Michigan Department of Environmental Quality P.O. Box 30458 Lansing, Michigan 48909-7958	Ms. Kim Fish Acting Chief Water Resources Division Michigan Department of Environmental Quality P.O. Box 30458 Lansing, Michigan 48909-7958
Mr. James Milne, Env Manager Mr. Thomas Graf, Env. Specialist Great Lakes Submerged Lands Unit Michigan Department of Environmental Quality P.O. Box 30458 Lansing, Michigan 48909-7958	Mr. Scott Rasmusson Great Lakes Shorelands Unit Gaylord District Office Michigan Department of Environmental Quality 2100 West M-32 Gaylord, Michigan 49735

VIA ELECTRONIC SUBMISSION

FLOW (FOR LOVE OF WATER) SUPPLEMENTAL PUBLIC COMMENTS AND REPORT ON THE JOINT APPLICATION OF ENBRIDGE ENERGY TO OCCUPY GREAT LAKES BOTTOMLANDS FOR ANCHORING SUPPORT STRUCTURES AND IMPROVEMENTS FOR LINE 5 PIPELINES IN THE STRAITS OF MACKINAC AND LAKE MICHIGAN [2RD-DFDK-Y35G]

Dear Michigan Department of Environmental Quality Director Grether; GLSL Unit Chief Milne; and GLSL Unit Specialist Graf; Acting Chief Fish; Analyst Rasmusson; other State Officials; and staffs:

In May 2017, Enbridge submitted its original joint permit application to your agencies to authorize 22 new additional anchors on the lake's bottomlands to stabilize the Line 5 pipelines. For Love of Water ("FLOW") initially submitted [formal comments](#), together with technical reports and other attachments, during the public comment period on the above matter ending June 29, 2017. FLOW then submitted [supplemental comments](#) on August 4, 2017, laying out the State of Michigan's legal duty to broaden the scope of review beyond the lake foot bed where the anchors connect and require Enbridge to submit a comprehensive environmental impact and alternatives analysis demonstrating no harm to the waters and no feasible and prudent alternatives. Moreover, FLOW introduced a technical report, identifying more evidence of damage to Line 5 in the Straits, including bends, ovalities, and coating damage. Again on October 12, 2017, FLOW submitted [supplemental comments](#) regarding new evidence to show that the anchor structures themselves were causing damage to Line 5's pipeline coating. On November 2, 2017, FLOW then sent a related letter to the Governor, Attorney General, and the Directors of the Michigan Department of Environmental Quality ("DEQ"), the Michigan Department of Natural Resources ("DNR"), and the Michigan Agency for Energy ("MAE"), expressing grave concern about Enbridge knowingly misleading both state and federal agencies in authorizing past anchor permits and entering into federal consent decrees when the company knew about bare steel spots adjacent to anchor locations as early as 2014.

Consistently, throughout all of our submissions, FLOW has documented ongoing easement violations, and urged the State of Michigan to properly construe the Great Lakes Submerged Lands Act (“GLSLA”) to require Enbridge to apply for a new occupancy agreement or permit; this is because the new screw-anchor and bracket design structures for the dual Line 5 pipelines in the Straits are new material changes from the [original design](#) authorized by the [state’s 1953 easement](#).

Although the public record amply demonstrates the new or altered design and need for a new agreement, FLOW is submitting new additional information about the condition of Line 5 as it related to the state’s evaluation of Enbridge’s pending GLSLA permit request to install 22 additional saddles or brackets, supports, and screw anchors to suspend large segments of its underwater Line 5 pipelines located in the Straits of Mackinac.

From Clay Pillars to Grout Bags to Screw-Anchors: An Overview of Enbridge’s Historic Efforts to Address the Easement’s Maximum Span Requirement and to Develop a New Screw-Anchor Design on the Bottomlands of the Straits of Mackinac.

In 1953, Bechtel engineers designed the dual Line 5 pipelines to rest on the lake bottom with no maximum spans to exceed 75 feet. This provision is an express term of the easement. Enbridge even admits that it was “originally engineered for sand bag supports.”¹ The history of the pipeline clearly demonstrates that Enbridge struggled to comply with this 75-foot maximum span requirement and often was in violation of this provision due to a combination of strong currents and erosion forces on the lake bottom in the Straits of Mackinac. For nearly the first 50 years of Line 5 occupying the public trust waters of Lake Michigan, Enbridge attempted to remedy this lakebed washout problem by installing sand bags, clay pillars, and grout bags.

Enbridge’s efforts, however, failed to stabilize Line 5 on the lakebed given the dynamic scouring effects of the lakebed floor. For example, based on the “As-Built” drawings of the Straits legs of Line 5 updated through the 1979 underwater inspection, Dr. Timm calculated a total of 17 spans that exceed the 75-foot maximum unsupported span distance and three spans that exceed the 140 foot structural damage threshold.² Commissioned as part of its EPA Consent Decree, Enbridge’s 2016 Kiefner Report also documented a previously undisclosed 2003 survey of Line 5 that identified 16 unsupported spans between 140 feet and 224 feet on the east pipeline, and 286 feet on the west pipeline (nearly four times the allowable length under the Easement).³ In 2001, Line 5 experienced significant washouts, leading to Enbridge to characterize the situation as an “emergency” on its permit application for grout bags.

The lakebed continues to shift, as Enbridge acknowledged in an August 2016 letter to the State of Michigan, explaining that the company anticipated future changes and additional requests to install anchor supports: “Enbridge continues to believe that our ability to predict growth of spans is reliable.

¹ Appendix 1: Enbridge presentation to the Michigan Petroleum Pipeline Task Force (2015) http://www.michigan.gov/documents/deq/deq-pipeline-task-force-brief-line-5_470547_7.pdf

² Dr. Ed Timm, “Technical Note: Regarding Enbridge Line 5 Non-Compliance with 1953 Easement Requirements A Mechanistic Analysis of Straits Pipeline Washout Phenomena,” August 20, 2016 <https://www.epa.gov/sites/production/files/2017-01/documents/enbridge-consent-decree-public-comments-part3-353pp.pdf>

³ http://www.mlive.com/news/index.ssf/2017/06/line_5_unsupported_spans.html

However, due to the dynamic nature of the lake bed, there could be further changes in span length that are not currently expected that could result in a future decision to seek to install additional screw anchors.”⁴

Then, starting in 2002, Enbridge developed a new design for the pipeline that would literally anchor the pipeline down to the lake bottom with permanent screw anchors and saddle supports around the pipeline.⁵ This new design transformed the entire pipeline infrastructure by elevating it off the lakebed floor. Instead of the pipeline resting in a trench on the lake bottom, Enbridge engineered Line 5 to be elevated off the lakebed floor so that an “average span clearance depth underneath the pipe is about 1.35 ft,”⁶ ranging from a 0.5 ft minimum span clearance to a 4 ft maximum span clearance. Enbridge estimates that approximately 14% of the whole crossing length is now supported by anchors.⁷ Almost two decades later with 128 screw anchors installed, Enbridge’s new design solution appears to be causing fundamental structural problems with the pipeline protective coating with bare metal spots and potential loss of cathodic protection.

Since 2002, Enbridge has continued requesting joint permit authorization from DEQ and U.S. Army Corps of Engineers (“USACE”) for what it termed “maintenance” and “repair” work to locate 128 permanent screw anchors with saddle supports on the bottomlands on the Great Lakes at least 9 more times in 2003, 2005, 2006, 2010, 2012, 2014, 2016, 2017/2018. These requests typically coincided with discovering pipeline spans that violated the 75-foot maximum requirement following biannual remote operator vehicle (“ROV”) inspections.⁸ In each of these joint applications to the MDEQ and USACE, Enbridge maintained that these additional anchor supports were stand-alone “repairs” without submission of studies, reports, and information within its possession that the original design in the Straits and new screw anchor support and pipeline design were not working to stabilize this entire infrastructure in the Straits of Mackinac. Enbridge has never applied for and DEQ has never comprehensively reviewed, considered, or authorized the new, material and substantially changed design with 128 screw anchors elevating the Line 5 pipelines off the lakebed. This new design was not contemplated by the Bechtel engineers in 1953. Moreover, the Great Lakes Submerged Lands Act does not authorize “activity” permits that actually constitute a new design, permanent structures, and improvements on bottomlands or suspended in water areas above the bottomlands; rather, a new application for an agreement pertaining to water over and the filling in of bottomlands is required in conformance with the public trust. MCL 324.32502; 32503; 32505; R. 322.1008.

New Evidence of Enbridge’s Own Anchors Causing Pipeline Coating Damage for Over Three Years Requires New GLSLA Application and Full Scope of Review Under the Law

As part of a consent decree with the federal government over the 2010 Line 6B oil spill into the Kalamazoo River, Enbridge conducted an underwater inspection of Line 5 pipelines on August 30, 2017, which revealed that the screw-anchors themselves are causing damage to the pipeline coating and creating bare metal gaps in the cathodic protection. Seven bare areas on the pipeline were identified the size of dinner plates. In September 2017, Enbridge downplayed these seven exposed metal gaps, describing them the

⁴ Letter to State of Michigan from Enbridge dated August 11, 2016
<https://www.enbridge.com/~media/Enb/Documents/Projects/line5/08112016LTRENB%20Line%205%20Pipeline%20Supports%20Response.pdf>

⁵ Letter to State of Michigan from Enbridge dated June 27, 2014, p. 23.
http://www.michigan.gov/documents/deq/Appendix_B.2_493988_7.pdf

⁶ Appendix 2. Letter to State dated April 13, 2017 from Enbridge.

⁷ Id.

⁸ Letter to State of Michigan from Enbridge dated June 27, 2014, p. 23.
http://www.michigan.gov/documents/deq/Appendix_B.2_493988_7.pdf

size of Band-Aids and explaining that the coating on the east leg of the dual 20-inch underwater pipeline was scratched by an abandoned 3-inch, 750-foot cable that was "inadvertently snagged during the recent inspection."⁹

In light of this new evidence, the [DEQ](#) quickly requested additional information from Enbridge regarding its permit application, including compliance with Rule 15 of Part 325, Great Lakes Submerged Lands, of the Natural Resources and Environmental Protection Act, 1994 PA 451 to show no adverse effects to the environment and public trust and no feasible and prudent alternative.¹⁰

In late October 2017, news broke that Enbridge had acted in bad faith and knew about damage to Line 5's protective coating in the Straits of Mackinac as early as 2014 but did not disclose this knowledge to state or federal officials until late in the summer of 2017.¹¹ The state further elaborated that: "Enbridge knew about the damage three years ago and that it occurred while anchors were being installed to better secure the pipeline to the lake bottom."¹² This information could have altered previous state and federal authorization in 2016 and 2017 that allowed additional "maintenance" screw anchors to be placed on the lake bed permits.

This new evidence also expressly contradicted Enbridge's public testimony to the Michigan Pipeline Safety Advisory Board ("PSAB"), where Enbridge officials made a presentation in March 2017, denying there were any gaps in the coating around the dual underwater pipelines,¹³ but later disclosed that there were numerous patches of bare metal on Line 5 larger than dinner plates.¹⁴ In October 2017, Enbridge claimed that it was an "internal reporting issue" that led to the company's false assurance at the PSAB meeting.¹⁵

The State of Michigan appropriately expressed grave concern and demanded a work schedule for the repairs to Line 5's coating gaps and inspections of each of the 128 anchor locations. Executive Director Brader from the MAE also raised the important factor of human error in pipeline disasters, noting that Enbridge's Line 6B massive oil spill was caused in large part by operators' 17-hour delay. The Line 5 human error evidence coupled with Enbridge's corporate culture of withholding information about the true condition of their aging 64-year-old dual pipelines is entirely unacceptable given that Enbridge has already installed 128 similar screw-anchor supports around the Line 5 pipelines since 2002.¹⁶

⁹ Garret Ellison, "Inspections show Line 5 coating gaps larger than disclosed," MLive, September 14, 2017 http://www.mlive.com/news/index.ssf/2017/09/line_5_coating_inspection.html

¹⁰ Letter from DEQ to Enbridge dated September 13, 2017, http://www.michigan.gov/documents/deq/2017-09-13_Enbridge_Pipelines_325_Application_Ltr_600615_7.pdf

¹¹ Garret Ellison, "Enbridge knew about Line 5 coating damage in 2014," MLive, Oct. 27, 2017 http://www.mlive.com/news/index.ssf/2017/10/enbridge_line_5_damage_2014_de.html

¹² Id.

¹³ Garret Ellison, "Outer wrap coating has failed on parts of Line 5, Enbridge confirms," MLive, March 14, 2017 http://www.mlive.com/news/index.ssf/2017/03/enbridge_line_5_delamination.html

¹⁴ Garret Ellison, "Enbridge knew about Line 5 coating damage in 2014," MLive, Oct. 27, 2017 http://www.mlive.com/news/index.ssf/2017/10/enbridge_line_5_damage_2014_de.html

¹⁵ Garret Ellison, "Enbridge knew about Line 5 coating damage in 2014," MLive, Oct. 27, 2017 http://www.mlive.com/news/index.ssf/2017/10/enbridge_line_5_damage_2014_de.html

¹⁶ Letter to Enbridge from State of Michigan dated March 11, 2016 https://www.michigan.gov/documents/ag/Enbridge_Request_for_Information_518071_7.pdf This letter reveals that Enbridge had withheld important information since 2014 about the pipeline's conditions by providing information to the state through a "read-only data portal."

On November 13, 2017, Enbridge informed the state that the majority of the 48 out of 128 locations inspected by actual divers had gaps;¹⁷ 3 were bare metal and 42 had calcareous deposits. Notably, both state-of-the-art technologies Enbridge relies on to detect corrosion - external ROV inspection and the Baker Hughes CPCM tool - had failed to identify the gaps in the pipeline's asphalt enamel based coating system. The same day, the PSAB directed Enbridge to make a [full accounting](#) at the December 11, 2017 board meeting about the pipeline's condition, its protective coating and anchors, the results of its video inspection, automated in-line tests, and recent hydrostat and biota testing. MAE's Executive Director Brader commented: "A year ago, Enbridge said there were no coating gaps in the Straits pipeline. Now, there are dozens. When will we know the full accounting of what Enbridge knows about Line 5? I sincerely hope there are no more surprises when Enbridge gives their presentation to the Pipeline Safety Advisory Board in December. We and the people of Michigan deserve nothing less, and the State will be bringing on additional experts to examine Enbridge's information and challenge it where necessary."

In 2017, Enbridge had three locations where grout bags were still being used as actual pipe supports. The 2017 pending permit was intended to replace these grout bags with anchor supports; however, following the discovery of metal bare loss adjacent to the anchor support locations, the DEQ postponed Enbridge's permit request until March 2018.

According to Enbridge's [Semi-Annual Report to the EPA](#) as part of the Consent Decree, Enbridge completed 7 out of the 8 bare metal coating repairs in the 2017 construction season. The outstanding bare metal spot (1.64 square feet) is in the location where Enbridge's barge anchor snagged a 3-inch cable that hit the pipeline in August 2017.

On November 20, 2017, the PSAB's independent contractor, Dynamic Risk, released its Final Alternatives Analysis for public comment and hearings until December 22, 2017. Related to this pending permit application, the Final Report failed to analyze new evidence disclosed by Enbridge affecting the pipeline's integrity, including external corrosion, bends, 48 bare metal spots and/or coating gaps caused by the installation of screw anchors (another 80 locations will be visually inspected by divers in 2018), compromised cathodic protection, and historic excessive pipeline spans greater than the 75-foot limit (including a 286-foot span that was unsupported for years), as required by the legal operating agreement with the State of Michigan. Dynamic Risk's rationale for not analyzing new information related to the 48 bare metal spots was: "it would be inappropriate to speculate on any of the above aspects of the coating condition." (Final Report ES12).

Just one week later on November 27, 2017, without informing or consulting with the PSAB, Governor Snyder unilaterally entered into an [agreement with Enbridge](#) that attempted to circumvent and narrow the scope of alternative analysis to three options for a replacement line in the Straits: a tunnel, trench, or new line on the bottomlands. There was no mention of Enbridge's outstanding permit application for 22 screw anchors or any investigation into Enbridge's ongoing easement violations, including but not limited to inadequate insurance liability and emergency response capability.

On December 11, 2017, the PSAB passed three resolutions that called on the state to reject the narrowing of the alternatives to a replacement pipeline in the Straits, and demanded that the alternatives assessment consider existing pipeline design capacity and other modification to any crude oil pipeline in the Straits of Mackinac.

¹⁷ Mark Tower, "Enbridge finds issues at 42 of 48 sites along underwater oil pipeline," MLive, November 15, 2017 http://www.mlive.com/news/grand-rapids/index.ssf/2017/11/enbridge_finds_issues_with_42.html

In the [January 26, 2018 letter](#) to the PSAB, the Governor rejected all three resolutions on amending his November 27, 2017 Agreement with Enbridge, citing inability to conduct further inspections and pipeline coating repairs until the summer of 2018, to renegotiate adverse weather conditions, and evaluate all alternatives. The Governor's letter also extended the final date for a final agreement with Enbridge from August 15, 2018 to September 30, 2018.

In sum, the totality of this new and evolving evidence triggers the need for a broad scope and extensive review that includes the entire 4.6 mile span of the pipelines, not just the lakebed footprint for 22 new screw anchors. This evidence triggers DEQ's duty under GLSLA and Michigan Environmental Protection Act ("MEPA") to demand that Enbridge file a comprehensive assessment examining and demonstrating no adverse risk, endangerment, impacts, and no feasible and prudent alternatives. The DEQ and USACE are in no position to legally authorize the outstanding 22 anchor permits.

Conclusion

Enbridge's 2017/2018 permit application is a completely new engineering design with material modifications, new structures, and fill material that was never contemplated under the terms of the 1953 state easement. In light of these recent and significant evidentiary disclosures, we urge the DEQ re-examine the scope of review and demand a new GLSLA application from Enbridge as required under law. The DEQ must then determine both existing and potential adverse environmental effects. The DEQ is not authorized to grant or permit the occupancy, use and structures unless Enbridge shows and the department has determined both of the following:

- (a) That the adverse effects to the environment, public trust, and riparian interests of adjacent owners are minimal and will be mitigated to the extent possible.
- (b) That there is no feasible and prudent alternative to the applicant's proposed activity which is consistent with the reasonable requirements of the public health, safety, and welfare.

Mich. Admin. Code R 322.1015.

Accordingly, the burden rests with Enbridge – not the State of Michigan or its citizens – to establish that there are no unacceptable risks or likely effects to waters, fishing, navigation, commerce, and public and private uses, *and* that no feasible and prudent alternatives to Line 5 based on existing or feasible capacity of overall pipeline system in the Great Lakes; the required scope of this showing of no alternatives includes determination of whether existing or improved pipeline infrastructure within the Enbridge system into and out of Michigan are a feasible and prudent alternative.

Once more FLOW appreciates every effort moving forward the State of Michigan makes to assure to the highest duties and standards to comply with the laws and public trust duties and principles that apply to this matter. Should you have any questions or desire further information, we are willing to meet with you and technical experts to discuss the above.

Thank you.

Sincerely yours,

A handwritten signature in blue ink, appearing to read "James Olson".

James Olson
President

A handwritten signature in blue ink, appearing to read "Elizabeth R. Kirkwood".

Elizabeth R. Kirkwood
Executive Director

CC: Charles Simon, Chief, Regulatory Office, Corps Detroit District
Kerrie Kuhn, Chief, Permits, Corps Detroit District
Michigan Governor Rick Snyder Michigan
Attorney General Bill Schuette
MDNR Director Keith Creagh
U.S. Senator and Hon. Gary Peters
U.S. Senator and Hon. Debbie Stabenow

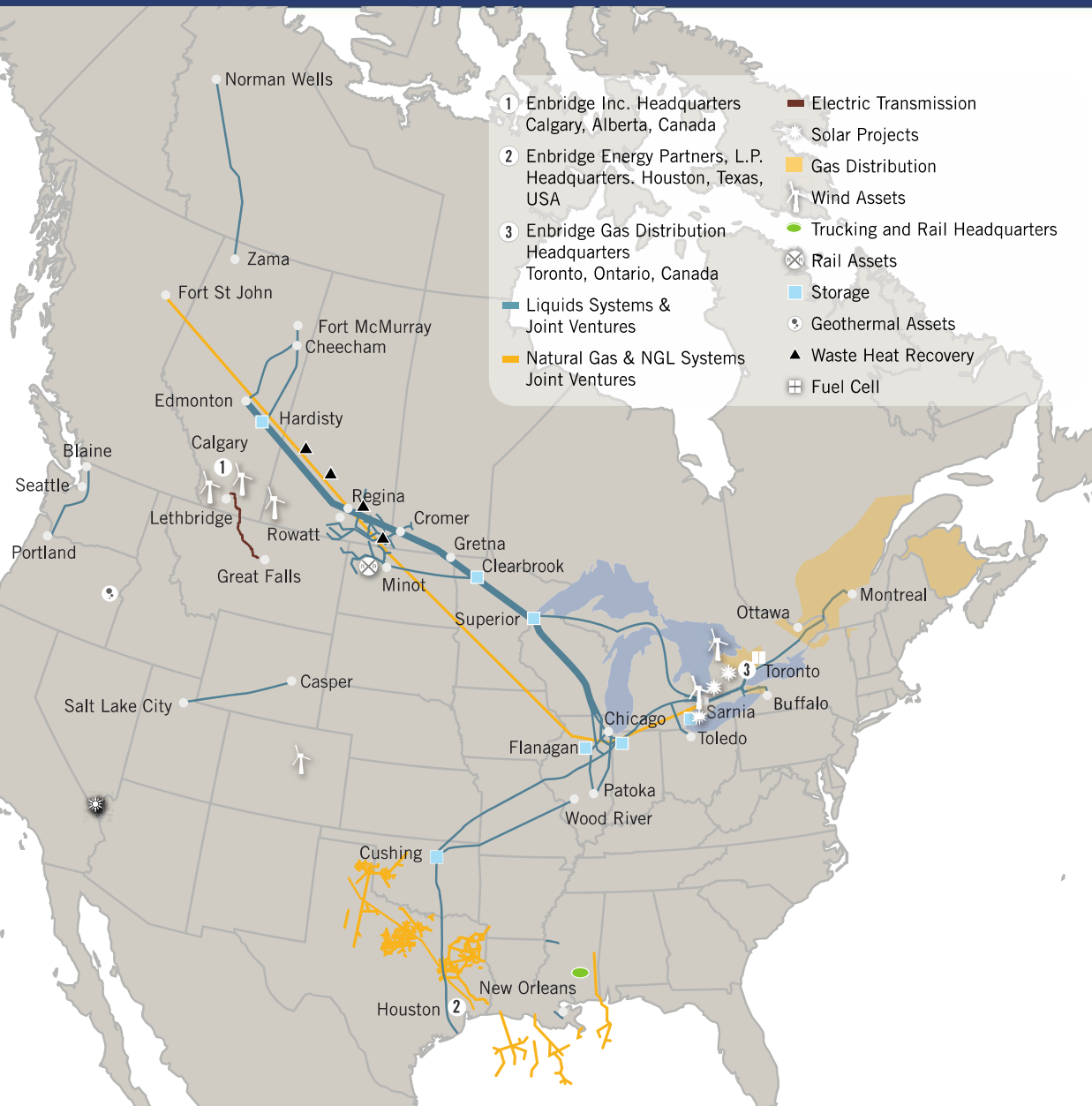
Appendix 1



Enbridge Operations In Northern Michigan Line 5



Enbridge: A Vital Link to Energy Supply



- Enbridge Energy has been delivering energy reliably **since 1949** on what was originally referred to as the Lakehead System.

About **15% of total U.S. petroleum imports** arrives via Enbridge's Lakehead System.

- Enbridge meets **more than 50%** of crude oil needs of all Great Lakes refineries.

Liquids Pipelines in Michigan



Line 6B:

Griffith, IN to Marysville, MI

- 235 miles in MI
- 30-36-inch pipe
- Capacity 500,000 bpd
- Medium & heavy crude

Line 79:

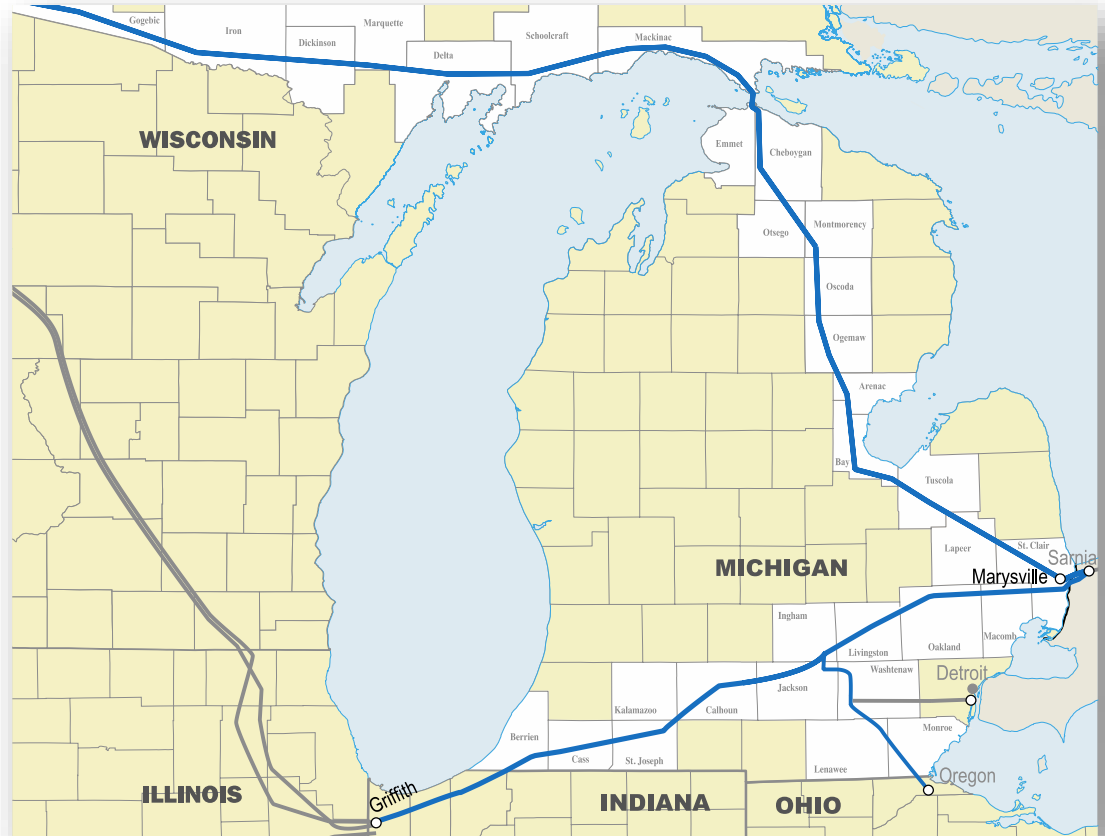
Stockbridge to Romulus, MI

- 64 miles in MI
- 16-20-inch pipe
- Capacity 80,000 bpd
- Light & heavy crude

Line 17:

Stockbridge, MI to Toledo, OH

- 77 miles in MI
- 16-inch pipe
- Capacity 100,000 bpd
- Heavy crude

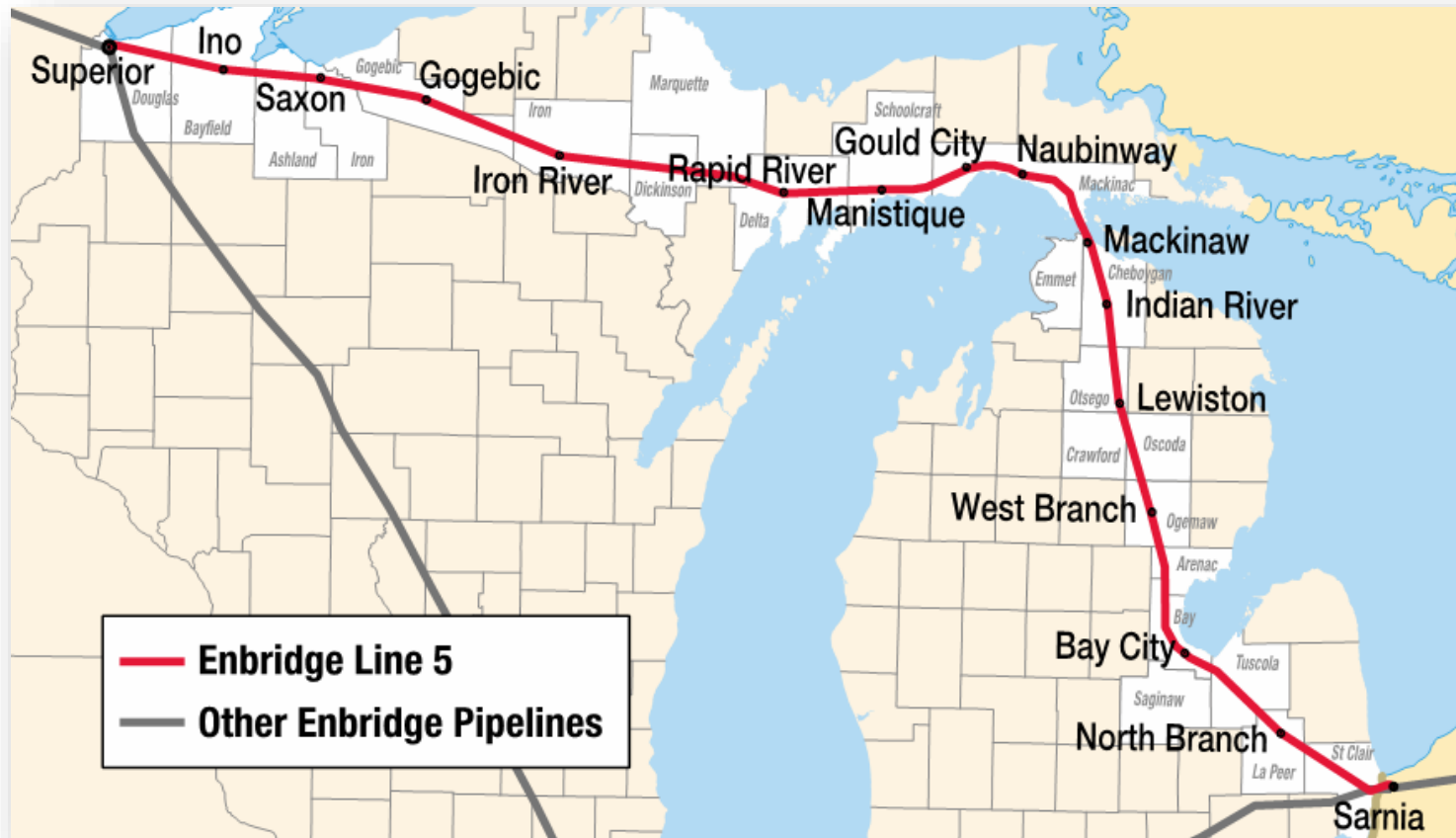


Line 5:

Superior, WI to Sarnia, ON, Canada

- 554 miles in MI

Line 5

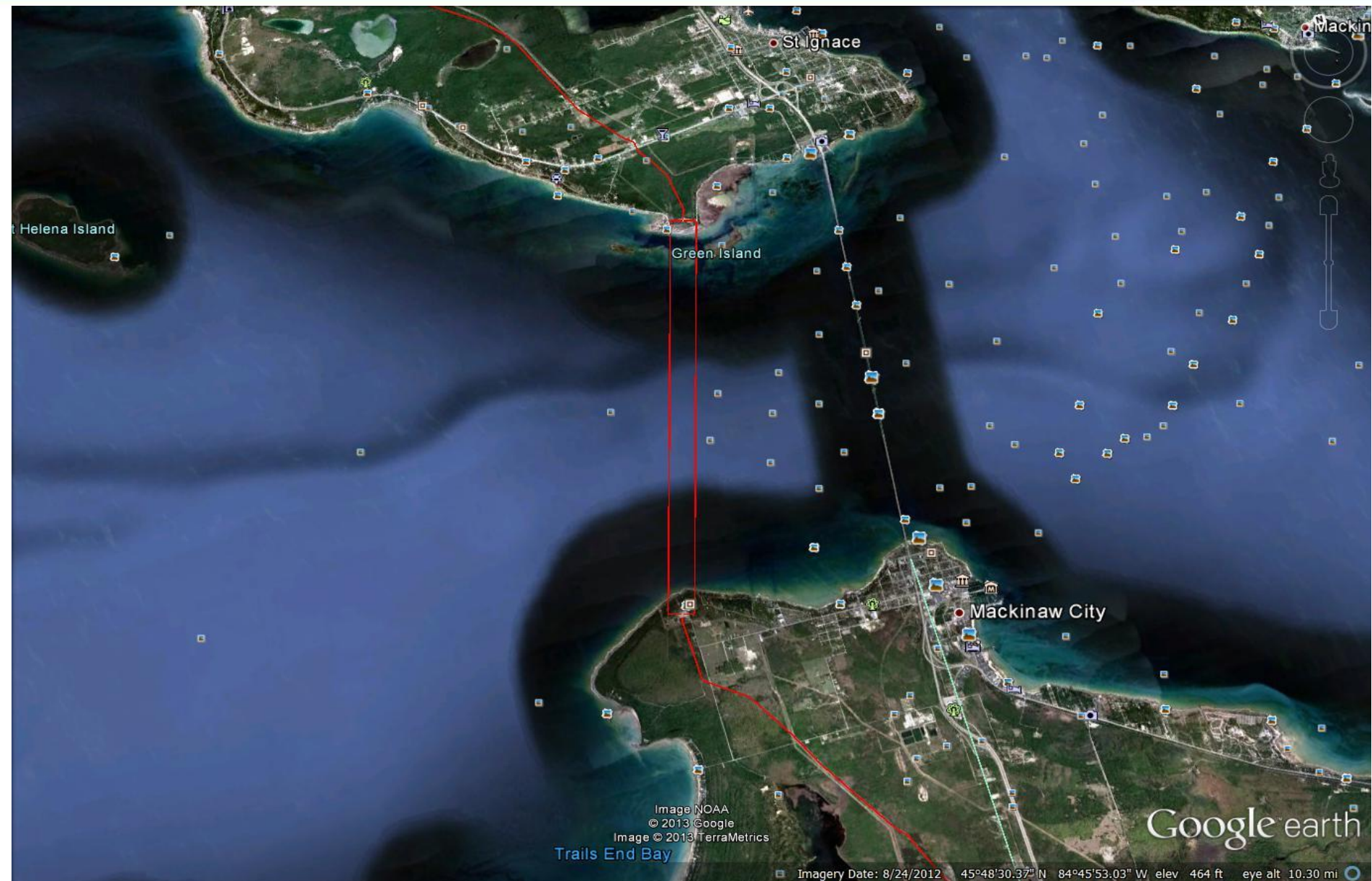


Line 5: Superior, WI to Sarnia, ON, Canada

- 645 miles (554 miles in MI)
- Capacity 540,000 bpd
- 30-inch pipe (2, 20-inch heavy-walled and seamless pipelines under Straits)
- Well functioning coating
- Light crude (also NGL & others)

- Line 5 transports light crude oil, light synthetic crude and natural gas liquids.
- From secure North American resources in western Canada and North Dakota. Does not transport heavy crude. Nor are there any plans to transport heavy crudes.

Straits Crossing



Safety is the Cornerstone of our Business



- Number 1 priority is to operate **safely and reliably**
 - No incident is ever considered acceptable.
- Since 2012, invested **\$4.4 billion** in new technologies and training to further enhance pipelines and facilities.
- During the past 10 years, delivered nearly **13 billion barrels** of crude oil and liquids.

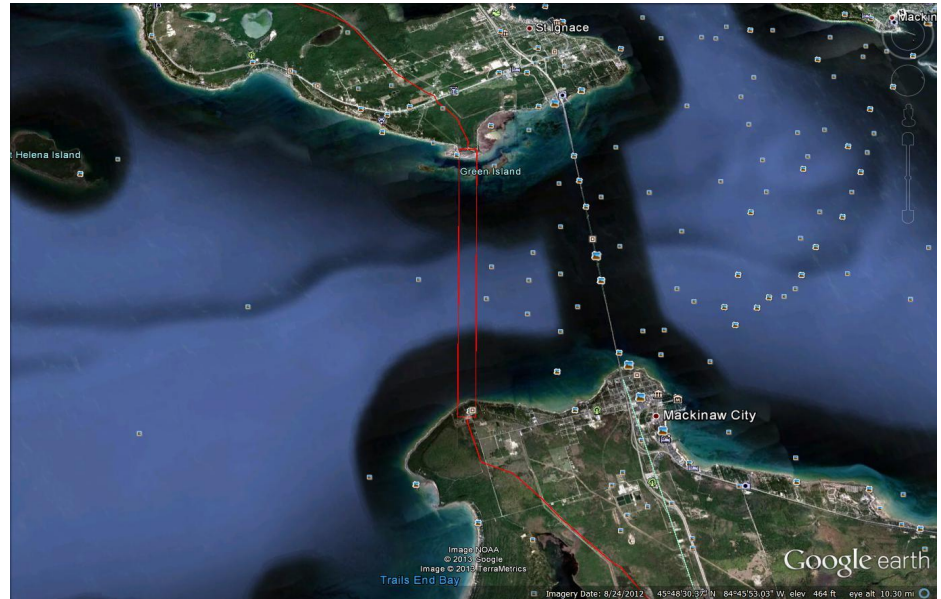


Goal to build and maintain pipelines with ZERO releases.

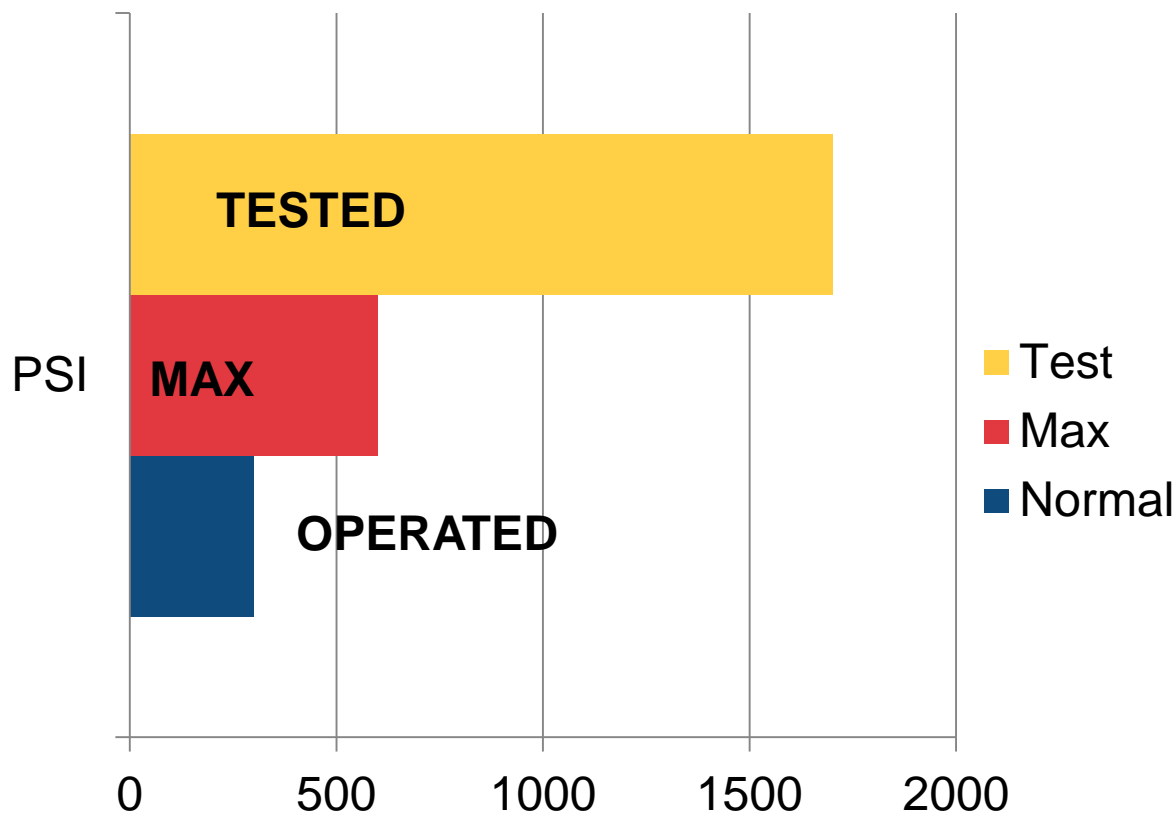
Safety in the Straits of Mackinac



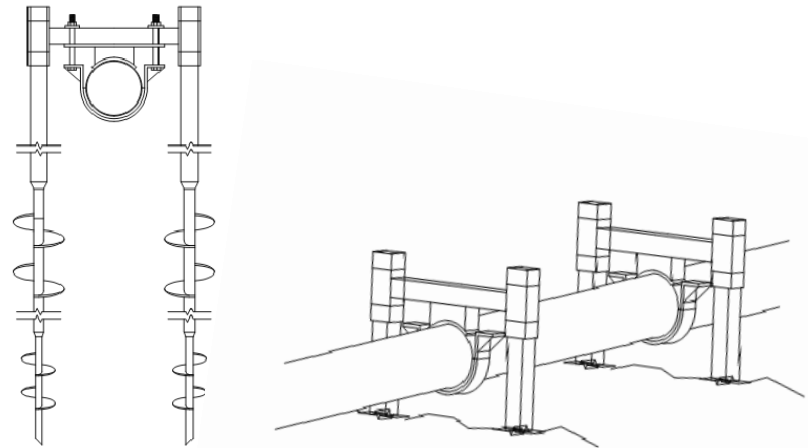
- Design
- Inspections
- Automatic shut-off valves
- Remotely operated Isolation Valves
- New leak detection equipment
- Electric back-up generator
- Valve yard containment system



Line 5 Straits Pressure



- Beyond 50 ft. depth secured in brackets screwed into the lake bottom
- Originally engineered for sand bag supports
- Enbridge began installing permanent steel screw anchors in 2002
- 40 supports installed this summer
124 total supports
- Program on-going





- Comprehensive maintenance and **integrity program**, including visual inspections.

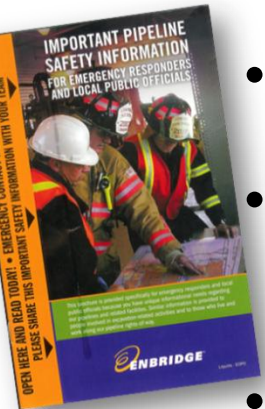


Continuous Safety Improvements



Improvements since 2010:

- Pipeline and Facility Integrity
- Leak Detection
- Pipeline and Control Center Operations
- Public Awareness
- Emergency Response
- Safety Culture

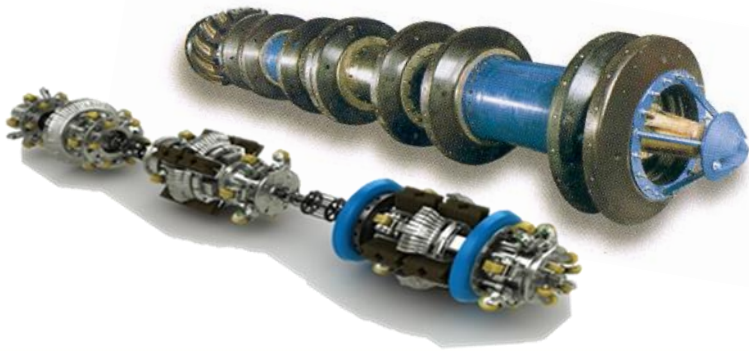


- Tactical Response Plan specific for the Straits of Mackinac
- Integrated Contingency Plan (ICP) underwent extensive, first-ever PHMSA coordinated peer review. Approved July 2013
- Remotely operated shut-off valves at upstream and downstream shores of the Straits
- Isolated within approximately 3 minutes

Internal Inspections

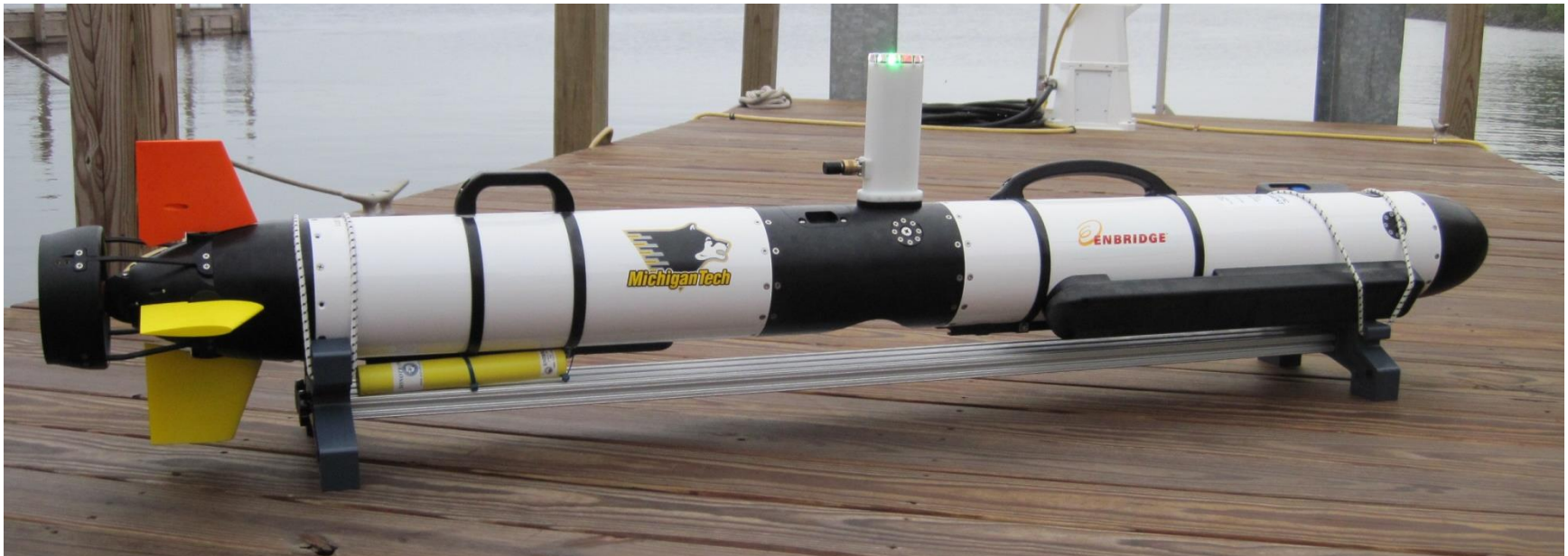
Sophisticated electronic vehicles move inside the pipe along with the oil to obtain detailed measurements of the pipe condition including:

- internal corrosion
- external corrosion
- dents, buckles, gouges



External Inspections

- Frequent Underwater Autonomous Vehicle and Remote Operated Vehicle inspections.
- Routine aerial and right-of-way patrols are conducted for buried pipelines.
- Visually patrolled at least 26 times a year.



Benefits to State Add Up to Millions



Supporting Michigan's Economy

In 2013, Enbridge paid nearly **\$21 million** in state property, sales, use and income taxes.

Employ approximately **250 employees** & contractors in **24 locations** – average annual salary: **\$82,000**



Conclusion



Thank You
www.enbridge.com



Appendix 2



Bradley F. Shamlala
Vice President, U.S. Operations
Liquids Pipelines

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April 13, 2017

Via Email and Overnight Federal Express

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Director
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Re: Response to Follow-Up Questions Concerning Enbridge's Forthcoming Application to Install Screw Anchor Supports on the Line 5 Dual Pipelines at the Straits of Mackinac

Dear Director Grether and Executive Director Brader:

I am writing in response to the questions raised concerning Enbridge's forthcoming joint application to MDEQ and the US Army Corps of Engineers ("Corps") to install additional screw anchor supports along the Line 5 Dual Pipelines' crossing of the Straits of Mackinac. Specifically, I have enclosed answers to each of the questions raised by Mr. Matthew Goddard in his email to Enbridge dated April 4, 2017.

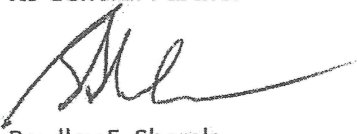
I understand that the enclosed information has been requested to provide you with background information concerning historical supports on the Dual Pipelines, and Enbridge's decision to install additional anchors at this time. I further understand that the enclosed information will help assist in your review of Enbridge's joint application, and will help to respond to questions that may arise from Enbridge's forthcoming application. As you are aware, Enbridge will submit its joint application to MDEQ next week after you have had a chance to review the enclosed information.

Director Grether and Executive Director Brader
April 13, 2017
Page 2

We look forward to any comments or questions you might have regarding the enclosed responses.

Sincerely,

ENBRIDGE ENERGY, LIMITED PARTNERSHIP
By Enbridge Pipelines (Lakehead) LLC
Its General Partner

A handwritten signature in black ink, appearing to read 'BSH', with a long horizontal flourish extending to the right.

Bradley F. Shamla
Vice President, U.S. Operations

Enclosure

1. **Grout bags (How many in total have been installed? Of these, how many have been replaced with anchors? How many that haven't been replaced are left, are they deteriorating and how quickly? If any of these grout bags that are not replaced deteriorate, would Enbridge be out of compliance?)** [Based on subsequent conversations, this question is understood to refer not to total number of grout bags but to total number of spots along the line that have been secured with grout bags.]

There are only three locations where grout bags are still used as actual pipe supports today. These were put in place to remediate span length issues. Installation of the screw anchor supports at all three locations to replace the grout bags was planned in 2016 as part of the 18 additional anchor installs. These screw anchor supports will be installed in 2017 pending permit approval. In the unlikely event that grout bag supports were to deteriorate to the point of not supporting the pipeline, the corresponding spans could exceed 75 feet until the screw anchors could be installed. Even if spans exceed 75 feet due to a deterioration of grout bags, there would be no impact to the integrity of the pipeline prior to the installation of additional screw anchors as the total span length would be well below 140 ft.

2. **What is the basis for the "proactive" criteria and how high is our level of confidence that these 22 anchors are proactive enough to prevent us from needing to continue to apply a permit request every two years?**

The basis for the assessment is an examination of the lake bed erosion trends observed over the many years of operation. Enbridge continues to believe that our ability to predict growth of spans is reliable. However, due to the dynamic nature of the lake bed, there could be further changes in span length that are not currently expected that could result in a future decision to seek to install additional screw anchors. Enbridge is committed to continuing to work with the State of Michigan to assess, and if necessary mitigate, any changes that may be observed in the future. The proactive model used for the 2016 pipeline inspection to determine required anchor installs is addressed below in Response 3.

3. **Provide some more information on the 4 anchors that are being requested in addition to the 18 that were in last year's application**

- o **Why the additional four – these were identified with new information gathered while installing the anchors in November**

- **What changed in 6 months? I.e. lake bed, modelling assessment, etc.**
- **By what technique did we get info on the additional four (ROV AUV or human visual observation?)**

The 2016 underwater inspection data was further examined following the completion of the anchor installation work in November 2016. As a result of this further review, it was suggested that four (4) additional screw anchor supports be added to the 18 that were in last year's application and will be included in the 2017 permit application for the Line 5 screw anchor support installation project.

The four additional anchors were added to the work plan for 2017 after Enbridge took an even more conservative look at the possibility for additional scour at the pipeline touchdown

locations. Though the ends of these new spans go into deeper cover and the likelihood of scour causing span growth beyond 75 feet is quite low, it was decided to apply the additional conservatism at these locations and to install screw anchor supports as the spans were within seven feet of the easement limit.

Enbridge is committed to continuing to work with the State of Michigan to monitor, assess, and if necessary, mitigate any changes that may be observed in the future. Further, additional screw anchor support installs may be required in the future as discussions continue with the EPA on Consent Decree requirements regarding the Line 5 Straits crossing.

- 4. What is the typical span clearance depth underneath the pipe (4 – 6 ft)? Maximum? Minimum? Average? Has Enbridge calculated the percentage of the pipeline that is supported by anchors vs lake bed?**

The average span clearance depth underneath the pipe is about 1.35 ft, the maximum span clearance depth underneath the pipe is 4 ft and the minimum span clearance depth underneath the pipe is 0.5 ft.

The estimated percentage of the pipeline that is supported by anchors on both crossings is approximately 14% of the whole crossing length.

- 5. At what water depth are the anchors? Specifically, how many are at the bottom where higher currents are present, and how many are up along the banks.**

There are 29 anchors at water depth >200 ft and 100 anchors at water depth <200 ft.

- 6. Need to confirm VIV assessment is considering multiple current directions and velocities.**

Four (4) current profilers were deployed to collect the current data, two (2) near the pipeline at the East crossing and two (2) near the pipeline at the West crossing. The current profilers were placed about 2 ft off the lake bottom. In the current velocity calculation, the average current over the elevations of 2 ft – 6 ft above the bottom was used where good quality current data was collected. Currents below 2 ft were calculated using known equations.

Vortex induced vibration (VIV), if it occurs, mainly causes the pipe to vibrate in the vertical direction. As such, only the portion of the current that flows across the pipeline (or is perpendicular) contributes to VIV. According to the assessment, a current velocity of 2.3 ft/sec is the transition velocity above which the VIV would become less critical. The VIV allowable span length is a function of the current velocity. As the current velocity increases, the VIV allowable span length decreases. At a current velocity of 2.3 ft/sec, the VIV allowable span length is about 140 ft. A critical span length analysis showed that in order to cause VIV for a 75 ft long span at the Straits, the current velocity would have to be in the order of about 9.8 ft/sec or about 6.7 mph. Note that the maximum velocity of the current by the four (4) current profilers was about 2.75 ft/sec or 1.88 mph.

7. Kurt B. had commented on March 13 that Enbridge would be moving to an annual inspection schedule – is this accurate?

This is not accurate. Kurt Baraniecki's comments to the Michigan Pipeline Safety Advisory Board on March 13 were related to in-line inspections. Enbridge is committed to annual inline inspections to detect metal loss and geometry features beginning in 2017 as required by the Congressional mandate in the 2016 PIPES Act. Our current plans are to continue with biannual AUV and ROV external inspections with the next inspections scheduled for 2018.