

# PIPELINE SAFETY ADVISORY BOARD



DEQ Director  
Heidi Grether

DNR Director  
Keith Creagh

## Agenda

August 6, 2018

9:00 AM – 5:00 PM (EST)

Ramada Lansing Hotel and Conference Center, Regency Ballroom  
7501 West Saginaw Highway  
Lansing, Michigan 48917

9:00 – 9:05 AM	Welcome and Introductions
9:05 – 9:10 AM	Meeting Minutes: May 14, 2018* ( <i>Attachment 1</i> )
9:10 – 9:15 AM	Correspondence Received ( <i>Attachment 2</i> )
9:15 – 9:20 AM	Organizational Items ( <i>Attachment 3</i> ) <ul style="list-style-type: none"><li>• <i>Next Meeting – October 15, 2018</i> 1:30 - 3:30 PM (EST) Lansing, TBD</li></ul>
9:15 – 11:00 AM	Petroleum Pipeline Task Force Recommendations and Charge to Board ( <i>Attachment 4</i> ) <ul style="list-style-type: none"><li>A. House Bill 6201 – Oil Spill Response Plans and Reporting (<i>Attachment A</i>)</li><li>B. Hazardous Liquids Pipeline Safety Program (<i>Attachment B</i>)</li><li>C. Pipeline Safety Best Practices and Pipeline Siting Subcommittee Recommendations (<i>Attachment C</i>)</li></ul>
11:00 – 11:15 AM	<i>Break</i>
11:15 – 12:15 PM	Petroleum Pipeline Task Force Recommendations and Charge to Board <ul style="list-style-type: none"><li>D. State Policies on Emergency Response and Planning for Pipelines (<i>Attachment D</i>)</li><li>E. Miscellaneous Recommendations</li></ul>
12:15 – 12:30 PM	Recommendations and Advice to Governor
12:30 – 1:15 PM	<i>Break for Lunch</i>
1:15 – 1:30 PM	Straits Incident Progress
1:30 – 2:15 PM	Enbridge Agreement ( <i>Attachment 5</i> )
2:15 – 2:45 PM	Board Member Comments
2:45 – 3:00 PM	<i>Break</i>
3:00 – 5:00 PM	Public Participation
5:00 PM	Adjourn

**Key:** \* – indicates action item



## MINUTES

## MICHIGAN PIPELINE SAFETY ADVISORY BOARD

Causeway Bay Lansing Hotel and Conference Center  
Ballroom F - J  
6820 South Cedar Street  
Lansing, Michigan 48911

May 14, 2018  
9:00 a.m. – 3:30 p.m.

- Present: Keith Creagh, Co-Chair, Department of Natural Resources (DNR)  
Heidi Grether, Co-Chair, Department of Environmental Quality (DEQ)  
Inspector Chris Bush (Designee for Capt. Chris Kelenske), Michigan State Police (MSP)  
Anthony England, University of Michigan-Dearborn  
Craig Hupp, Public Member  
Shawn Lyon, Marathon Petroleum  
Homer Mandoka, Nottawaseppi Huron Band of the Potawatomi  
Laura Moody (*Designee for Attorney General Bill Schuette*), Department of Attorney General (DAG)  
Jeffrey Pillon, National Association of State Energy Officials  
Jerome Popiel, United States Coast Guard (*Coast Guard Liaison, non-voting*)  
Brad Shamla, Enbridge Energy Company  
Chris Shepler, Shepler's Mackinac Island Ferry Service  
Michael Shriberg, National Wildlife Federation  
Sally Talberg, Michigan Public Service Commission (MPSC)
- Absent: Anne Armstrong, Michigan Agency for Energy (MAE)  
Capt. Chris Kelenske, (Designee for Col. Kriste Kibbey Etue), MSP  
Jennifer McKay, Tip of the Mitt
- Others: Alex Morese, MAE  
Robert Reichel, DAG  
Holly Simons, DEQ  
Mark Sweatman, DNR  
Travis Warner, MPSC  
Nate Zimmer, DEQ

I. CALL TO ORDER

Heidi Grether, Director, DEQ, called the meeting to order at 9:04 a.m.

II. WELCOME AND INTRODUCTIONS

Co-Chair Grether welcomed everyone and reminded the board that Holly Simons, elected by the board to be Secretary, will take the minutes for today's meeting. Co-Chair Grether informed the members of the public audience that two public appearance cards were available at this meeting: yellow cards for those who wish to ask questions regarding the Straits incident and white cards for members of the public wishing to speak

during the public comment portion of the meeting. Both completed cards should be submitted to Holly.

III. FEBRUARY 26, 2018 MEETING MINUTES

Having reviewed the minutes from the February 26, 2018, meeting, Co-Chair Grether noted a discrepancy in who ran the meeting and asked that the minutes be amended slightly to clarify that point. Co-Chair Grether then asked for additional comments.

Craig Hupp inquired about follow-up on reports from previous meetings and future meeting minutes requesting more detail be captured to better reflect board members' advice and comments so constituencies know what is said and that their representatives are contributing to the board's work. He also asked that due dates, reporting, etc. be included. Discussion took place.

**Brad Shamla moved, seconded by Chris Shepler, that the amended minutes from the February 26, 2018, meeting be approved. The vote was taken on the motion. The motion carried.**

IV. CORRESPONDENCE RECEIVED

Correspondence received on behalf of the Board since its last meeting was shared with the Board in the pre-meeting packet, including:

*Non-Board Members*

- Rut Pacquin
- Greg Davis
- Mark Lore
- Michele Peltier
- Margaret Sokolnicki
- Ron Mallory
- Kaye Kurnat
- John Sarver
- William Seck
- Korey Smith
- Mark Witalec
- Cynthia Greene
- Laura Judge
- Robert Dunn
- Janet Fairchild
- Randolph Mateer
- Charity Steere
- Jamie Winters
- John Apol
- John Harris
- Tammy Hibner
- Sarah McKinney
- Thurlow "Sam" McClellan, Tribal Chairman, Grand Traverse Band of Ottawa and Chippewa Indians

- Dale Giddings
- Lynn Hartung
- Vincent Lumetta
- Jaynan Montague
- Anne Woiwode
- Bob Learner

V. ORGANIZATIONAL ITEMS

Co-Chair Grether highlighted the dates of the remaining 2018 meeting schedule. Discussion took place regarding meeting locations, meeting conflicts, need for an additional meeting, and future agenda items. Co-chairs and staff will look at the potential for hosting the proposed August meeting in the Traverse City area to accommodate those members who will also be attending the Great Lakes Fishery Trust meeting that same evening. Adding an additional meeting date in July – or possibly extending the August meeting into a day-and-a-half or two-day meeting – to allow for more deliberative conversation regarding the multiple reports that will be due around that time will also be discussed with staff and brought back to the board.

VI. STRAITS INCIDENT

Jerome Popiel provided an in-depth briefing of the timeline and response actions by the United States Coast Guard, Unified Command, and the utility companies.

Co-Chair Grether introduced Scott Schaefer, Incident Management Specialist, Newberry Field Office, DEQ. Scott provided an in-depth briefing of the DEQ response efforts.

Peter Holran, Director of U.S. Government and Public Affairs, Enbridge Energy, provided information on the timeline of events and response efforts of Enbridge.

Co-Chair Grether opened the floor for questions from board members.

Craig Hupp inquired about the adverse weather clause and asked that historical weather records be consulted to help assess how often Straits conditions don't allow for response activity. He questioned whether the clause is enough and if wave height research available through the United States Coast Guard or the DEQ.

Anthony England inquired about anchor impact. He questioned about the impacts on "old metal" resulting in dents.

Discussion took place.

Co-Chair Grether read questions submitted by members of the public audience. Discussion took place.

VII. BREAK

The board adjourned for a break at 11:00 a.m. and reconvened at 11:17 a.m.

### VIII. UTILITY CORRIDOR

Mark Sweatman introduced students and staff from Michigan Technological University. James Morrison, President, ILF Consultants, Inc., Traverse City, and students Jeremy Dziewit, Michael Frahm, Gavin Bodnar, and Aaron Crapsey provided a presentation on their senior design project, the Mackinac Straits Underground Utility Corridor.

Chris Shepler inquired how to assure there isn't shifting like the example recently in Seattle. James Morrison talked about how the geology in the Straits differs from that in Seattle and has been accounted for in the tunnel design.

Discussion took place.

### IX. BREAK FOR LUNCH

The board adjourned for lunch at 12:08 p.m. And reconvened at 1:09 p.m.

### X. OLD BUSINESS

- Pipeline Safety Best Practices and Pipeline Siting Subcommittee  
Travis Warner and Shawn Lyon provided an update.

Craig Hupp questioned whether recommended changes need MPSC review and how capacity expansion is reviewed by MPSC. Sally Talberg indicated these were within the Commission's authority.

Discussion took place.

- Emergency Response  
Co-Chair Grether introduced Jay Eickholt, Emergency Management Coordinator and Health and Safety Officer, DEQ. Jay provided an update.

Craig Hupp questioned how the state agencies collaborate and how emergency responses are coordinated. Co-Chair Creagh indicated that this is accomplished through the State Emergency Operations Center (EOC). Craig Hupp inquired if there is coordinated training. Co-Chair Creagh confirmed that this is provided by the State Police. Craig Hupp inquired how tribal representatives are included in the process. Co-Chair Creagh responded that there is a mechanism in the EOC process to reach out to tribal leaders.

Discussion took place.

- Independent Risk Analysis  
An update provided by Guy Meadows was included in the board packet.
- Enbridge Agreement  
Bob Reichel provided an update. Discussion took place.

- Tribal Consultation  
Co-Chair Creagh provided an update. Discussion took place.

The Co-Chairs and staff will review the remaining task force recommendations and determine how the remaining meetings should be formatted. Old Business for the next meeting will include: recommendation from the Pipeline Safety Best Practices and Pipeline Siting Subcommittee and an update on the St. Clair crossing. Proposed “buckets” include: emergency response, PHMSA authorities, siting and best practices, public transparency, and interdependencies.

Craig Hupp inquired about when the board will receive the propane supply report and other presentations from the February meeting. Co-Chair Creagh noted information will be sent to the board two weeks prior to the May 14, 2018, meeting.

#### XI. PUBLIC PARTICIPATION

- Anne Woiwode, Sierra Club of Michigan, shared verbal comments.
- Terri Wilkerson shared verbal comments.
- Vince Lumetta shared verbal comments.
- Dale Giddings shared verbal comments.
- Jaynan Montague shared verbal comments.
- Sean McBrearty, Oil and Water Don't Mix, shared verbal comments.

#### XII. ADJOURN

Co-Chair Grether called the meeting to adjourn at 2:09 p.m.

#### NEXT MEETING

Monday, August 13, 2018  
Time: 1:00 – 3:30 p.m.  
Location: TBA

**From:** [Joanna Learner](#)  
**To:** [mdrewyor@mtu.edu](mailto:mdrewyor@mtu.edu)  
**Cc:** [jtravis@record-eagle.com](mailto:jtravis@record-eagle.com); [Lara Hamsher](#); [Oil & Water Don't Mix](#); [MiPetroleumPipelines](#); [Jamie McCarthy](#); [Celia Haven](#); [kristy@watershedcouncil.org](mailto:kristy@watershedcouncil.org); [Liz Kirkwood](#); [David Holtz](#); [Beth Wallace](#); [David Karowe](#); [Sweatman, Mark \(DNR\)](#)  
**Subject:** Line 5, Response to 4/22/18 tunnel article  
**Date:** Thursday, May 03, 2018 3:24:44 PM

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May 3, 2018

Professor Mike Drewyor [mdrewyor@mtu.edu](mailto:mdrewyor@mtu.edu)  
School of Technology  
Michigan Technological University  
1400 Townsend Drive  
Houghton, MI 49931-1295

Dear Professor Drewyor:

I was recently in Traverse City to participate in the Oil and Water Don't Mix Coalition's, Line 5 Retirement Party. I live on the bank of the Kalamazoo River in Battle Creek and am very familiar with oil pipelines and their hazards.

The Sunday newspaper article about a possible tunnel beneath the Mackinac Straits designed by you and your students was especially interesting to read. ('Bridge above and tunnel below' by Jordan Travis, April 22, 2018 Traverse City Record Eagle). I would like to share several thoughts and concerns.

One relates to isostatic rebound, the upward motion of bedrock after being pressed down by the weight of glaciers. A recent study about this phenomena was described in the [BATTLECREEKENQUIRER.COM](#), March 5, 2018, p.5A article, 'State still feels Great Lakes Ice Age,' by Keith Matheny, Detroit Free Press, USA Today NETWORK. Isostatic rebound of the rocks under the Straits is reported to be active and occurring at a rate of one foot per 100 years. Do we know how this rock movement would effect a tunnel and its contents in a 25 or 50 year period? Would a long tunnel alter or accelerate the rebound effect? Would bed rock rebound cause cracking that could bring tunnel flooding? Can we risk possible Great Lakes contamination from this rebound?

A fresh water shortage crisis is my second concern. The Great Lakes are a fresh water resource and reservoir of indescribable value. Here is 20% of all surface fresh water on Earth. Water for millions today and millions more in the future. The Great Lakes make Michigan Pure. They make America Great. The English Channel and the Chunnel cannot compare to the Mackinac Straits. No matter how advanced tunnel making technology may be, there is risk. The Great Lakes are an incredible treasure. There are safe alternatives, on land and away from the lake waters, that can meet our oil needs. These

must be identified and followed. Great Lakes fresh water should have Zero risk from oil pipelines.

Finding agreement on a safe, away from the Lakes, alternative to Line 5 and the implementation of this solution may be a long, time consuming process. Possibly many years. I have read that State of Michigan oil and gas needs can actually be met by sources outside of the Line 5 pipeline. These options must be explored.

Also, the age and stresses on the present Line 5 do not give the time for a good solution to be found. Enbridge spent over a billion dollars in cleaning Talmadge Creek and the Kalamazoo River after their July 25, 2010 oil spill. They were conscientious and thorough in this effort. Today, however, instead of adding 22 supports to Line 5, Enbridge should flush out the pipes, turn off the pumps and shut down Line 5. The many billions of cleanup dollars for the inevitable spill should be used to accelerate the land-line solution.

Your consideration of these concerns is greatly appreciated. Thank you.

Also attached is a copy of a poem that I read at the Line 5 Retirement Party.

Bob Learner  
3580 Kalamazoo Ave.  
Battle Creek, MI 49037

Tele: 269-965-8693  
e-mail: [rnllearner@comcast.net](mailto:rnllearner@comcast.net)

17 Hours, 65 Years  
CALLING ENBRIDGE 1765\*  
PLEASE ANSWER

Robert Learner

Calling Enbridge 1765, Calling Enbridge 1765,  
Please Answer.  
17 hours, a ruptured pipe,  
One million gallons, into the night.  
Talmadge Creek - Kalamazoo River,  
Tar sand oil, running forever.  
17 hours, a rusted break,



From Marshall, Ceresco, Battle Creek.  
Heavy diluted bitumen crude,  
Augusta, Galesburg, Morrow Lake too.  
Calling Enbridge 1765, Calling Enbridge 1765,  
Where are you?  
17 hours,  
No Answer.

Calling Enbridge 1765, Calling Enbridge 1765,  
Please Answer.  
65 years for Line No. 5,  
Two twenty inch pipes with a 50 year life.  
Lake Huron, Lake Michigan, great fresh water lakes,  
Five miles across in the Mackinac Straits.  
65 years, two old oil pipes,  
23 million gallons running day and all night.  
Niagara force currents, times that by ten,  
Lake bed washed out, gone is the sand.  
Calling Enbridge 1765, Calling Enbridge 1765,  
Please Answer.

Four anchor supports, broken free by the flow,  
Two old oil pipes, supported no more.  
Zebra / quagga mussels hold on,  
New acid waste, new weight by the ton.  
65 years, two stressed-out old pipes,  
Nine rusty spots on the eastern Straits side.  
Glass fiber coating, in places torn,  
Metal fatigue, the most feared rupture born.  
Calling Enbridge 1765, Calling Enbridge 1765,  
Where are you?  
65 years,  
No Answer.

Calling Enbridge 1765, Calling Enbridge 1765,  
Please Answer.  
Five beautiful lakes, a great glacial gift,  
Fresh water for millions, forever so blessed.  
Pure Michigan treasure, foundation for life,  
A wonderful resource, a shared human right.  
High winds, high waves, strong currents and ice,  
A dynamic ecosystem, supporting all life.  
Two tired old pipes, 100 - 200 - 300 feet deep,  
With the importance of water, they can never compete.

So flush out the pipes, turn off the pumps,  
Shutdown Line 5, we need to be blunt.  
20%, all surface fresh water on Earth,  
Must remain safe, on this planet of our birth.  
Calling Enbridge 1765, Calling Enbridge 1765,  
Please Answer.

\* The number, Enbridge 1765, is a combination of the 17 hour delay in shutting down the oil in Line 6b when it ruptured in 2010 and the current 65 year age of the Line 5 pipe in the Mackinac Straits. The number is designed to be raised yearly as the pipe ages or until it breaks or is shut down



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

May 14, 2018

Keith Creagh, Co-Chair  
Heidi Grether, Co-Chair  
Michigan Pipeline Safety Advisory Board

Directors Creagh and Grether:

I am writing to call the Board's attention to the findings of a recently-released [study commissioned by FLOW](#) of the potential economic impact of a Line 5 oil spill.

Conducted by nationally respected ecological economist Dr. Robert Richardson of Michigan State University, the study adds up potential costs of a Line 5 spill into the Straits of Mackinac and adjoining waters under a realistic – but not worst-case – scenario. The bottom line is that a Line 5 oil spill could deliver a blow of over \$6 billion in economic impacts and natural resource damages to Michigan's economy.

The study estimates \$697.5 million in costs for natural resource damages and restoration and more than \$5.6 billion in total economic impacts, including:

- \$4.8 billion in economic impacts to the tourism economy;
- \$61 million in economic impacts to commercial fishing;
- \$233 million in economic impacts to municipal water systems;
- over \$485 million in economic impacts to coastal property values.

The study does not depict a worst-case spill. Under the study scenario, an approximately 59,500-barrel spill, damages occur to approximately 900 miles of shoreline across 15 counties in the Upper and Lower Peninsulas of Michigan. The study assumes the spill would take place during ice free months under conditions favorable to response.

A worst-case scenario would involve a prolonged spill of greater magnitude and broader geographic range, reaching into Georgian Bay, Saginaw Bay and other waters. The report does not estimate impacts to the shipping sector, costs of evacuation, and impacts on Canadian shorelines and economic sectors.

This study puts credible numbers behind what common sense tells us – that a Line 5 spill could cause catastrophic economic impacts in addition to environmental destruction. It's another compelling reason for the state to take swift action to shut down Line 5.

I am attaching a copy of the study. Thank you for entering it into the Board's record.

Sincerely,

A handwritten signature in blue ink that reads "Liz Kirkwood". The signature is written in a cursive, flowing style.

Liz Kirkwood  
Executive Director

# Oil Spill Economics: Estimates of the Economic Damages of an Oil Spill in the Straits of Mackinac in Michigan

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Robert B. Richardson, Ph.D.  
Nathan Brugnone, M.S.  
Department of Community Sustainability  
Michigan State University

May 2018

Prepared for FLOW (For Love of Water)  
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## Executive Summary

The Straits of Mackinac is a roughly five-mile (eight-kilometer) long section of waterway that joins Lakes Michigan and Huron into a single hydraulic system. The Mackinac Bridge connects Michigan's Upper and Lower peninsulas at their narrowest distance, and a submerged section of Enbridge Energy's Pipeline 5 (Line 5) spans the Straits of Mackinac just west of the Mackinac Bridge. The objective of this report is to provide an estimate of regional economic damages resulting from a potential breach of Line 5 at or near its crossing at the bottom of the Straits of Mackinac.

The framework for this estimation of the economic damages of a rupture of Line 5 in the Straits of Mackinac is based on a hypothetical scenario involving a major spill of approximately 2,500,000 gallons of crude oil (about 59,500 barrels). The scenario would involve damages to approximately 900 miles of shoreline across five Tier I counties (i.e., Charlevoix, Cheboygan, Emmet, Mackinac, and Presque Isle), for which impacts are expected to be greater, and ten Tier II counties (i.e., Alcona, Alpena, Antrim, Benzie, Chippewa, Delta, Grand Traverse, Iosco, Leelanau, and Schoolcraft Counties). The scenario is based on assumptions related to (i) the vulnerability of the pipelines to damage from events such as an anchor strike, (ii) a failure of the automatic response valves, and (iii) a delay in human response of up to two hours. The basis for these assumptions was derived primarily from a document review and interviews with experts. It is important to note that this oil spill scenario does not necessarily reflect, nor is it intended to be interpreted as the worst-case scenario; rather, it is a reasonable case that is informed by expert knowledge. The scenario reflects the real possibility of technological failure and delay in human response. In the context of Line 5, the worst-case scenario may be far greater in terms of scale, scope, and the magnitude of impacts.

Estimates of economic damages of an oil spill under this scenario were developed based on information gathered from key informant interviews and a review of public documents and references listed at the end of this report. We include estimates of two categories of economic damages from an oil spill: (i) the costs of natural resource damages and restoration, and (ii) the economic impacts to the private sector and to municipalities in the region. The economic costs of natural resource damages and restoration from an oil spill are estimated to be \$697.5 million. These estimates are potentially conservative, given the sensitivity of the freshwater ecosystem and the presence of numerous endangered species.

A breach of the pipeline would have significant impacts to several economic sectors in the region, including tourism, commercial fishing, municipal drinking water and sewer operations, and real estate. The present value of economic damages to the tourism sector from an oil spill under the scenario are estimated to be \$4.8 billion. The present value of economic impacts to the commercial fishing sector is estimated to be \$61.0 million under the scenario. Estimates of the economic damages to municipal water systems related to drinking water provision and wastewater treatment facilities are related to the potential

costs of facility repair and replacement, and the economic damages to municipal water systems are estimated to be more than \$233 million. Finally, we estimated the economic damages to coastal property based on losses of annualized benefits, based on 2017 county equalized values of real and personal property. The present value of economic damages to coastal properties under the scenario is more than \$485 million. The total estimate of potential economic damages from this scenario is more than \$5.6 billion. An overview of the estimates of natural resource damages and economic impacts by sector is presented below in Table 1.

**Table 1: Overview of estimates of natural resource damages and economic impacts of an oil spill from Line 5 in the Straits of Mackinac**

<b>Category</b>	<b>Economic Damages</b>
Natural resource damages and restoration	\$697,500,000
Economic impacts	
• Tourism	\$ 4,823,082,926
• Commercial fishing	61,050,000
• Municipal water systems	233,090,000
• Coastal property	485,811,163
Total economic impacts	\$5,603,034,089

While the assumptions upon which these estimates are based are admittedly coarse, reflecting the high levels of uncertainty regarding the scope of an oil spill, the estimates themselves demonstrate that the potential economic damages of a release of oil from Line 5 at or near its crossing at the Straits of Mackinac are high. We believe that these estimates are conservative and likely underestimate economic impacts, as they do not take into account the consequences for public health, the challenges related to containment, or the possibility of an oil spill of greater geographic scale. Previous oil spills in open waters have involved tens of billions of dollars in economic damages, and there are reasons to believe that a rupture of Line 5 has the potential to inflict damages of a similar or greater magnitude.

The findings and conclusions expressed in this report are those of the authors, who are responsible for any errors or omissions.



## Introduction

The Great Lakes are the largest surface freshwater system on Earth. Only the polar ice caps contain more fresh water. The Great Lakes and their connecting channels contain 84 percent (%) of North America's surface fresh water, and about 21% of the world's supply of fresh surface water, and they are among the most ecologically diverse ecosystems on the planet (EPA, 2017). They provide drinking water to tens of millions of Canadians and Americans and are important to the economies of both Canada and the United States, supporting manufacturing, transportation, farming, tourism, recreation, energy production, and other forms of economic growth (Environment Canada and EPA, 2017).

The Straits of Mackinac is a roughly five-mile (8 kilometer [km]) long section of waterway that joins Lakes Michigan and Huron into a single hydraulic system (Schwab, 2016). The Mackinac Bridge connects Michigan's Upper and Lower peninsulas at its narrowest point, between Mackinaw City and St. Ignace (Adie, 2012). Travelers driving over the Mackinac Bridge in Northern Michigan are treated to one of the most spectacular vistas in the entire Great Lakes region (Alexander and Wallace, 2012). A submerged section of Enbridge Pipeline 5 (Line 5) spans the Straits of Mackinac just ¼-mile west of the Mackinac Bridge. The objective of this report is to provide an estimate of regional economic damages resulting from a potential breach of Line 5 at or near its crossing at the bottom of the Straits of Mackinac. For purposes of this report, the terms breach, spill, and leak will be used synonymously.

Line 5 was built in 1953 by the Lakehead Pipe Line Company (later rebranded as Enbridge Energy Partners, L.P.) and was engineered by the Bechtel Corporation, four years before the Mackinac Bridge was constructed. Line 5 is owned and operated by Enbridge Energy Partners, L.P., a Calgary, Alberta, Canada-based energy company. It is a 645-mile, 30-inch-diameter pipeline that originates in Superior, Wisconsin, travels through Michigan's Upper and Lower Peninsulas, and terminates in Sarnia, Ontario, Canada (Enbridge, 2017). As it travels under the Straits of Mackinac, Line 5 splits into two 20-inch-diameter, parallel pipelines that are buried onshore and taper off to deep levels underwater, crossing the Straits west of the Mackinac Bridge for a distance of 4.5 miles (about 7.2 km). The twin pipelines of Line 5 run about 1,000 feet apart at depths ranging between 100 and 270 feet and have existed at the bottom of the Straits for more than six decades (Groundwork Center for Resilient Communities, 2017). Line 5 occupies the State-owned lakebed of the Straits of Mackinac per an easement authorized by the Michigan Department of Conservation (now Department of Environmental Quality) in 1953 (MPPTF, 2015). In order for this pipeline to be built on state-owned lands and waters, the Michigan Legislature enacted a new public trust law, 1953 PA 10, that authorized certain limited private use of public trust waters for public utilities. Thus, Line 5 occupies public waters and is subject to the public trust, of which the State of Michigan acts as trustee in perpetuity.

Line 5 transports approximately 22.7 million gallons—or up to 540,000 barrels (bbl) per day of light crude oil, light synthetic crude, and natural gas liquids, the latter of which are refined into propane (Alexander and Wallace, 2012; Enbridge, 2017). It is part of the Enbridge Lakehead System, one of the largest networks of pipelines in the world. The pipeline is operated by Canadian-based Enbridge Energy Partners, L.P., and it was originally constructed to transport Canadian oil products to Canadian refineries via the shortest available route. The Lakehead System serves major refining centers in the Great Lakes, the Midwest, and Ontario, Canada, and through connections with affiliated pipelines, the System has access to refineries in the Mid-Continent and Gulf Coast regions. These interstate pipeline networks are regulated by the Pipeline and Hazardous Materials Safety Administration (PHMSA), a federal agency under the U.S. Department of Transportation that enforces pipeline safety rules and regulations. A map of the Lakehead System is presented in Figure 1, and a map of Line 5 is presented in Figure 2.

The focus of this report is on the portion of Line 5 that are the dual pipelines located on the bottomlands of the Straits of Mackinac. However, this represents just a small portion of Line 5—less than 5 miles out of a total 645 miles of the length of the pipeline. It is important to note that the onshore portions of Line 5 pose also pose a significant risk to Michigan's waters. In the Upper Peninsula, Line 5 crosses 16 tributaries within 9 miles of Lake Michigan, and 11 of those are less than 4 miles from the Lake (TMWC, 2017). An oil spill in this area would have a high likelihood of reaching Lake Michigan. In the Northern Lower Peninsula, Line 5 crosses the Indian River, Little Sturgeon River, Pigeon River, and Upper Black River, and passes near many inland lakes, including Burt, Douglas, Mullet, and Paradise Lakes. These water resources are ecologically and economically important, and they are also vulnerable to exposure to risks from Line 5.

This report provides an estimate of the potential economic damages of an oil spill from Line 5 at or near its crossing of the Straits of Mackinac. Estimating the economic damages from such an event involves confronting a number of challenges related to the uncertainty of the scope and extent of the impacts from an oil spill in an open freshwater environment. Using data collected from key informant interviews and a review of relevant reports, publicly-available data, and other documents, potential economic damages were estimated based on a hypothetical spill scenario involving the release of 2.5 million gallons of crude oil, or approximately 59,500 barrels. This scenario is based on an assumption a failure of the automatic response system and a delay in human response.



**Figure 1: Map of the Lakehead System (Source: Pipeline and Hazardous Materials Safety Administration)**



**Figure 2: Map of Line 5; inset: crossing at the Straits of Mackinac (Source: Enbridge Energy Partners, L.P.)**

There is broad uncertainty about the effects of the release of oil under this scenario, including the location of a possible spill along the pipeline, the time of year, and the extent of affected shoreline. For purposes of this report, we assume that a spill occurs when the waters are ice-free, and we assume that the breach would affect approximately 900 miles of shoreline, primarily near the Straits of Mackinac and extending farther into Lake Huron and Lake Michigan. It is important to emphasize the high levels of uncertainty related to this scenario. If a rupture were to occur, it is possible that automatic response valves would be triggered, and a release of oil could be of a lesser magnitude. However, it is also possible that a failure of those valves and an extended delay in response, such as those experienced in pipeline ruptures, could lead to a release of oil of a far greater magnitude than this scenario, with economic damages well in excess of the estimates in this report. The estimates provided in this report are associated with one

scenario of an oil spill, and they demonstrate the potential economic damages from such a scenario. It is important to note that this oil spill scenario does not reflect a worst-case scenario; rather, it is a reasonable case that is informed by expert knowledge. The scenario also does not consider lost non-market values, including passive use values, such as existence value (Carson et al., 2003). The scenario reflects the real possibility of technological failure and delay in human response. We believe that these estimates are conservative and likely underestimate economic impacts, as they do not take into account the consequences for public health, the challenges related to containment, or the possibility of an oil spill of greater geographic scale. In the context of Line 5, the worst-case scenario may be far greater in terms of scale, scope, and the magnitude of impacts.

## Background

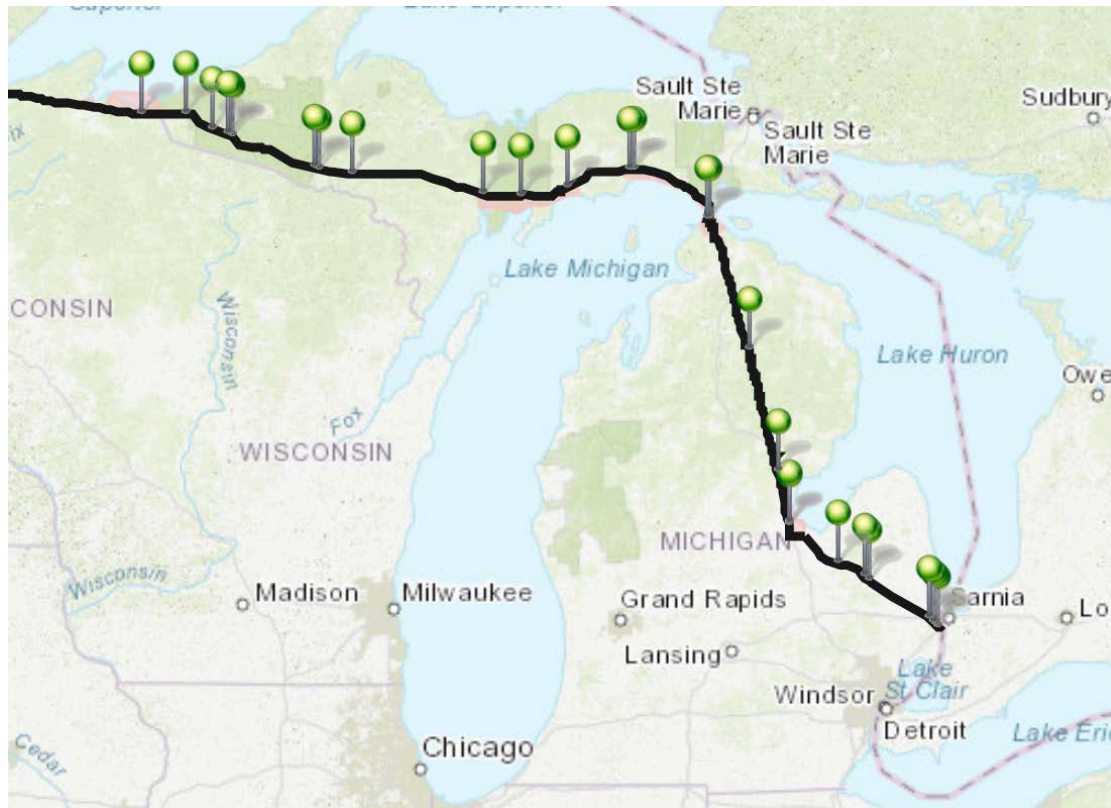
Enbridge Energy Partners, L.P. (Enbridge) claims that it is “committed to safe operations, environmental stewardship and social responsibility” (Enbridge, 2013). However, Enbridge is the same firm responsible for the largest (by surface area affected) and most costly inland oil spill in American history (Alexander and Wallace, 2012). An Enbridge pipeline ruptured near Marshall, Michigan in July 2010, and according to the company, it released more than 840,000 gallons of tar sands oil into the Kalamazoo River system (FWS, 2015a). Despite warnings of trouble, oil flowed for 17 hours before Enbridge shut down the pipeline, after being alerted by an outside caller (Ellison, 2017a). From 2010 to 2014, more than 1.2 million gallons of oil have been recovered from the river (EPA, 2016a). The delay in human response with this event raises serious concerns regarding the response to a rupture of Line 5.

In March 1991, the Enbridge Line 3 pipeline ruptured near Grand Rapids, Minnesota, spilling over 1.7 million gallons of oil, much of which flowed into the Prairie River, a tributary of the Mississippi, amounting to the largest inland oil spill in history, in terms of amount of oil released (Shaffer, 2014). In 2014, Enbridge applied for approval of a Line 3 replacement, which would cross 337 miles of Minnesota carrying 760,000 barrels of crude oil per day on its route from Alberta to the Enbridge terminal in Superior, Wisconsin. Across the Enbridge pipeline system, there have been more than 1,000 spills in North America between 1999 and 2014, totaling more than 7 million gallons of oil (Young, 2012; TMWC, 2017).

Although the Enbridge pipeline sections that cross the Straits of Mackinac have never spilled oil into the conjoined waters of Lakes Michigan and Huron, Line 5 has ruptured at least 29 times over the past 50 years and has spilled at least 1.13 million gallons of oil (Ellison, 2017a). Many of these events were relatively small in scope, such as a 2015 spill of just 8 gallons near Marenisco in 2015, and a release of approximately 20 gallons in 2013 near Mackinaw City, perilously close to the Straits area. A larger spill involved the release of 222,600 gallons of oil and natural gas near Crystal Falls, Michigan, in 1999. The rupture was caused by the line lying on a rock, and the spill forced the evacuation of about 500 people after responders ignited a vapor cloud that sparked a 36-hour long fire



(Alexander and Wallace, 2012; Ellison, 2017a). In 1976, a pipe failure on Line 5 caused a release of 210,000 gallons of oil near Lake Gogebic. Four years earlier, 252,000 gallons were released near Iron River because of a longitudinal weld failure. A similar weld failure caused a spill of 285,600 gallons near Lake Gogebic in 1968. Although the pipeline is 65 years old, 1968 is the earliest year of data available. A map of the locations of oil spills from the Line 5 pipeline system since 1968 is presented in Figure 3.



**Figure 3: Map of locations of oil spills along Enbridge Line 5, 1968-2017 (Source: Ellison, 2017a)**

Recent events have demonstrated that the Straits of Mackinac are at risk of contamination, and that Line 5 is vulnerable to a rupture. In August 2017, Enbridge disclosed that there were a few areas of exposed bare metal on the underwater pipeline at the bottom of the Straits of Mackinac; it was later determined that there were dozens of areas where the protective coating had been damaged. Enbridge was aware of the damages as early as 2014 but did not disclose their existence for three years (Ellison, 2017b). Of the 48 anchor support locations inspected by Enbridge on the pipeline, the vast majority were found to have missing coating, and 42 supports were found to have had some issue of concern (Tower, 2017). On April 1, 2018, about 600 gallons of petroleum-based dielectric fluid leaked into the Straits of Mackinac and Lake Michigan after two power cables owned by Wisconsin-based American Transmission Company were damaged (Tower, 2018). The fluid was used for insulation for the cables, and was composed primarily of alkyl derivatives of benzene, a hydrocarbon present in oil, which is considered toxic to both humans and aquatic life. The leak was not reported to the U.S. Coast Guard until late the following day. The State of Michigan alleges that the damage

was caused by the anchor of the Clyde S. VanEnkevort, a tug and barge vessel passing through the Straits of Mackinac, which are a no-anchor zone (Oosting & Burke, 2018). An anchor strike by that same vessel was also determined to have dented Line 5 in three places (Lawler, 2018; Oosting & Burke, 2018).

A spill from Enbridge Line 5 in the Straits of Mackinac could contaminate nearby municipal drinking water intakes, devastate some of the commercial, recreational, and tribal fisheries of the Great Lakes, kill aquatic and terrestrial wildlife, impair critical ecosystem services, diminish coastal property values, and tarnish the image of the State of Michigan and perceptions of its high levels of ecological integrity. Pollution from a spill would almost certainly impose negative impacts on the State's multibillion-dollar tourism industry (Tourism Economics, 2017), particularly the iconic and historic tourist destinations of Mackinac Island, Bois Blanc Island, and Mackinaw City. In 2016, tourism in Michigan yielded \$23.7 billion in visitor spending alone, generating an estimated \$40.7 billion in total sales (Tourism Economics, 2017). Yet, of even greater concern, if volatile organic compounds (VOCs) found in oil were to enter municipal water and wastewater treatment plants, there would be significant costs for repair and replacement of important equipment. More damaging still, during periods when plants are inoperable, there would potentially be catastrophic public health crises resulting from untreated sewage and a lack of fresh drinking water.

### Michigan Pipeline Safety Advisory Board

In 2014, Governor Rick Snyder created the Michigan Petroleum Pipeline Task Force by executive order. The goal of the Michigan Petroleum Pipeline Task Force was to identify and recommend actions within State government to protect the public health, safety and welfare of Michigan citizens and the environment related to the transportation of liquid petroleum products through major pipelines within the State (MPPTF, 2015). The Task Force made four recommendations for Line 5:

1. Ban heavy crude transport
2. Conduct an independent risk analysis
3. Conduct an independent pipeline alternatives analysis
4. Collect additional information from Enbridge

On September 3, 2015, Governor Rick Snyder created the Michigan Pipeline Safety Advisory Board (MPSAB) to implement the recommendations in the Michigan Petroleum Pipeline Task Force Report. The 15-member MPSAB, comprised of regulated stakeholders, government agencies, and non-governmental organizations, acts in an advisory capacity to the Governor.

Two years after its formation, however, the MPSAB had only produced one report—the pipeline alternatives report. This report, authored by Dynamic Risk, Ltd., an oil pipeline industry consultant, was criticized by State agencies and the public for both a failure to examine existing pipeline infrastructure and bias towards the construction of a tunnel to enclose the pipeline. The accompanying economic risk analysis was left unfinished. The

State canceled its contract with Det Norske Veritas (DNV) due to conflict of interest. As a result, the nearly-complete report was never released. The risk and decision-making burden was, thus, shifted to the public without adequate information regarding a worst-case scenario.

In January 2018, the State of Michigan entered into a contract agreement with Michigan Technological University to have a team led by Dr. Guy Meadows, formerly of the MPSAB, perform a risk analysis on Enbridge's Line 5 in the Straits of Mackinac. Dr. Meadows is Director of the Great Lakes Research Center at Michigan Tech, and he and a team of researchers are expected to release their study of the risk analysis in September 2018. While a broader understanding of risks of a breach of Line 5 in the Straits of Mackinac is anticipated to be informed by the research underway by this team, others cite the precautionary principle (Ackerman, 2017) and the legal duties of the public trust doctrine as ample evidence of the need to consider the worst-case scenario and to make an informed decision regarding the future of the pipeline.

### Potential Economic Damages and Uncertainty

This report was commissioned by FLOW (For Love of Water), a Great Lakes water law and policy organization based in Traverse City, to address the public need and desire for transparent information regarding the potential impacts of a breach of Enbridge Line 5. The objective of this report is to provide reasonable estimates of the economic damages related to an oil spill from Line 5 in the Straits of Mackinac. To this end, we focus on natural resources, tourism, commercial fishing, municipalities, coastal real estate, and ecosystem services. The United States Environmental Protection Agency (EPA) has identified these areas as useful in understanding impacts of aquatic pollutants, particularly agricultural runoff and other contaminants. Therefore, we believe these sectors to be useful proxies of the economic impacts of an oil spill in this unique, sensitive environment. However, this report is not an exhaustive analysis of potentially affected sectors, but rather represents the several economic sectors that are likely to be affected by an oil spill, and they may serve as proxy measures of potential damages. There is a great deal of uncertainty associated with an oil spill, and this was confirmed among experts in every field we queried. This uncertainty reflects the uniqueness and complexity of the situation.

Never has such a large, freshwater ecosystem experienced an oil spill of the magnitude possible here. Most large aquatic oil spills have taken place in saltwater environments, with the Kalamazoo River oil spill being a notable exception. Also known as the Enbridge Line 6B spill, this pipeline purportedly released nearly one million gallons of oil-rich bitumen, a highly-viscous, semi-liquid form of petroleum into Talmadge Creek and the Kalamazoo River when it ruptured in 2010, although in the years that followed, more than 1.2 million gallons of oil have been recovered from the river (EPA, 2016a). Bitumen is a product of tar sands (also referred to as oil sands), which are a combination of clay, sand, water, and bitumen. Tar sands can be mined and processed to extract bitumen, which can then be refined into oil. Owing to human error and the lengthy delay by Enbridge in responding to the rupture, the magnitude of this spill far exceeded worst-



case projection. For this reason, our oil spill scenario does not represent the most commonly-occurring scenario from the Schwab (2016) simulations, nor is it a worst-case scenario; rather, it is a reasonable case that is informed by expert knowledge. The scenario reflects the real possibility of an anchor strike by marine vessels, a technological failure of automatic response valves, and a delay in human response of up to two hours. In the context of Line 5, the worst-case scenario may be far greater in terms of scale, scope, and the magnitude of impacts.

Throughout the report, we note the high levels of uncertainty in terms of the scale and scope of possible impacts of an oil spill, and we describe the assumptions associated with the estimation of potential economic damages. We note all sources of information where applicable, and we acknowledge each of these sources also operate on approximations and uncertainty. We do not make assertions regarding risk, or the probability of a spill and its potential impacts, as the variables necessary for calculation of probability are too numerous to fully consider. This report provides an estimate of potential economic damages under an oil spill scenario, and the assumptions that provide the basis for these estimates are based on published reports and the perspectives of key informants.

## Economic Impact and Value

Aquatic ecosystems such as the Great Lakes Basin and the Straits of Mackinac provide an array of economic benefits, including recreation uses, community impacts, and the values of ecosystem services, such as water provision for irrigation, municipal drinking water, and wastewater treatment systems. Numerous other services are also reliant on these ecosystems, such as food production (i.e., commercial and subsistence fishing) and refugia and habitat (i.e., for resident and migratory fish and wildlife populations), and protection of these ecosystems is necessary to ensure that these benefits will be provided in the future. Degradation of these ecosystems with an oil spill would have negative economic consequences.

This report focuses on the regional economic costs from a potential breach of Line 5 at or near its crossing at the bottom of the Straits of Mackinac, and these should be interpreted as economic impacts, which are reductions in expenditures and the costs associated with restoring any environmental damages. The report does not speculate on the risks of such a breach of the pipeline, as the probability of such an event is uncertain. Nevertheless, there is a non-zero probability of a breach of the Line 5 pipelines, and as such, the economic consequences of such an event are worth consideration.

In this context, it is important to distinguish between economic value and economic impacts. Economic value refers to the maximum amount a consumer is willing to pay for a good or service in a market economy, where the value accrues to the consumers. For example, visitors to a beach for recreation may incur expenditures for their trips, but some would be willing to pay more. The difference between willingness to pay and actual spending is considered to be value that accrues to the visitor. In the context of

environmental benefits, many economic values are not considered in markets and are often ignored in policy decisions. Such market failures require the use of non-market valuation methods to estimate the economic value of changes in environmental quality. This report does not involve the use of these methods or the estimations of such values.

The regional economic impacts of changes in environmental quality would be conceptualized as the effect of an increase (decrease) in private and public expenditures that result from the changes. For example, suppose visitors to a beach spend money locally, for food purchases or fuel. If a pollution incident contaminates water quality at a particular beach, potential visitors to that beach may choose to travel elsewhere for recreation, thereby reducing local spending by recreation visitors to the affected beach. The reduction in local spending by recreation visitors would involve negative economic impacts to the region.

In this report, we focus only on economic impacts, and we distinguish between natural resources damages and restoration—the costs of which would be borne by federal and state agencies who would seek compensation from Enbridge in a legal settlement—and economic costs that would be borne by companies, landowners, and municipalities in the form of lost revenue or added costs of repair and alternative provision of services.

The economic impacts of technological disasters such as oil spills and similar events such as toxic leaching, chemical plant explosions, and radiological emissions have been well documented in numerous reviews (Flynn & Chalmers, 1980; Nelson, 1981; Cohen, 1995). Technological disasters tend to result from a combination of human error and mechanical malfunction, and depending on the scope, magnitude, and location, they can have significant impacts for human health, natural resources, and ecosystem services—all of which have social and economic consequences.

Coastal oil spills are of particular economic concern because the impacts of such events are greatest in terms of biological resources and other forms of natural capital (Cohen, 1995). Estimates of economic impacts after such events occur (*ex post*) can illuminate the magnitude, scope, and distribution of their social and economic costs, and even then, such analyses are often constrained by insufficient data. The challenges are amplified when economic damages are difficult to quantify, such as when long-run environmental impacts are unknown, tourism declines because of perceptions of a contaminated coastline, or residential property values decline as a result of the stigma of a polluted environment (Larkin et al., 2013).

The numerous oil spills in recent decades have generated an extensive body of literature on the economic dimensions of such events and their economic impacts (Meade and Sorensen, 1970; Burrows et al., 1974; Grigalunas et al., 1986; Assaf et al., 1986; Cohen, 1995; Larkin et al., 2013). This literature distinguishes between direct and indirect effects of oil spills. Direct effects would include economic damages that stem from physical injury to property (Epley, 2012; Winkler & Gordon, 2013) and natural resources (Cohen, 1995). Indirect effects are sometimes referred to as “pure economic losses,” or the lost earnings resulting from oil spills, such as damages to a region’s reputation that lead to

losses in the tourism sector, or to coastal restaurants unable to sell local fish (Larkin et al., 2013). There are also numerous other non-market losses associated with passive use values, whose estimation issues have been summarized in relation to past oil spills (Assaf et al., 1986; Grigalunas et al., 1986).

In March 1989, the oil tanker Exxon Valdez struck the submerged rocks of a reef and spilled roughly 11 million gallons of crude oil into Prince William Sound, off the coast of southern Alaska. The spill contaminated nearly 1,300 miles of shoreline and is considered one of the major environmental disasters in U.S. history (Carson et al., 2003). The spill had profoundly negative impacts on the fisheries of Prince William Sound, Lower Cook Inlet, and Kodiak Island. The social costs of the oil spill on south-central Alaska's fisheries during 1989 were estimated to be \$108.1 million (Cohen, 1995), or \$209.3 million in 2016 dollars. The economic effects persisted into 1990, where the social costs were estimated to be \$47.0 million, or \$86.3 million in 2016 dollars. Ecological effects have persisted for decades, as exposure to sequestered oil has continued to cause animal deaths (Graham, 2003). Salmon, for example, had increased mortality for four years after the spill because incubating eggs had been exposed to oil. Researchers estimated that shoreline habitats such as mussel beds affected by the spill would take up to 30 years to recover fully.

The contingent valuation method was used to estimate the passive use losses related to Exxon Valdez oil spill, and early estimates amounted to \$2.8 billion as the lower bound on aggregate passive use losses (or \$5.14 billion, in 2016 dollars) (Carson et al., 2003), which the authors acknowledge as conservative. Subsequent developments in econometric applications have advanced the estimation of non-parametric models and more flexible parametric models of the distribution of willingness-to-pay in contingent valuation. Estimates using these approaches have amounted to passive use losses up to \$7.19 billion dollars (or \$13.2 billion, in 2016 dollars).

In April 2010, an explosion at the Deepwater Horizon oil rig operated by British Petroleum (BP) at the Macondo exploration well in the Gulf of Mexico resulted in the deaths of 11 rig workers and the release of 134 million gallons of oil until the well was capped in July of 2010, approximately three months later. This incident became the worst offshore environmental disaster in U.S. history and was over 12 times greater in magnitude than the 1989 Exxon Valdez oil spill. Oil washed ashore and contaminated the coastlines of four U.S. states, Louisiana, Mississippi, Alabama, and Florida.

The spill had a negative impact on the fisheries of the Gulf of Mexico. Following the spill, recreational and commercial fishing activities were closed in affected federal waters between the mouth of the Mississippi River and Pensacola Bay, Florida (Morgan et al., 2016). Years after the event, many of the effects on natural resources and ecosystem services continue to linger. Federal government studies revealed that dolphins showed signs of oil poisoning, and dolphin deaths continued long after the spill at a higher rate than normal (Venn-Watson et al., 2015).

Economic estimates suggest that the BP spill significantly reduced demand for oysters in Louisiana in the months following the spill. The spill also had a negative impact on the recreation and tourism sector. Estimates of the economic impacts of cancelled recreational trips to coastal counties were developed for legal claims by the State of Florida (Court et al., 2017). A survey of households in 13 states indicated that 1.88 million planned visitor-trips to the region were cancelled up to a year after the incident, resulting in a loss of \$1.30 billion in visitor spending. Total regional economic losses were estimated at \$2.04 billion in industry output, \$1.37 billion in value added, and an employment loss of 20,486 job-years. As of January 2018, total costs of the spill to BP were estimated at approximately \$65 billion, including court fees, penalties, and cleanup costs (Bousso, 2018).

In May 2015, a pipeline operated by Plains All American Pipeline, L.P. ruptured and discharged approximately 105,000 gallons (2,500 barrels) of heavy crude onto land, beaches, and the Pacific Ocean coast of Santa Barbara, California, resulting in the largest coast spill in California in more than 25 years (MPPTF, 2015). Field teams documented dead fish, invertebrates, and other wildlife in the oiled areas following the spill. As part of the Natural Resource Damage Assessment and Restoration process, state and federal natural resource co-trustees are still investigating the extent to which the incident may have caused harm to birds (e.g., brown pelicans, common murre, Pacific loons, snowy plovers), marine mammals (e.g., California sea lions), fish (e.g., surf perch and grunion), and marine invertebrates and their habitats (NOAA, 2015). The spill also shut down fisheries, closed numerous beaches, and negatively affected recreational uses such as camping, non-commercial fishing, and beach visits.

As previously mentioned, in July 2010, a rupture of Enbridge's Line 6B pipeline released bitumen, a refined and viscous form of crude oil into Talmadge Creek and the Kalamazoo River, near Marshall, Michigan. Nearly one million gallons of oil were discharged in total, and the spill harmed wildlife, damaged the watershed, displaced 150 families from their homes, and cost Enbridge more than \$1.2 billion in cleanup expenses (FWS et al., 2015a). In a filing with the Securities and Exchange Commission, the \$1.2 billion figure included \$551.6 million spent on response personnel and equipment, \$227 million on environmental consultants and \$429.4 million on professional, regulatory, and other costs (Enbridge, 2014). Enbridge estimates it has \$219 million in spill costs yet-to-be-paid, and additional costs from ongoing restoration initiatives continue to mount.

In May 2015, the State of Michigan reached a \$75 million settlement with Enbridge, under which the company would pay for additional remediation and monitoring, the costs of construction and restoration of wetlands, removal of a dam, and improvements to recreation and boating sites along the River. In June of 2016, the United States, the State of Michigan, the Nottawaseppi Huron Band of the Potawatomi Tribe, and the Match-E-Be-Nash-She-Wish Band of the Pottawatomi Indians (Gun Lake Tribe), reached a settlement for natural resources damages that required Enbridge to pay an additional almost \$4 million for restoration projects and assessment costs. This was in addition to the cost of completing certain projects and monitoring under the May 2015 settlement with the State (comprising approximately \$58 million of the \$75 million settlement), for a

total estimated cost of \$62 million specifically related to natural resource damages. In addition, in July 2016, the U.S. Environmental Protection Agency and the Department of Justice reached a settlement with Enbridge, whereby the company would spend at least \$110 million on measures to prevent spills and improve operations across its pipeline system in the Great Lakes region, in addition to paying civil penalties totaling \$61 million for Clean Water Act violations resulting from the discharge (EPA, 2016a). Settlements with private landowners, businesses, or natural resource damage to their property, use, enjoyment, and natural features on their property are not available.

## Methods

The framework for this estimation of the economic damages of a rupture of Line 5 in the Straits of Mackinac is based on a hypothetical scenario involving a major spill of approximately 2,500,000 gallons of crude oil (approximately 59,500 barrels). The scenario would involve damages to approximately 900 miles of shoreline across 15 counties in the Upper and Lower Peninsulas resulting from technological failure and delay in human response.

It is assumed that five Tier I counties (i.e., Charlevoix, Cheboygan, Emmet, Mackinac, and Presque Isle) will suffer the greatest damages because of closer proximity to the Straits and to the pipeline. It is further assumed that ten Tier II counties (i.e., Alcona, Alpena, Antrim, Benzie, Chippewa, Delta, Grand Traverse, Iosco, Leelanau, and Schoolcraft Counties) would also be affected, but to a lesser extent.

The impacts associated with this scenario are informed by a report of simulations of oil spills in the Straits of Mackinac by the Water Center at the University of Michigan (Schwab, 2016). The simulations were developed using a hydrodynamic model of discrete particle motion in the context of the currents in the Straits of Mackinac, using a statistical analysis of worst case spill scenarios. The simulations considered three different oil spill volumes: i) 5,000 barrels (bbl), ii) 10,000 bbl, and iii) 25,000 bbl (or approximately 210,000, 420,000, and 1,050,000 gallons, respectively<sup>1</sup>).

The study simulated oil spills for 840 overlapping 60-day periods between May and October, when the lakes are free of ice cover. The report acknowledges that its assumptions and results presented in the report are conservative (Schwab, 2016). The simulation results found that over 15% of Lake Michigan's open water (9,141 km<sup>2</sup>) and almost 60% of Lake Huron's open water (35,264 km<sup>2</sup>) could be affected by visible oil from a spill in the Straits of Mackinac (see Table 2). At least 60% of the cases affected an area of 207 km<sup>2</sup> in Lake Michigan and 1,953 km<sup>2</sup> in Lake Huron.

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<sup>1</sup> Based on 42 gallons per barrel.

**Table 2: Offshore area affected by any case, by percentage range of cases (Schwab, 2016)**

<b>Percent of cases</b>	<b>Total area (km<sup>2</sup>)</b>	<b>Lake Michigan area (km<sup>2</sup>)</b>	<b>Lake Huron area (km<sup>2</sup>)</b>
> 0%	44,405	9,141	35,264
> 20%	12,931	1,688	11,243
> 40%	5,684	518	5,166
> 60%	2,160	207	1,953
> 80%	635	64	571

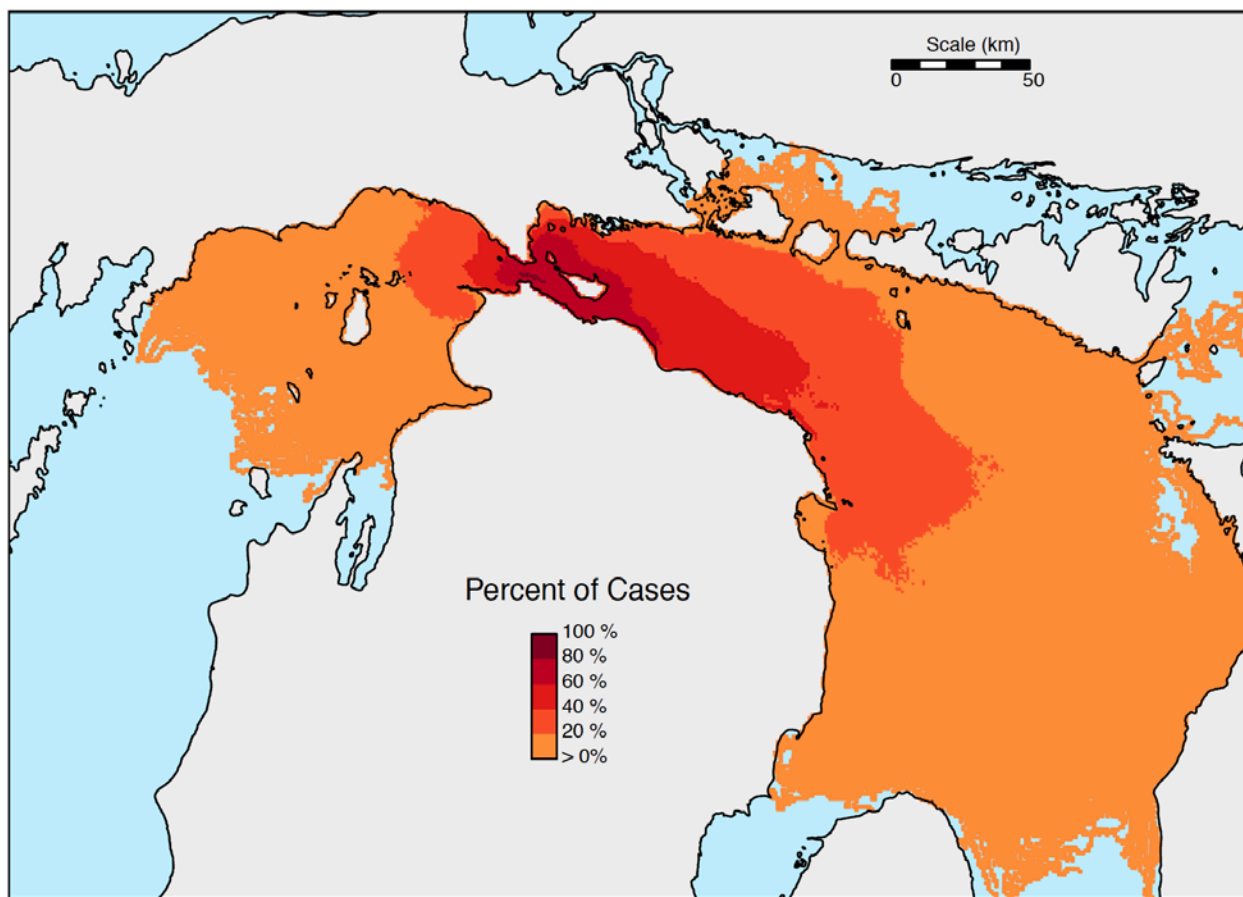
A summary of the length of impacted shoreline for three different initial release volumes is provided below in Table 3. Estimates are provided in terms of (i) the length of shoreline that could be impacted by any spill, (ii) the maximum length of impacted shoreline in a single case, and (iii) the median length of impacted shoreline from all cases.

**Table 3: Length (km) of impacted shoreline for three initial release volumes (Schwab, 2016)**

<b>Initial release volume (barrels)</b>	<b>All cases</b>	<b>Single case</b>	<b>Median</b>
5,000	709	115	60
10,000	835	170	85
25,000	1,162	245	120

A graphical representation of the offshore area affected by any case in the simulations is presented in Figure 4.

The worst-case scenario modeled by Schwab (2016) is a spill of a magnitude of 25,000 bbl (approximately 1 million gallons) that is equivalent to the size of the spill that occurred in Line 6B in the Kalamazoo River in 2010 over a 17-hour period (the time period that oil flowed before Enbridge shut down the pipeline). However, that pipeline was 30 inches in diameter, and at the time, had a capacity of 10.1 million gallons (240,000 barrels) per day (Martell, 2014). While the terrestrial portion of Line 5 is 30 inches in diameter, the submerged portion of Line 5 consists of two pipelines, each measuring 20 inches in diameter, and they collectively have a capacity of up to 22.7 million gallons per day. If similar delays in management responses were employed in the event of an oil spill along Line 5 near the Straits of Mackinac, the total spill volume could conceivably be far greater than 1 million gallons. Furthermore, due to modeling assumptions, Schwab (2016) acknowledges that results presented in the report can be considered conservative, in terms of the extent of the oil spill simulations, and the associated scope and magnitude.



**Figure 4: Percent of cases in which oil is present at any time after initial release (Schwab, 2016)**

In at least one case from the simulations, 70% of the initial release volume of oil would be beached in less than 24 hours (Schwab, 2016). Other cases involved extensive beaching of oil within 6-12 hours of a rupture, which is short of the 17-hour delay before the company took action in the case of the rupture of Line 6B. Given the geographic scale of the potentially affected area of an underwater rupture of Line 5, and the limited equipment available to respond, containment of the spill could take months. Furthermore, given the strong currents in that location, the affected shorelines could conceivably reach even farther south in Lake Michigan, potentially to southern Lake Huron, or worse, into Georgian Bay and farther throughout the Great Lakes Basin. In fact, Canadian coastline impacts are forecasted in some of Schwab's (2016) simulations. And, although potentially significant, the present report does not consider economic implications of international shoreline oiling.

The oil spill scenario used in this estimate of economic damages is 2.5 million gallons, which may be conservative in light of discussions of the need for contingency planning to avoid a truly worst-case scenario. The scenario is based on assumptions related to (i) the vulnerability of the pipelines to damage from events such as an anchor strike, (ii) a failure of the automatic response valves, and (iii) a delay in human response of up to two hours. It is worth noting that the oil spill scenario in this report does not reflect the

challenges of containment, which could potentially prolong the leak and magnify the geographic scale and scope of impacts. This scenario also does not consider the worst case, which could involve a prolonged spill of greater magnitude and broader geographic range (i.e., Georgian Bay, Saginaw Bay, Lake St. Clair, Lake Erie, Lake Ontario, etc.).

The framework of the estimation of the economic impacts in this study focuses on five categories of ecosystem services that are likely to be directly affected by an oil spill in the Straits of Mackinac: (i) refugia and habitat (natural resources), (ii) cultural services (recreation and tourism), (iii) food provision (fisheries), (iv) water supply (municipal water provision and treatment), and (v) shelter (personal property). This study does not consider the possibility of a rupture of Line 5 during the winter season when the Straits of Mackinac may be covered with ice, as the economic impacts would be difficult to estimate when containment may not be possible. This study also does not consider a rupture of Line 5 in the context of a spill of natural gas liquids, as there are few studies of the impacts of such an event. To that end, the estimates of economic damages in this report reflect the release of crude oil in the months when the waters of the Straits and adjacent lakes are free of ice cover. This report did not consider direct impacts to the Great Lakes shipping industry or the downstream effects that would be induced via import-export delays. In addition, this report did not consider the costs of evacuation of particular areas that could be exposed to air contamination from a release of oil. Finally, this report did not consider the potential impacts to economic sectors in Canada in areas affected by a release of oil from Line 5 because of limited availability of data. The exact location of a hypothetical spill along the pipeline is not considered, but it is assumed to be at or near its crossing at the Straits of Mackinac.

### Data collection and analysis

The method for estimation involved (i) the collection of baseline data for the annual economic output for each of these categories of ecosystem services, (ii) the development of impact estimates, based on previously published reports, publicly-available data, and data collected from expert interviews, and (iii) the calculation of estimates of economic impacts for each scenario, across all five categories of ecosystem services, for three years immediately following a break of Line 5 in the Straits of Mackinac. The estimation of the economic impacts of an oil spill in the Straits of Mackinac involved the use of two methods of data collection:

1. Primary data: Key informant interviews
2. Secondary data: Document review

### Primary data: Key informant interviews

The authors conducted a total of 30 interviews with key informants, including civil engineers, conservationists, fisheries biologists, hydrologists, legal experts, administrators of municipal water systems, real estate professionals, tourism professionals, and other experts. Recruitment of key informants was conducted through (i) purposive sampling (i.e., inquiries with individuals with specific responsibilities of



interest to the study), and (ii) snowball sampling (i.e., inquiries with new informants based on acquaintances and recommendations of initial informants).

### Secondary data: Document review

The authors reviewed numerous reports, websites, and data sets, including:

- About Line 5, 2017. Enbridge Energy Partners, L.P.
- Alternatives Analysis for the Straits Pipelines, 2017. Dynamic Risk Systems, Inc.
- An Investigation into the Effect of Near Bottom Currents on the Structural Stability of Enbridge Line 5 in the Straits of Mackinac: Technical Report, 2017. Edward E. Timm.
- County economic profiles, 2017. National Association of Counties.
- EPA Response to Enbridge Spill in Michigan, 2016. U.S. Environmental Protection Agency.
- Enbridge Energy Line 5, 2017. Tip of the Mitt Watershed Council.
- Exhibit 5: Declaration of Mark P. Ebner. Tribes' Motion and Brief to Intervene as Parties-Plaintiff. National Wildlife Federation v. Administrator of the Pipeline and Hazardous Materials Administration, Case No. 16-cv-11727, 2016.
- Final Damage Assessment and Restoration Plan/ Environmental Assessment for the July 25-26, 2010 Enbridge Line 6B Oil Discharges near Marshall, MI.
- Leading the Way in Responsible Energy Delivery, 2013. Enbridge Energy, L.P., Superior Region Office.
- Statistical Analysis of Straits of Mackinac Line 5: Worst Case Spill Scenarios, 2016. Schwab, D. J., Water Center, University of Michigan.
- Sunken Hazard: Aging oil pipelines beneath the Straits of Mackinac an ever-present threat to the Great Lakes, 2012. National Wildlife Federation.

Literature from numerous studies of the impacts of previous oil spills was also reviewed, and their findings informed this study. A full list of resources can be found at the end of this document.

## Estimates of Economic Damages

Estimates of potential economic damages of an oil spill from Line 5 near the Straits of Mackinac are presented below, including natural resource damages, impacts to tourism, impacts to the commercial fishing sector, losses in coastal property values, and potential costs borne by coastal municipalities.

### Natural Resources and Ecosystem Services

The shorelines of Lake Michigan and Lake Huron near the Straits of Mackinac and beyond are endowed with an abundance of natural resources that are of vast ecological

and economic value, including fresh water, fish, wildlife, beaches, coastal sand dunes, and a variety of aquatic and terrestrial plants. Northern Michigan is home to vast stretches of diverse and undisturbed Great Lakes shorelines, including coastal wetlands, marshes, and limestone cobble shorelines, and these ecosystems provide habitat for a variety of plant and animal life. All types of freshwater organisms are susceptible to the harmful effects of exposure to oil, including mammals, aquatic birds, fish, insects, microorganisms, and vegetation. In addition, the effects of spilled oil on freshwater microorganisms, invertebrates, and algae also affect other species throughout the food web (EPA, 2016a). In particular, oil spills can lead to losses at the base of the food web that reduce food availability for other species.

Ecosystem services are the functions of an ecosystem that generate benefits or value to humans; they are the conditions and processes through which natural ecosystems sustain and fulfill human life. Ecosystems provide a range of benefits to all people, including the benefits of provisioning, regulating, cultural, and supporting services. Costanza et al. (1997) estimated the value of 17 ecosystem services for 16 biomes and an aggregate global value expressed in monetary units. The value of global ecosystem services was estimated to be around US\$ 33 trillion per year (in 1995 US dollars), a figure significantly larger than global gross domestic product (GDP) at the time. This estimate was based on the benefit transfer method, which assumes a constant unit value per hectare of ecosystem type and multiplies that value by the area of each type to arrive at aggregate totals. This can be improved somewhat by adjusting values using expert opinion of local conditions. Benefit transfer is analogous to the approach taken in GDP accounting, which aggregates value by multiplying price times quantity for each sector of the economy.

Estimating the natural resource damages from an oil spill from Line 5 near its crossing at the Straits of Mackinac involves confronting the challenges related to the uncertainty of the scope of an oil spill and the extent of its impacts in an open freshwater environment. The Schwab (2016) simulations involved quantitative analysis of 840 oil spill cases from a discharge from Line 5 and concluded that more than 44,000 km<sup>2</sup> (more than 27,000 square miles) of open water in Lakes Michigan and Huron, and more than 1,000 km (more than 620 miles) of shoreline of Lake Michigan, Lake Huron, and nearby islands are potentially vulnerable to the impacts of a spill.

Natural Resource Damage Assessment (NRDA) is the legal process that federal agencies use to evaluate the impacts of oil spills on natural resources along the nation's coast and throughout its interior (NOAA, 2017). The responsibilities of federal agencies in an NRDA include assessment, planning, and restoration. Federal and state agencies, and Indian tribes, referred to collectively as natural resource trustees, work together to identify the extent of natural resource injuries, the best methods for restoring them, and the type and extent of restoration required. In addition to examining environmental impacts, the NRDA process includes assessing and restoring the public's lost use of damaged natural resources (e.g., recreational fishing or swimming). An NRDA involves collecting, compiling and analyzing information, statistics, or data to determine the extent

of injuries to natural resources from hazardous substance releases or oil discharges, and to determine appropriate ways of restoring and compensating for those injuries.

There are few estimates of damages to natural resources from oil spills in freshwater ecosystems. One prominent example is the Natural Resource Damage Assessment and Restoration (NRDAR) from the oil spill from Enbridge Line 6B in the Kalamazoo River near Marshall, Michigan (FWS et al., 2015a). Although Enbridge reported a total release of more than 840,000 gallons from the 2010 rupture (FWS et al., 2015a), more than 1.2 million gallons of oil were recovered from the river in the four years that followed (EPA, 2016a).

There have been two settlements against Enbridge related to natural resource damages from that oil spill. Federal, State and tribal officials, acting as natural resource trustees, announced a natural resource damage settlement with Enbridge that will result in multiple resource restoration projects along the Kalamazoo River and a payment for restoration of nearly \$4 million. The State of Michigan filed a separate claim against Enbridge for compliance with State law requirements for cleanup, mitigation, compensation, and restoration in which the natural resource damages components of the resulting settlement were estimated to cost at least \$58 million. The two settlements combined result in at least \$62 million in natural resource damages resulting from that event (FWS, 2015b).

The rupture of Enbridge Line 6B released oil into Talmadge Creek and along approximately 38 miles of the Kalamazoo River. The oil impacted over 1,560 acres of stream and river habitat as well as floodplain and upland areas, injuring birds, mammals, reptiles, and other wildlife (FWS et al., 2015a). While the aquatic and terrestrial ecosystems of the Kalamazoo River are quite different from those of the Straits of Mackinac, Lake Michigan, Lake Huron, and nearby islands, it is possible to extrapolate the extent of potential natural resource damages of an oil spill from Line 5 based on the NRDAR of the rupture of Line 6B. Dividing the total costs for natural resource damages from the release from Line 6B (\$62 million) by the length of the affected shoreline (80 miles, based on 40 miles affected with two shorelines per mile of river) provides an estimate of natural resource damages of approximately \$775,000 per mile of shoreline.

The oil spill scenario in this report would involve the release of 2.5 million gallons of oil and damages to approximately 900 miles of shoreline across the Tier I and Tier II counties. Application of the estimate of natural resource damages per mile of affected shoreline to the oil spill scenario developed in this report would yield an estimate of natural resource damages from a rupture of Line 5 of approximately \$697.5 million. While estimation of natural resource damages through extrapolation is admittedly coarse, the calculations provide an estimate of the potential damages and associated costs of cleanup and restoration. These estimates may be conservative, given the sensitivity of the freshwater ecosystems of the Straits of Mackinac, the threatened and endangered species of the region, and the scale of the affected area.

## Tourism

Tourism represents an important economic sector in Michigan and has been a high priority for private and public investment in the State. Michigan hosted 119 million person-trips in 2016, and visitor spending grew 3.0% to reach \$23.7 million (Tourism Economics, 2017). Visitor spending generated \$40.7 billion in total business sales in 2016, as visitor dollars flowed through the State's economy to other sectors, such as business services, finance, and insurance, among others. (These are known as indirect and induced impacts.) Spending grew by \$670 million in 2016, with 75% of the increase stemming from the categories of food, beverage, and lodging expenditures. Direct spending by tourists supports approximately 221,420 jobs in Michigan, and the total tourism economy in 2016, including direct, indirect, and induced impacts, supported 337,490 jobs, or approximately 6.1% of total employment in the state. Including indirect and induced impacts, travel in Michigan generated nearly \$2.6 billion in state and local taxes and \$2.7 billion in federal taxes in 2016. In the absence of the state and local taxes generated by travelers, each Michigan household would have had to pay an additional \$685 to fill the gap (Tourism Economics, 2017).

Coastal areas feature prominently in the State's award-winning tourism promotion campaign, "Pure Michigan." Coastal areas of Northern Michigan attract millions of tourists each year who come to visit beaches, swim, sail, kayak, fish, view wildlife, and enjoy other activities that depend on clean water, clean air, abundant fish and wildlife, and overall environmental quality. For many households, beaches are the ultimate vacation destination. Mackinac Island alone hosts more than 1 million visitors per year and Sleeping Bear Dunes National Lakeshore receives more than 1.5 million visitors per year. Visitor spending in the fifteen counties considered in this study represent 7.34% of total tourism expenditures in the State.

There have been previous studies of recreation visitation at coastal tourist attractions in Michigan. A visitor study conducted at Sleeping Bear Dunes National Lakeshore in 2009 involved the distribution of questionnaires to visitors at 11 different locations (Holmes et al., 2010). Approximately 47% of visitors were visiting the park for the first time in their lifetime and 25% had visited six or more times (out of a total sample of 696 respondents, or n=696). Visitors were asked about their perceived importance of protecting several resources and attributes, and the attributes that were most commonly considered "extremely important" or "very important" were clean water (96%) and clean air (95%). Approximately 95% of respondents rated protection of scenic views as "extremely important" or "very important", and other highly-rated attributes included protection of sand dunes (94%), natural areas (93%), native wildlife (92%), and native plants (87%). All of these attributes would be damaged in the event of an oil spill, and these findings underscore the importance of high environmental quality to the tourism sector.

In an online survey of visitors to coastal sand dune areas in Michigan, respondents indicated that the activities of beach-going (20.1%) and scenic enjoyment (19.7%) were the top *primary* reasons for visiting these areas (n=7,062). In terms of all activities in which respondents participated, beach-going ranked highest (66.5%), followed by scenic

enjoyment (54.1%). Other highly-ranked activities included swimming, kayaking, and watching birds and wildlife from the shoreline (Arbogast et al., 2018). These findings also demonstrate the importance of the quality of coastal amenities for recreation and tourism.

Estimates of the economic impact of direct visitor spending and the total impact of visitor spending (including indirect and induced effects), are presented in Table 4. They are based on the calculations of the multiplier effects estimated in statewide estimates of the total economic impact of visitor spending in Michigan (Tourism Economics, 2017). Estimates indicate that Tier I counties generate \$1.7 billion in total economic impact of visitor spending, and Tier II counties generate \$1.2 billion in total economic impact of visitor spending, for an estimated total economic impact of visitor spending in the region of nearly \$3 billion.

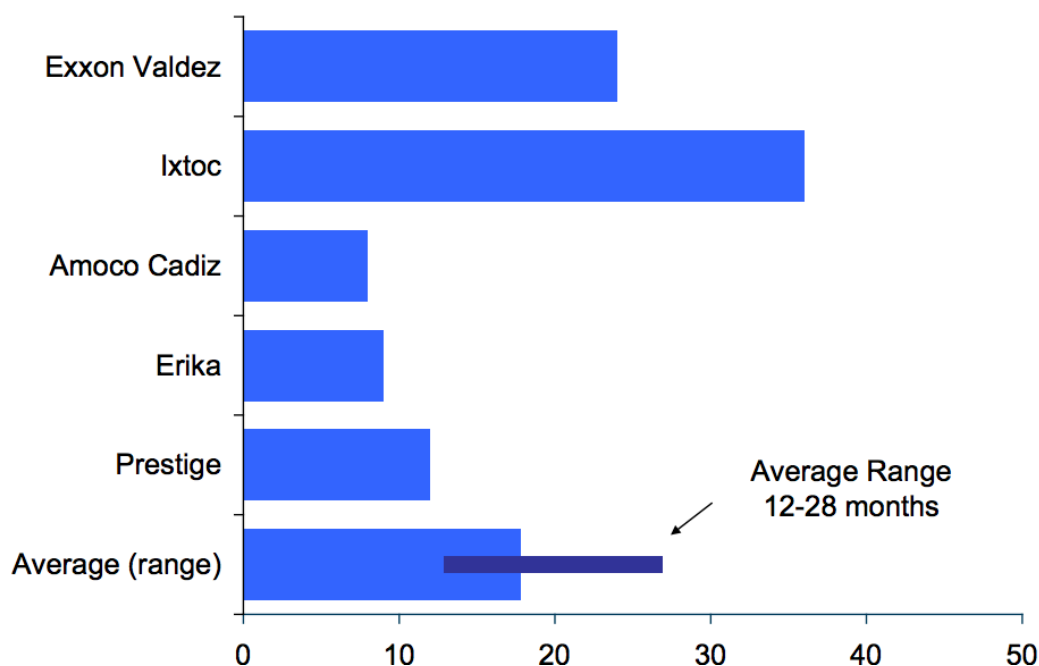
**Table 4: Economic impact of tourism in Michigan, 2016**

<b>Tier I Counties</b>	<b>Visitor spending</b>	<b>Total impact of visitor spending</b>
Charlevoix	\$ 313,260,000	\$ 537,220,000
Cheboygan	89,910,000	154,190,000
Emmet	363,390,000	623,190,000
Mackinac	219,980,000	377,250,000
Presque Isle	35,920,000	61,600,000
<b>Tier I sub-total</b>	<b>\$ 1,022,460,000</b>	<b>\$ 1,753,460,000</b>
<b>Tier II Counties</b>		
Alcona	46,470,000	79,690,000
Alpena	42,010,000	72,040,000
Antrim	89,900,000	154,170,000
Benzie	115,680,000	198,380,000
Chippewa	159,830,000	274,100,000
Delta	67,750,000	116,190,000
Grand Traverse	426,850,000	732,020,000
Iosco	66,200,000	113,530,000
Leelanau	116,030,000	198,980,000
Schoolcraft	43,140,000	73,980,000
<b>Tier II sub-total</b>	<b>\$ 719,970,000</b>	<b>\$ 1,234,710,000</b>
<b>Total: Tier I + II Counties</b>	<b>\$ 1,742,430,000</b>	<b>\$ 2,988,170,000</b>

Visitor spending also supported \$11.6 billion in business and personal income, and sustained 337,490 jobs, or approximately 6.1% of total employment in the State. Tourism is particularly important to tribal economies throughout the region, and the sector is a major source of employment for tribal members. Travel in Michigan generated nearly \$2.6 billion in state and local taxes, and \$2.7 billion in federal taxes in 2016, including indirect and induced impacts. The year 2016 marked the 7<sup>th</sup> consecutive year of growth in visitation and visitor spending.

The impact of an oil spill on the tourism sector is largely based on the perception and preferences of tourist visitors. Negative perceptions about environmental amenities can persist long after containment and remediation. Previous studies confirm that tourism significantly declines after an oil spill. In Louisiana, leisure visitors spent much less following the Deepwater Horizon oil spill in the Gulf of Mexico. Leisure visitor spending in 2010 dropped by \$247 million, with an estimated total loss of \$422 million over three years, from 2011 through 2013 (Tourism Economics, 2011). There is also evidence that regional tourism declined, even in areas that did not experience oil pollution. These findings imply that perceptions of environmental quality matter in tourism decision-making, even where environmental quality is not compromised.

The duration of the impacts of oil spills on tourism has been found to extend well beyond the spill event (see Figure 5).



**Figure 5: Months after initial disruption from oil spills for visitor spending to return to baseline (Tourism Economics, 2011)**

Tourism Economics (2011) estimated the number of months after initial disruption for visitor spending to return to baseline, based on five previous oil spills, and found that the average duration of impacts for tourism is 12-28 months. They projected more enduring impacts in the Gulf of Mexico. It is worth noting that several of these oil spills did not occur near coastal shorelines, yet they still had immediate and enduring effects on tourism in their respective regions. Given the proximity of Line 5 to the shorelines of both the Lower and Upper Peninsulas of Michigan, a release of oil from in the Straits of Mackinac would likely have greater impacts than these examples, in terms of both the scope of impacts and their duration.

Estimates of the economic damages to the tourism sector of an oil spill from Line 5 in the Straits of Mackinac were developed based on the following assumptions:

- Tier I counties experience a loss of visitor spending and associated total economic impact of 60% in Year 1, 50% in Year 2, 40% in Year 3, 20% in Year 4, and 10% in Year 5.
- Tier II counties experience a loss of visitor spending associated total economic impact of 40% in Year 1, 35% in Year 2, 25% in Year 3, 15% in Year 4, and 10% in Year 5.

The present value of estimated economic damages to the tourism sector of an oil spill from Line 5 in the Straits of Mackinac was estimated based on a discount rate of 3%, which is appropriate for the estimate of economic impacts of environmental damages. Based on these assumptions, estimates of the total economic impact of an oil spill at or near the Straits of Mackinac on the tourism sector are presented in Table 5. The present value of economic damages to the tourism sector is estimated to reach more than \$4.8 billion.

**Table 5: Present value of potential economic damages to the tourism sector from an oil spill from Line 5 in the Straits of Mackinac**

<b>Affected Area</b>	<b>Economic Impact</b>
Tier I counties	\$ 3,156,228,245
Tier II counties	\$ 1,666,854,681
Total economic impact	\$ 4,823,082,926

### Commercial fishing

From tournament anglers and charter boat captains to tribal and subsistence fisherwomen and men, fishing comprises a central aspect of the identity, spiritual life, and cultural heritage of many Michiganders (O’Keefe & Miller, 2011a). Among U.S. boaters, one in three lives in the Great Lakes Basin, and commercial fishing adds approximately \$1 billion to the Great Lakes regional economy (GLERL/NOAA, n.d.). The fishery is also an important aspect of Michigan’s economy. Commercial, tribal, and recreational fishing together generate an estimated \$5 billion to \$8.5 billion per year (Gillies, 2010). Of Michigan’s nearly 200 commercial fishing operations, about 75% are affiliated with the Chippewa-Ottawa Resource Authority (CORA) and the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), which accounts for about half of the total commercial catch (Michigan Sea Grant, 2013). Coastal economies brought in \$23 million from charter fishing trips alone in 2016, and 90% of these voyages disembarked from communities along Lakes Michigan (78%) and Huron (12%) (O’Keefe & Miller, 2011b; O’Keefe, 2017).

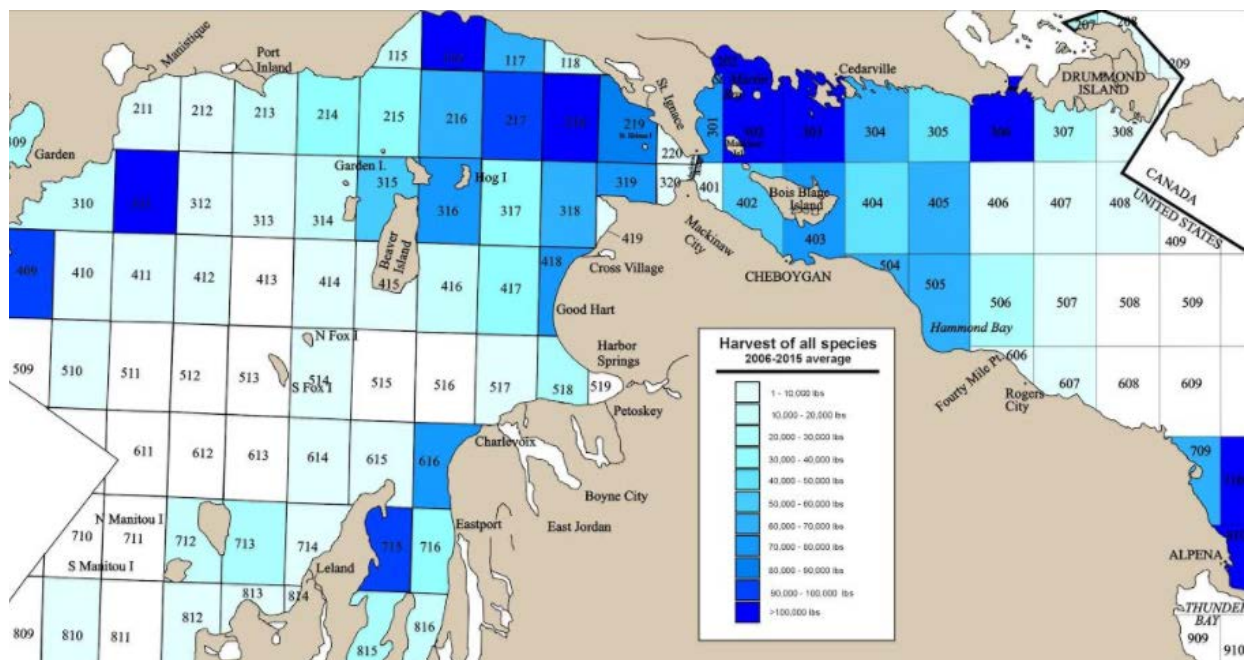
We use average dockside value of commercial catches—approximately \$10 to \$12 million per year—for the direct effect baseline estimate (Michigan DNR, 2013; Michigan DNR, 2016). These figures, however, are undergirded by the fact that the majority of



economic impact in this sector is indirect and, sometimes, unquantifiable. For instance, charter captains are driven to their trade not by dreams of financial gain, but by the desire to help people enjoy fishing; in fact, the average charter captain operates at a financial loss (O'Keefe, 2015). These examples highlight the challenges encountered in estimating effects of a spill on the Michigan commercial fishing industry.

A report from the Michigan Department of Natural Resources (Gonia, 2014) estimates average annual indirect effects from commercial fishing to be four to five times the dockside value, and a commercial operation may be able to quintuple its gross dockside value by operating its own retail outlet. On the other hand, the task of estimating impacts to the fishery is fraught with uncertainty related to the timing and location of such an event. How should damages be modeled if a spill were to occur during spawning season? How would fish behave in the presence of oil? An event like this is unprecedented in this ecosystem and with this form of oil. Hence, we adopt a conservative point of view and wholly acknowledge the uncertainty in these estimates. This section considers neither recreational nor tournament fishing, but average annual dockside value of commercial fishing only. This is comprised of less than 51 State-licensed commercial operations (less than this engage in fishing during a given year, but many operations maintain their licenses due to irreplaceability) and about 150 tribal operations (Gonia, 2014).

Based upon information gathered from experts and other key informants, as well as data presented in Figures 6, 7, 8, and 9, it is clear that the tribes, bear a disproportionate amount of the risk with respect to the commercial fishing economy. This is not to discount the risk borne by *all* commercial fishing operations in the region; tribes and State-licensed bear about 50% each (GLMRIS, 2012). A map of fish harvests reported by the Chippewa Ottawa Resource Authority (CORA) is presented in Figure 6.



**Figure 6: Fish harvest reported by CORA commercial fishers, summarized by grid, 2006 – 2015 average (Ebner, 2016)**



Maps of commercial fishing locations in Lake Michigan and Lake Huron are presented in Figures 7 and 8.

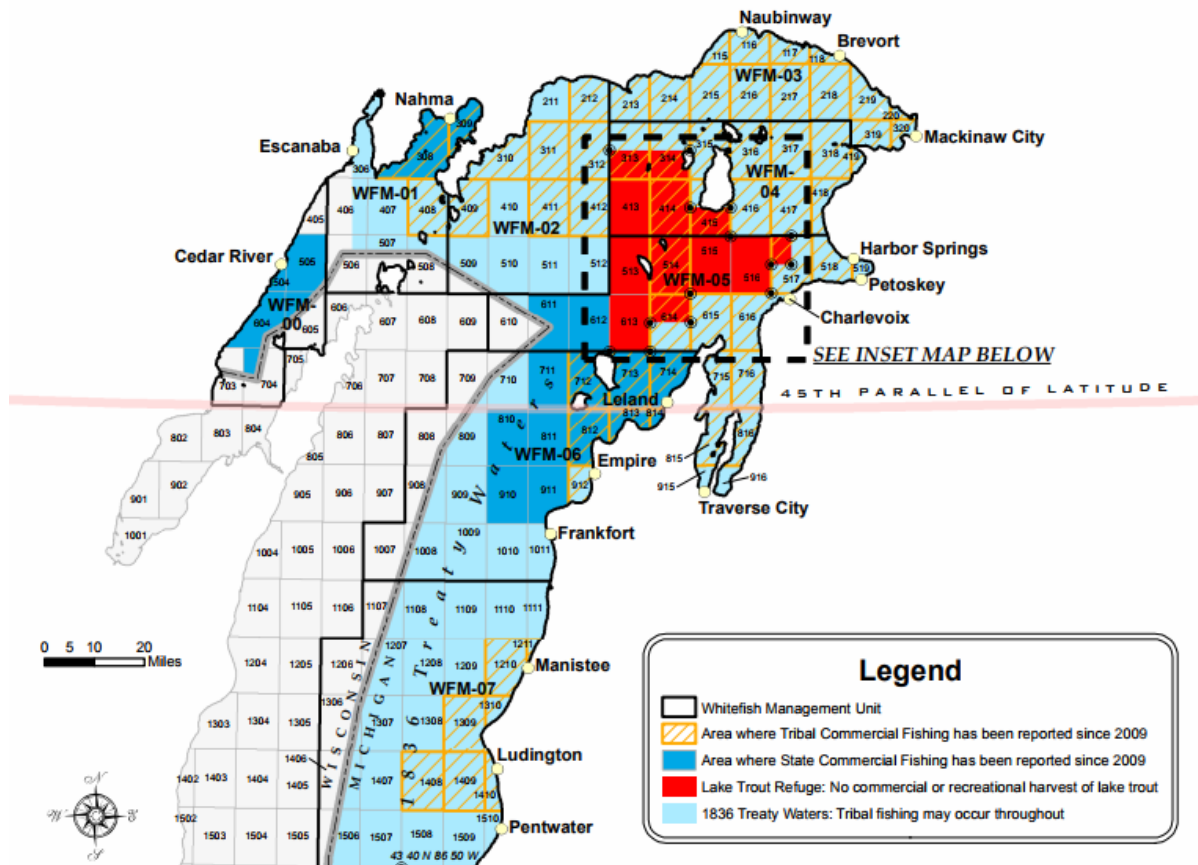


Figure 7: Commercial fishing locations map for Lake Michigan (DNR, 2013)

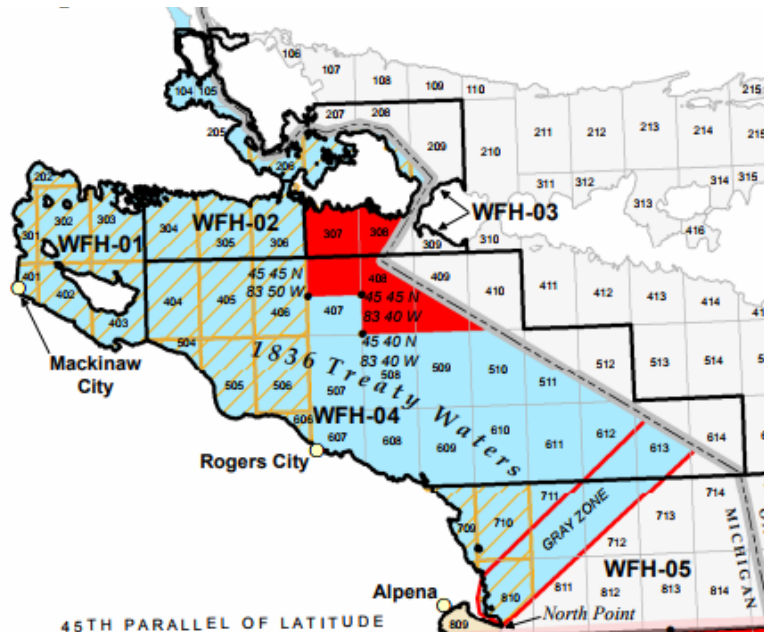
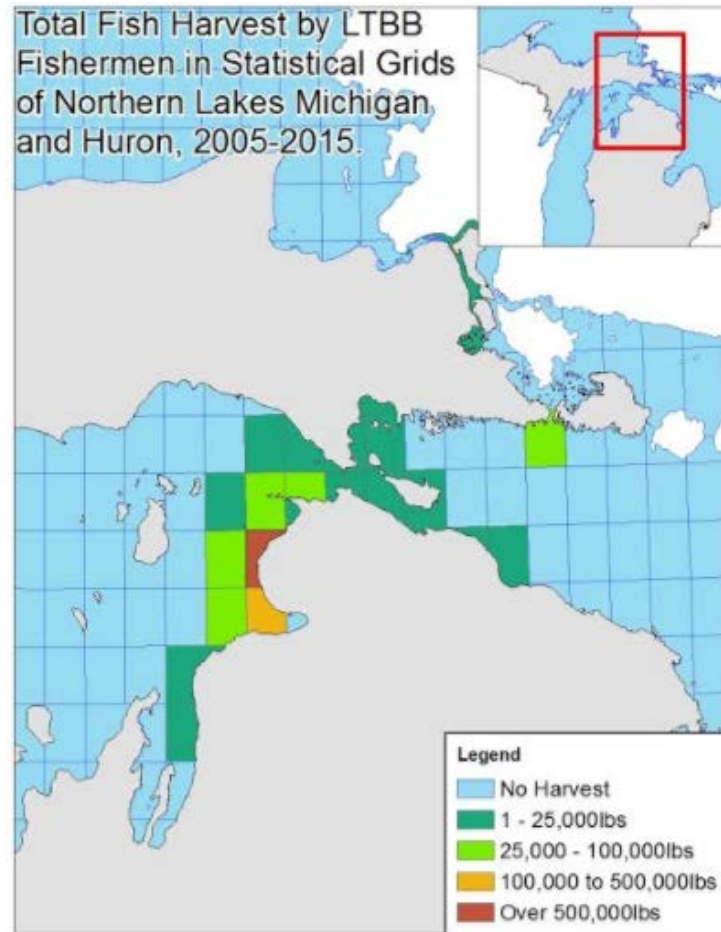


Figure 8: Commercial fishing locations map for Lake Huron (DNR, 2015)

Total fish harvest by the Little Traverse Bay Bands of Ottawa Indians in statistical grids of Northern Lakes Michigan and Huron between 2005 and 2015 is presented in Figure 9 (Ebner, 2016).



**Figure 9: Total fish harvest by Little Traverse Bay Bands of Ottawa Indians in statistical grids of Northern Lakes Michigan and Huron, 2005-2015 (Ebner, 2016)**

Estimates of the economic damages to the commercial fishing sector from an oil spill from Line 5 are presented in Table 6. Economic damages under the oil spill scenario are estimated at \$32 million for the first year following an oil spill event. Across the three years following an oil spill event, economic damages to commercial fishing are estimated to be \$62 million under the assumptions of the oil spill scenario developed for this report. While the presented time horizon is three years, it is worth noting that ecosystem effects from a spill—as well as negative consumer perceptions—could last for years or decades, and biological impacts may be observed in other Great Lakes. Lakes Michigan and Huron comprise the majority of Michigan’s commercial fishery. These ecosystems are highly sensitive to invasive species, and it is difficult to predict the extent to which an oil spill would exacerbate extant pressures on whitefish and other commercial species, as well as

the aquatic ecosystems they inhabit. Based on a discount rate of 3%, the present value of these estimates of economic damages to the commercial fishing sector is \$62.0 million.

**Table 6: Present value of potential economic damages to the commercial fishing sector from an oil spill from Line 5 in the Straits of Mackinac**

<b>Time horizon</b>	<b>Economic Impact</b>
Year 1	\$ 32,000,000
Year 2	\$ 20,000,000
Year 3	\$ 10,000,000
Total economic impact	\$ 62,000,000

### Municipal Water Systems

From changes in tourist populations to reduced numbers of new business openings, Straits-area municipalities have the potential to be impacted in a variety of ways by an oil spill. These impacts may come in the form of emergency evacuation costs (for Mackinac Island and surrounding areas), tax revenue interruptions, and costs associated with provisioning alternative sources of clean drinking water. As confirmed through numerous interviews, the viability of townships, cities, and counties from Cheboygan to Charlevoix is closely tied to the health, unspoiled beauty, and perceived safety of the Great Lakes. Thus, while a complete analysis of potential oil spill impacts on municipalities would be wider in scope, our report conservatively focuses on wastewater treatment plants and provisioning of water resources to municipalities. This section includes some of the most surprising findings that we encountered through our research.

The ability to draw drinking water from just below the lake surface is a convenience that many coastal municipalities leverage. Water treatment facilities draw in surface or ground water and then filter, treat, and provide it to residential and commercial customers who then drink it, utilize it in food preparation, wash with it, and use it to irrigate lawns and crops. In a minority of Straits-area municipalities, water treatment is conducted in the same facility that conducts wastewater treatment. In most Straits-area municipalities, however, these functions are divided among separate facilities. Mackinac Island, for instance, has a relatively small residential population and yet has separate water and wastewater plants, whereas St. Ignace has a single facility. These two locales, along with Alpena, Traverse City, and East Tawas among others, draw from just below the lake surface for water processing and provisioning. Municipalities that do not draw surface water instead pump water from underground aquifers using wells. Mackinaw City, which pulls its water from wells, treats right at each source.

The other half of the municipal water role is dealing with the wastewater outflows of homes and businesses. Wastewater treatment plants are designed to maximum specific capacities based upon the service area population and composition. On rainless days, these facilities typically operate under their maximum capacity. However, Michigan's weather variability and frequent precipitation events lead wastewater facilities to regularly intake storm water that carries with it whatever it picks up along the way.

Before continuing with the analysis of municipal impacts, it is important to note that a true worst-case scenario is essentially inconceivable. Each time one attempts to paint a more-inclusive picture by reflecting expert opinion, one also comes up against the fact an issue this polarizing makes everyone susceptible to bias. What we are attempting to balance is fact, opinion, and possibilities. With the Kalamazoo River oil spill still in recent history, we are reminded that the impacts of aquatic oil spills are difficult to estimate with precision. Therefore, we draw attention to the context and acknowledge that the following estimates reflect high levels of uncertainty. This is what is known in sustainability literature as a “wicked problem,” with no single best solution (Rittel and Webber, 1973). The problem is ill-defined, with high levels of value conflict. With this caveat, we have developed the fairest estimates of economic damages, based on available information and reasonable assumptions.

Our estimates of economic damages to municipal water systems are based on two assumptions. First, we assume that spill management is impacted by rough water conditions. In the oil spill scenario, this means that VOCs are drawn into Straits-area water treatment plants. We assume this results in damage to biotic and abiotic treatment mechanisms, and leaves municipalities without water provisioning for 8,600 homes and businesses for up to six months. Cost estimates of residential and business water provisioning are computed using figures from the Flint water crisis, including \$293.75 per home per week for bottled water delivery (Livengood, 2016). Second, we assume stormy conditions that cause VOCs to be carried into three Straits-area wastewater treatment plants. Under this assumption, the VOC concentration in the air of each of three wastewater plants would potentially lead to ignition and destruction, which would imply the costs of replacement of municipal wastewater facilities.

Estimates of potential economic damages to municipal water systems from a release of oil from Line 5 are presented in Table 7. Costs to municipalities in the region are estimated to be more than \$233 million. It is worth noting the potential public health effects in the scenario associated with the lack of ability to process sewage. The buildup of sewage in homes and businesses would be exacerbated by a reduction in clean water availability. Expert interviews suggest the costs associated with a public health crisis of this magnitude would greatly exceed estimates of material costs in Table 7.

**Table 7: Potential economic damages to municipalities from an oil spill from Line 5 in the Straits of Mackinac**

<b>Category</b>	<b>Economic Damages</b>
Residences and businesses impacted	55,600
Months impacted	12
Bottled-water provisioning	\$ 196,000,000
Water plant repairs	\$ 1,100,000
Wastewater facility replacement	\$ 36,000,000
Total costs	\$ 233,100,000

## Coastal property

Residential and commercial properties along the shoreline of northern Michigan include some of the most valuable real estate in the Great Lakes region, in part because of the scenic views and other environmental amenities that attract residents, second-home owners, and tourists to the area. A breach of Line 5 that released oil into the Straits of Mackinac could have significant negative impacts on the value of coastal properties, particularly on Mackinac Island and other nearby areas that are popular tourist destinations.

Estimates of the economic damages to coastal property for this study were constrained by a lack of readily-available data on real estate values in the region. However, several studies have estimated the impact on property values from previous oil spills. A study of the impact of a pipeline rupture in southern Maryland in 2000 found that property values declined approximately 11% (Simons et al., 2001). In that study, losses to the value of waterfront properties were approximately \$28,400, and the value of interior properties declined by an average of \$14,390.

Numerous studies have estimated the effects of the Deepwater Horizon oil spill on real estate prices in the Gulf of Mexico. In one study, the values of residential condominiums and single-family homes in coastal Alabama were initially impacted by up to 14%, but some of this loss was recovered after the well was capped (Epley, 2012). Vacant residential land suffered more significant losses in the aftermath of the spill (up to 42%), and losses of up to 16% persisted long after the event. Another study noted an average loss of approximately \$56,000 per home in affected areas (Myers, 2013). Using data on condominium prices in Orange Beach and Gulf Shores, Alabama, a before-and-after econometric test found that there was a 12.1% decline in condominium sale prices after the oil spill, while additional tests indicate a decline of 10.1% to 13.5% in sale prices over the first 100 days after the spill (Siegel et al., 2013). However, any significant negative price effects due to the spill were found to have dissipated by approximately 3.5 months after the spill.

It is worth noting that a rupture of Line 5 could occur in closer proximity to the shoreline than the Deepwater Horizon oil spill. The release of oil from Enbridge Line 6B in the Kalamazoo River led to the temporary evacuation of dozens of households, primarily because of exposure to contamination. In addition to the negative effects on water quality and aquatic ecosystems, releases of crude oil also negatively impact air quality through contamination from a wide range of chemicals, including VOCs. These same chemicals are also emitted by many other sources such as motor vehicles, industries, paints, and cleaning solvents.

Depending on the location of the release of oil from a breach of Line 5, the risk of exposure to contamination could potentially require the evacuation of some areas, and the relocation of households and businesses in the affected area. The economic damages of such an event are uncertain and context-dependent but given the high value of real estate

in the area and the scale of use during the summer season, the effects on property values could be highly significant.

More than 80% of the University of Michigan simulation analyses of worst-case spill scenarios involved direct impacts to northern Lake Michigan, Mackinac Island, and other parts of Lake Huron adjacent to the Straits of Mackinac (Schwab, 2016). Acknowledging the uncertainty associated with the location and scope of a possible rupture of Line 5, the economic damages to coastal property were estimated using the market value of coastal property, based on 2017 county equalized values of real and personal property (Charlevoix County, 2017; Cheboygan County, 2017; Emmet County, 2017; Mackinac County, 2017). Coastal property values were estimated based on the equalized values in coastal townships and cities in Tier I and Tier II counties. Maps were used to estimate the share of coastal properties as a percentage of total township/city area.

Estimates of the economic damages to coastal property of an oil spill from Line 5 in the Straits of Mackinac were developed based on the following assumptions:

- Tier I counties experience a loss of annualized benefits of coastal property of 80% in Year 1, 60% in Year 2, 40% in Year 3, 30% in Year 4, and 20% in Year 5.
- Tier II counties experience a loss of annualized benefits of coastal property of 50% in Year 1, 30% in Year 2, 15% in Year 3, 10% in Year 4, and 5% in Year 5.

Annualized benefits were calculated based on an estimate of a 50-year useful life. The present value of estimated economic damages to coastal property values from an oil spill from Line 5 in the Straits of Mackinac was estimated based on a discount rate of 3%, which is appropriate for the estimate of economic impacts of environmental damages. Based on these assumptions, estimates of the total economic impact of an oil spill at or near the Straits of Mackinac on coastal property values are presented in Table 8. Estimates of total economic damages are nearly \$500 million.

**Table 8: Present value of potential economic damages to coastal property values from an oil spill from Line 5 in the Straits of Mackinac**

<b>Affected Area</b>	<b>Economic Damages</b>
Tier I counties	\$ 235,774,960
Tier II counties	\$ 250,036,203
Total economic impact	\$ 485,811,163

## Conclusions

Oil spills occurring in freshwater bodies receive less publicity than spills into oceans, even though freshwater oil spills are more frequent and often more destructive to the environment (EPA, 2016b). Freshwater bodies are important to human health and the environment, and they are highly sensitive to contamination from oil spills and other pollution. Both standing water and flowing water bodies are often used for drinking water



and frequently serve as nesting grounds and food sources for various freshwater animals. All types of freshwater organisms are susceptible to the harmful effects of oil spills, including mammals, aquatic birds, fish, insects, microorganisms, and vegetation. In addition, the effects of spilled oil on freshwater microorganisms, invertebrates, and algae tend to move up the food chain and affect other species (EPA, 2016b).

This report provides estimates of the economic damages from an oil spill from Line 5 at or near its crossing in the Straits of Mackinac. The estimates were based on an oil spill scenario involving a release of 2.5 million gallons of crude oil and affected shoreline of 900 miles across fifteen counties in Michigan. The scenario is based on assumptions related to (i) the vulnerability of the pipelines to damage from events such as an anchor strike, (ii) a failure of the automatic response valves, and (iii) a delay in human response of up to two hours. The basis for these assumptions was derived primarily from a document review and interviews with experts. It is important to note that this oil spill scenario does not necessarily reflect, nor is it intended to be interpreted as, *the* worst-case scenario; rather, it is a reasonable case that is informed by expert knowledge. The scenario reflects the real possibility of technological failure and delay in human response. In the context of Line 5, the worst-case scenario may be far greater in terms of scale, scope, and the magnitude of impacts.

Natural Resource Damage Assessment is the legal process that federal agencies use to evaluate the impacts of oil spills on natural resources. The damages to natural resources and ecosystems from oil spills must be assessed, monitored, and restored, and their related injuries must be compensated, according to federal law. Estimates of natural resource damages in the event of a breach of Enbridge Line 5 at or near its crossing at the Straits of Mackinac could reach more than \$697 million for the oil spill scenario developed for this report, even under conservative estimates.

These damages also have negative impacts to numerous economic sectors that depend on the aquatic and terrestrial ecosystems that are affected, including coastal tourism, commercial fishing, municipal water treatment systems, and coastal real estate, among others. This study involved the estimation of potential economic damages to these economic sectors, based on assumptions and data collected from key informant interviews and a review of relevant documents and published research articles. Estimates of these economic impacts reach nearly \$5.6 billion under the oil spill scenario developed for this report. This estimate is also conservative, given the high levels of uncertainty regarding the location, scale, and scope of an oil spill near the Straits of Mackinac, and the potential for a worst-case scenario involving a rupture that affects a wider geographical range, or that involves a greater amount of oil released. A summary of the estimates of natural resource damages and economic impacts of an oil spill from Line 5 in the Straits of Mackinac is presented below in Table 9.

**Table 9: Summary of estimates of natural resource damages and economic impacts of an oil spill from Line 5 in the Straits of Mackinac**

<b>Category</b>	<b>Economic Damages</b>
Natural resource damages and restoration	\$697,500,000
Economic impacts	
• Tourism	\$ 4,823,082,926
• Commercial fishing	61,050,000
• Municipal water systems	233,090,000
• Coastal property	485,811,163
Total economic impacts	\$5,603,034,089

This report did not investigate potential direct impacts to the Great Lakes shipping industry or the downstream effects that would be induced via import/export delays. As a vital aspect of the U.S. economy, the Great Lakes Navigation System (GLNS) connects the Great Lakes regional economy, the 5th largest in the world, with trade partners around the region and globe (U.S. Army Corps of Engineers, 2013). The 60 ports on the Great Lakes support more than 128,000 U.S. jobs and collectively generate \$18.1 billion in annual revenue (U.S. Army Corps of Engineers, 2013). Delays to this system could have massive impacts on the economy. Furthermore, this report did not investigate the costs of evacuation of particular areas that would be intensely affected by a release of oil from Line 5 because of air contamination. Finally, because of limited availability of data, this report did not consider the potential impacts to economic sectors in Canada. The Schwab (2016) simulations demonstrated, however, that the shorelines of Ontario are vulnerable to impacts of an oil spill from Line 5.

This report is provided to demonstrate the potential economic damages from a release of crude oil in the highly sensitive freshwater environment of the Great Lakes, and as such, it does not reflect any analysis of the risk or probability of such an event. Nevertheless, given the age of the dual pipelines of Line 5 in the Straits of Mackinac, the company's track record with previous oil spills, and the documented history of economic impacts of previous oil spills, a rupture of this pipeline is possible, and has the potential to inflict economic damages that are significant, if not catastrophic.



## References

- Ackerman, F. (2017). *Worst-Case Economics: Extreme Events in Climate and Finance*. New York, NY: Anthem Press.
- Adie, M. O. (2012). *The Straits of Mackinac*. Charleston, SC: Arcadia Publishing.
- Alexander, J. & B. Wallace. (2012). Sunken Hazard: Aging Oil Pipelines Beneath the Straits of Mackinac an Ever-present Threat to the Great Lakes. National Wildlife Federation, Great Lakes Regional Center, 17 pp. Ann Arbor, MI: National Wildlife Federation. Available at: <http://www.nwf.org/>
- Arbogast, A. F., B. Garmon, E. Isley, J. Jarosz, S. Nicholls, R. B. Richardson. (2018). Valuing Michigan's coastal dunes: GIS information and economic data to support management partnerships. Report to Coastal Zone Management Program, Office of the Great Lakes. Lansing, MI: Michigan Department of Environmental Quality.
- Assaf, G., B. G. Kroetch, & S. C. Mathur. (1986). Non-Market Valuations of Accidental Oil Spills: A Survey of Economic and Legal Principles. *Marine Resource Economics* 2: 211-237.
- Bouso, R. (2018). BP Deepwater Horizon costs balloon to \$65 billion. Reuters, January 16, 2018. Available at: <https://www.reuters.com/article/us-bp-deepwaterhorizon/bp-deepwater-horizon-costs-balloon-to-65-billion-idUSKBN1F50NL>
- Burrows, P., C. Rowley, & D. Owens. (1974). The Economics of Accidental U.S. Oil Pollution by Tankers in Coastal Waters. *Journal of Public Economics* 3: 251-268.
- Carson, R. T., Mitchell, R. C., Hanemann, M., Kopp, R. J., Presser, S., & Ruud, P. A. (2003). Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez Oil Spill. *Environmental and Resource Economics* 25(3): 257-286.
- Charlevoix County. (2017). Charlevoix County 2017 Equalization Report. Charlevoix, MI: Charlevoix County Equalization Department. Available at: [http://www.charlevoixcounty.org/equalization\\_department/](http://www.charlevoixcounty.org/equalization_department/)
- Cheboygan County. (2017). Cheboygan County 2017 Equalization Report. Cheboygan, MI: Cheboygan County Equalization Department. Available at: <http://www.cheboygancounty.net/equalization-97/>
- Cohen, M. J. (1995). Technological Disasters and Natural Resource Damage Assessment: An Evaluation of the Exxon Valdez Oil Spill. *Land Economics* 71(1): 65-82.

Court, C. D., Hodges, A. W., Clouser, R. L. & Larkin, S. L. (2017). Economic impacts of cancelled recreational trips to Northwest Florida after the Deepwater Horizon oil spill. *Regional Science Policy & Practice* 9(3): 143-164.

DNR (Michigan Department of Natural Resources). (2013). Commercial Fishing Locations Map for Lake Michigan. State of Michigan. Available at: [http://www.michigan.gov/documents/dnr/laketrout\\_lakemichigan\\_102213\\_439225\\_7.pdf](http://www.michigan.gov/documents/dnr/laketrout_lakemichigan_102213_439225_7.pdf)

DNR (Michigan Department of Natural Resources). (2015). Commercial Fishing Locations Map for Lake Michigan. State of Michigan. Available at: [http://www.michigan.gov/documents/dnr/laketrout\\_huron102213\\_439224\\_7.pdf](http://www.michigan.gov/documents/dnr/laketrout_huron102213_439224_7.pdf)

Ebner, M. P. (2016). Exhibit 5: Declaration of Mark P. Ebner. Tribes' Motion and Brief to Intervene as Parties-Plaintiff. National Wildlife Federation v. Administrator of the Pipeline and Hazardous Materials Administration, Case No. 16-cv-11727.

Ellison, G. (2017a). Enbridge Line 5 has spilled at least 1.1M gallons in past 50 years. mlive.com, April 26, 2017. Available at: [http://www.mlive.com/news/index.ssf/2017/04/enbridge\\_line\\_5\\_spill\\_history.html](http://www.mlive.com/news/index.ssf/2017/04/enbridge_line_5_spill_history.html)

Ellison, G. (2017b). Enbridge knew about Line 5 coating damage in 2014. mlive.com, October 27, 2017. Available at: [http://www.mlive.com/news/index.ssf/2017/10/enbridge\\_line\\_5\\_damage\\_2014\\_de.html](http://www.mlive.com/news/index.ssf/2017/10/enbridge_line_5_damage_2014_de.html)

Emmet County. (2017). Emmet County 2017 Equalization Report. Petoskey, MI: Emmet County Equalization Department. Available at: <http://www.emmetcounty.org/officials-departments/equalizationgis/>

Enbridge (Enbridge Energy Partners, L.P.) (2013). Leading the Way in Responsible Energy Delivery. Enbridge Energy, L.P., Superior Region Office, 3 pp. Superior WI: Enbridge Energy Partners, L.P.

Enbridge (Enbridge Energy Partners, L.P.) (2014). Form 10-Q: Quarterly Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. Available at: <https://www.enbridgepartners.com/Investor-Relations/EEP/Financial-Information/SEC-Filings.aspx?filingId=9873669>

Enbridge (Enbridge Energy Partners, L.P.) (2017). About Line 5. Calgary, Alberta: Enbridge Energy Partners, L.P. Available at: <https://www.enbridge.com/projects-and-infrastructure/public-awareness/line-5-michigan/about-line-5>

Environment Canada and EPA (Environment and Climate Change Canada and the U.S. Environmental Protection Agency). (2017). State of the Great Lakes 2017 Technical Report. Cat No. En161-3/1E-PDF. EPA-905-R-17-001. Available at <http://binational.net>

- EPA (U.S. Environmental Protection Agency). (2017). Great Lakes Facts and Figures. Washington, DC: U.S. Environmental Protection Agency. Available at: <https://www.epa.gov/greatlakes/great-lakes-facts-and-figures>
- EPA (U.S. Environmental Protection Agency). (2016a). EPA Response to Enbridge Spill in Michigan. Washington, DC: U.S. Environmental Protection Agency. Available at: <https://www.epa.gov/enbridge-spill-michigan>
- EPA (U.S. Environmental Protection Agency). (2016b). Sensitivity of Freshwater Habitats. Emergency Management. Washington, DC: U.S. Environmental Protection Agency. Available at: <https://archive.epa.gov/emergencies/content/learning/web/html/freshwat.html>
- Epley, D. (2012). The gulf oil spill and its impact on coastal property value using the before-and-after procedure. *Journal of Real Estate Literature* 20(1): 121-137.
- FWS (U.S. Fish and Wildlife Service), Nottawaseppi Huron Band of the Potawatomi Tribe, and Match-E-Be-Nash-She-Wish Band of the Pottawatomi Indians. (2015a). Final Damage Assessment and Restoration Plan/ Environmental Assessment for the July 25-26, 2010 Enbridge Line 6B Oil Discharges near Marshall, MI. Bloomington, MN: U.S. Fish and Wildlife Service, Midwest Region. Available at: <https://www.fws.gov/midwest/es/ec/nrda/MichiganEnbridge/>
- FWS. (2015b). Enbridge Must Restore Environment Injured by 2010 Kalamazoo River Oil Spill. U.S. Fish and Wildlife Service. Available at: <https://www.fws.gov/midwest/news/785.html>
- Flynn, C. B. & J. A. Chalmers. (1980). *The Social and Economic Effects of the Accident at Three Mile Island*. Washington, DC: U.S. Nuclear Regulatory Commission.
- Gerstein, M. (2017). Researcher with Enbridge past to lead Line 5 study. The Detroit News. Available at: <http://www.detroitnews.com/story/news/local/michigan/2017/09/18/enbridge-mackinac-pipeline-study/105759468/>
- Gillies, J. (2010). Asian carp and the Great Lakes fishery: How much is at risk?. Great Lakes Echo. Available at: <http://greatlakesecho.org/2010/02/18/asian-carp-and-the-great-lakes-fishery-how-much-is-at-risk/>
- GLERL/NOAA. (n.d.). About Our Lakes: Economy. Great Lakes Research Environmental Research Lab. NOAA. Available at: <https://www.glerl.noaa.gov/education/ourlakes/economy.html>
- GLMRIS (Great Lakes and Mississippi River Interbasin Study). (2012). Commercial Fisheries Baseline Economic Assessment - U.S. Waters of the Great Lakes, Upper Mississippi

- River, and Ohio River Basins. U.S. Army Corps of Engineers. Available at: [http://glmr.is.anl.gov/documents/docs/Commercial\\_Fisheries\\_Report.pdf](http://glmr.is.anl.gov/documents/docs/Commercial_Fisheries_Report.pdf)
- Gonia, T. (2014). The Story of State-licensed Commercial Fishing History on the Great Lakes. Michigan Department of Natural Resources. Available at: [http://www.michigan.gov/dnr/0,4570,7-153-10364\\_52259-316019--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_52259-316019--,00.html)
- Graham, S. (2003). Environmental effects of Exxon Valdez spill still being felt. *Scientific American*, December 19, 2003. Available at: <https://www.scientificamerican.com/article/environmental-effects-of/>
- Grigalunas, T. A., R. C. Anderson, G. M. Brown, Jr., R. Congar, N. F. Meade, & P. E. Sorensen. (1986). Estimating the Cost of Oil Spills: Lessons from the *Amoco Cadiz* Incident. *Marine Resource Economics* 2: 239-262.
- Groundwork Center for Resilient Communities. (2017). Oil and Water Don't Mix. Available at: <http://www.oilandwaterdontmix.org/>
- Holmes, N. C., Papadogiannaki, E. Eury, D., & Hollenhorst, S. J. (2010). Sleeping Bear Dunes National Lakeshore Visitor Study. National Park Service, Park Studies Unit, Visitor Services Project, Report 216. Moscow, ID: University of Idaho. Available at: [http://psu.sesrc.wsu.edu/vsp/reports/216\\_SLBE\\_rept.pdf](http://psu.sesrc.wsu.edu/vsp/reports/216_SLBE_rept.pdf)
- Larkin, S. L., R. G. Huffaker, & R. L. Clouser. (2013). Negative Externalities and Oil Spills: A Case for Reduced Brand Value to the State of Florida. *Journal of Agricultural and Applied Economics* 45(3): 389–399.
- Lawler, E. (2018). Line 5 damaged, likely from same anchor strike that caused spill. mlive.com, April 11, 2018. Available at: [http://www.mlive.com/news/index.ssf/2018/04/anchor\\_strike\\_responsible\\_for.html](http://www.mlive.com/news/index.ssf/2018/04/anchor_strike_responsible_for.html)
- Livengood, C. (2016). Federal judge: Deliver bottled water to Flint residents. The Detroit News. Available at: <http://www.detroitnews.com/story/news/michigan/flint-water-crisis/2016/11/10/flint-bottle-water/93618580/>
- Mackinac County. (2017). Mackinac County 2017 Equalization Report. St. Ignace, MI: Mackinac County Equalization Department. Available at: <http://www.mackinacounty.net/departments/equalization/>
- Martell, A. (2014). UPDATE 1-Enbridge targets May 1 for start-up of expanded Line 6B oil pipeline. Thomson Reuters. Available at: <https://www.reuters.com/article/enbridge-inc-line6b/update-1-enbridge-targets-may-1-for-start-up-of-expanded-line-6b-oil-pipeline-idUSL1N0MV1P420140403>
- Meade, W. J. & P. E. Sorensen. 1970. The Economic Cost of the Santa Barbara Oil Spill. In *Santa Barbara Oil Spill Symposium*. Santa Barbara: University of California.

- Michigan DNR. (2013). Michigan's commercial fishery. Michigan Department of Natural Resources. Available at: [http://www.michigan.gov/dnr/0,4570,7-153-10366\\_46403\\_63473-311969--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10366_46403_63473-311969--,00.html)
- Michigan DNR. (2016). 2015 State-Licensed Commercial Fishing Data for Michigan. Michigan Department of Natural Resources. Available at: [https://www.michigan.gov/documents/dnr/2015-CommercialFishingData-MI\\_522137\\_7.pdf](https://www.michigan.gov/documents/dnr/2015-CommercialFishingData-MI_522137_7.pdf)
- Michigan Sea Grant. (2013). Michigan Commercial Fisheries Marketing and product Development. Michigan Sea Grant. 07-701 CP. Available at: <http://www.miseagrant.umich.edu/files/2013/01/07-701-fs-whitefish-marketing.pdf>
- Morgan, O. A., J. C. Whitehead, W. L. Huth, G. S. Martin, & R. Sjolander. (2016). Measuring the Impact of the BP Deepwater Horizon Oil Spill on Consumer Behavior: Evidence from a Natural Experiment. Appalachian State University, Department of Economics Working Paper Number 13-11. April 2013, Revised February 2016. Boone, NC: Appalachian State University.
- MPPTF (Michigan Petroleum Pipeline Task Force). (2015). Michigan Petroleum Pipeline Task Force Report. Lansing, MI: Michigan Petroleum Pipeline Task Force. Available at: [https://www.michigan.gov/documents/deq/M\\_Petroleum\\_Pipeline\\_Report\\_2015-10\\_reducedsize\\_494297\\_7.pdf](https://www.michigan.gov/documents/deq/M_Petroleum_Pipeline_Report_2015-10_reducedsize_494297_7.pdf)
- Myers, E. (2013). Worse than spilled milk: A cry for casualty loss reform in the wake of the Deepwater Horizon disaster. *Case Western Reserve Law Review* 63: 1363-1392.
- NOAA (National Atmospheric and Oceanic Administration). (2017). What is a Natural Resource Damage Assessment? National Ocean Service, National Atmospheric and Oceanic Administration. Available at: <https://oceanservice.noaa.gov/facts/nrda.html>
- Nelson, J. P. (1981). Three-Mile Island and Residential Property Values: Empirical Analysis and Policy Implications. *Land Economics* 57: 363-372.
- O'Keefe, D. (2015). 'Fisheries' magazine focuses on Great Lakes charter fishing industry. Michigan State University Extension, Michigan Sea Grant. Available at: [http://msue.anr.msu.edu/news/fisheries\\_magazine\\_focuses\\_on\\_great\\_lakes\\_charter\\_fishing\\_industry](http://msue.anr.msu.edu/news/fisheries_magazine_focuses_on_great_lakes_charter_fishing_industry)
- O'Keefe, D. (2017). Lake Michigan's charter fishing industry is ... remarkably stable. Michigan State University Extension, Michigan Sea Grant. Available at: [http://msue.anr.msu.edu/news/lake\\_michigans\\_charter\\_fishing\\_industry\\_is\\_remarkably\\_stable\\_msg17\\_okeefe17](http://msue.anr.msu.edu/news/lake_michigans_charter_fishing_industry_is_remarkably_stable_msg17_okeefe17)

- O'Keefe, D., & S. Miller. (2011a). 2009 Lake Michigan Tournament Fishing Study. Michigan State University Extension, Michigan Sea Grant. Available at: <http://www.miseagrant.umich.edu/downloads/fisheries/11-201-Lk-MI-Tournament-Fishing-Study.pdf>
- O'Keefe, D., & S. Miller. (2011b). 2009 Lake Michigan Charter Fishing Study. Michigan State University Extension, Michigan Sea Grant. Available at: <http://www.miseagrant.umich.edu/downloads/fisheries/11-200-Michigan-Charter-Fishing-Study.pdf>
- Oosting, J., & M. Burke. (2018). Schuette to sue over Line 5 anchor strike. The Detroit News. Available at: <https://www.detroitnews.com/story/news/local/michigan/2018/04/17/schuette-civil-action-coming-over-line-5-damage/523338002/>
- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4(2): 155-169.
- Schwab, D. J. (2016). Statistical Analysis of Straits of Mackinac Line 5: Worst Case Spill Scenarios. Water Center, University of Michigan, 21 pp. Ann Arbor, MI: University of Michigan. Available at: <http://graham.umich.edu/media/pubs/Mackinac-Line-5-Worst-Case-Spill-Scenarios.pdf>
- Siegel, C., Caudill, S.B., & Mixon, Jr., F.G. (2013). Clear skies, dark waters: The Gulf oil spill and the price of coastal condominiums in Alabama. *Economics and Business Letters* 2(2), 45-53.
- Simons, R. A., Winson-Geideman, K., & Mikelbank, B. A. (2001). The effects of an oil pipeline rupture on single-family house prices. *Appraisal Journal*, 69(4): 410.
- Shaffer, D. (2014). Enbridge files to replace problem pipeline in Minnesota. Enbridge files to replace problem pipeline in Minnesota. *StarTribune*, October 28, 2014. Available at: <http://www.startribune.com/enbridge-files-to-replace-problem-pipeline-in-minnesota/280528652/>
- Tower, M. (2017). Enbridge finds issues at 42 of 48 sites along underwater oil pipeline. mlive.com, November 15, 2017. Available at: [http://www.mlive.com/news/grand-rapids/index.ssf/2017/11/enbridge\\_finds\\_issues\\_with\\_42.html](http://www.mlive.com/news/grand-rapids/index.ssf/2017/11/enbridge_finds_issues_with_42.html)
- Tower, M. (2018). Company blames Straits of Mackinac spill on 'extraordinary' circumstances. mlive.com, April 3, 2018. Available at: [http://www.mlive.com/news/grand-rapids/index.ssf/2018/04/straits\\_spill\\_in\\_extraordinary.html](http://www.mlive.com/news/grand-rapids/index.ssf/2018/04/straits_spill_in_extraordinary.html)
- TMWC (Tip of the Mitt Watershed Council). (2017). Enbridge Energy Line 5. Available at: <https://www.watershedcouncil.org/enbridge-energy-line-5.html>

Tourism Economics. (2011). The Impact of the BP Oil Spill on Visitor Spending in Louisiana: Revised estimates. Wayne, PA: Tourism Economics. Available at: [https://www.crt.state.la.us/Assets/Tourism/research/documents/2011-2012/Oil\\_Spill\\_Impacts\\_201106.pdf](https://www.crt.state.la.us/Assets/Tourism/research/documents/2011-2012/Oil_Spill_Impacts_201106.pdf)

Tourism Economics. (2017). The Economic Impact of Travel in Michigan: Tourism Satellite Account, Calendar Year 2016. Wayne, PA: Tourism Economics. Available at: <https://medc.app.box.com/s/0y4ihokfc9mwit5wlfv84lfckhqysdz1>

U.S. Army Corps of Engineers. (2013). Great Lakes Navigation System: Economic Strength to the Nation. The United States Military.

Venn-Watson, S., L. Garrison, J. Litz, E. Fougères, B. Mase, G. Rappucci, E. Stratton, R. Carmichael, D. Odell, D. Shannon, S. Shippee, S. Smith, L. Staggs, M. Tumlin, H. Whitehead, & T. Rowles. (2015). Demographic clusters identified within the northern Gulf of Mexico common bottlenose dolphin (*Tursiops truncatus*) unusual mortality event: January 2010 - June 2013. PLoS ONE 10(2): e0117248. <https://doi.org/10.1371/journal.pone.0117248>

Winkler, D. T., & Gordon, B. L. (2013). The effect of the BP Oil spill on volume and selling prices of oceanfront condominiums. *Land Economics* 89(4): 614-631.

Young, E. (2012). Importing Disaster: The Anatomy of Enbridge's Once and Future Oil Spills. National Wildlife Federation, 8 pp. Reston, VA: National Wildlife Federation. Available at: <https://www.nwf.org/>



On April, 1, 2018 we dodged a bullet. A tug/barge dragged its anchor through the no-anchor utility corridor just west of the Mighty Mac. It severed two electrical cables and dented or "marred" both Enbridge pipelines which carry almost 23 million gallons of Canadian oil thru the Straits each day. Enbridge has reduced line pressure by 40% pending repairs. Over 95% of that crude oil goes to Sarnia, Ontario for the Canadian market or for export.

If the anchor flukes had caught the pipelines near one of the 128 anchor supports (with plans for 70 more) there would have been a disastrous oil spill. These supports inconveniently raise the pipelines several feet off the bottom. Enbridge has continuous problems with washouts under the twin pipelines caused by higher than anticipated currents- sagging pipelines tend to break.

You may recall that there was a huge 3-day blizzard in mid-April which caused the Coast Guard to suspend efforts for four days to recover the over 600 gallons of insulating fluid leaked from the severed electrical cables. Not a drop of this highly toxic dielectric fluid was recovered. Imagine instead a worst-case oil leak (both lines ruptured and a manual, two-hour shutdown of valves) producing a spill of over 2.7 million gallons of crude oil, impacting more than 700 miles of shoreline. Under ideal conditions, a recovery of only 30% of a spill is considered good.

If Line 5 would have been severed on April 1- the lives of every person in northern Michigan would have been dramatically altered. For starters, almost any oil spill would shut down Mackinac Island and St. Ignace, which both get their water from the Straits. Boat traffic and fishing would also be suspended. Then there is the problem of oil polluting your beach and wetlands for years. A recent study published by FLOW, conservatively estimates \$6.3 billion dollars in spill damages - mostly for tourism, property values and fishing.

After 65 years of pumping Canadian oil back to Canada through the Michigan shortcut, Line 5 is now 15 years beyond its life expectancy. Michigan should not bear the risk for getting Canadian oil to market. The alternative study performed by Dynamic Risk last year projected an increase of only 1-2 cents per gallon for gasoline for Michiganders if Line 5 were shut down.

Oil pipelines may be the safest way to move oil until we gradually convert to renewable energy. However, oil lines just do not belong anywhere near the Great Lakes. A tunnel in the Straits is not the answer. It is an excuse to keep pumping during more years of study for a tunnel that will never be built. Electric and natural gas liquids sharing the same tunnel is a recipe for an explosive disaster. Line 5 runs for almost 540 miles through the rest of Pure Michigan- crossing countless wetlands and over 200 streams and rivers (running along US-27 between Burt and Mullet Lakes). Almost any significant spill outside the Straits would still pollute the Great Lakes watershed.

Leonard Page  
SACCPJE  
Cheboygan





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

May 24, 2018

Governor Rick Snyder State of Michigan P.O. Box 30013 Lansing, MI 48909	Attorney General Bill Schuette G. Mennen Williams Building, 7th Floor 525 West Ottawa Street P.O. Box 30212 Lansing, Michigan 48909
Director Heidi Grether Michigan Department of Environmental Quality P.O. Box 30458 Lansing, Michigan 48909-7958	Director Keith Creagh Michigan Department of Natural Resources Executive Division P.O. Box 30028 Lansing, Michigan 48909

VIA ELECTRONIC SUBMISSION

**RE: STATE OF MICHIGAN’S LEGAL AUTHORITY TO AFFIRMATIVELY PROTECT THE PUBLIC TRUST WATERS OF THE GREAT LAKES AND THEIR TRIBUTARIES**

Dear Governor Snyder, Director Grether, Director Creagh, and Attorney General Schuette:

In recent news releases and reports, your administration and state officials have questioned whether the State of Michigan has jurisdiction or control to do anything about the imminent threat to the citizens of Michigan from Enbridge’s dual Line 5 pipelines located on the bottomlands of the Straits of Mackinac in the heart of the Great Lakes.

These statements overlook and misrepresent law and legal circumstances. Moreover, they are a disservice to and breach of your duties as trustees under the public trust doctrine to the Straits and Great Lakes. The legal fact is the State of Michigan has substantial jurisdiction and control over Enbridge Line 5 based on (1) the 1953 Easement, (2) the exercise of the state’s property power, (3) the common law public trust doctrine, (4) the Great Lakes Submerged Lands Act,<sup>1</sup> and (4) the police power regarding conservation and protection of Michigan’s air, water, and natural resources or public trust in those resources.<sup>2</sup>

In the 1953 Easement authorizing the pipelines, Enbridge (then the Lakehead Pipe Line Company) and the State of Michigan acknowledged the state’s jurisdiction and property power and police power control over the Straits of Mackinac, because of the Great Lakes. It is undisputed that there can be no pipelines in the Straits or elsewhere in or under the Great Lakes or its connecting waters without a lease, occupancy agreement, or other written consent and a

<sup>1</sup> MCL 324.32501 et seq. (“GLSLA”).

<sup>2</sup> Mich Const., Art. 4, Sec. 52; MCL 324.1701 et seq. (Michigan Environmental Protection Act (“MEPA")).

permit under the GLSLA from the State of Michigan. When Michigan joined the United States in 1837, Michigan took title absolutely in the bottomlands and waters of the Great Lakes below the ordinary high-water mark. *Illinois Central Railroad v Illinois*, 146 US 397 (1892); *Obrecht v National Gypsum Co*, 361 Mich 399 (1960); *Glass v Goeckel*, 703 NW 2d 58 (2005). This title is subject to a public trust, imposed on state as trustees to protect these waters, bottomlands, and protected uses from impairment or alienation. Moreover, in the words of the U.S. Supreme Court in *Illinois Central Railroad*, this public trust is “irrepealable.” This means that no one or no government can remove or nullify this trust in any manner.

Yet state officials have repeatedly stated or represented that the state has no jurisdiction on Line 5 in the Straits or have questioned jurisdiction, when in fact relevant state agencies and bodies in your administration and before have acknowledged the state does have jurisdiction. Even Enbridge has conceded the state’s jurisdiction and control of siting approvals by the Michigan Public Service Commission (“MPSC”) the easement, and the Michigan Department of Environmental Quality (“MDEQ”) under the GLSLA.<sup>3</sup>

Most recently, at the May 14 meeting of the Michigan Pipeline Safety Advisory Board, MDEQ Director Heidi Grether said to the media regarding the Line 5 pipelines in the Straits, “People keep saying shut them down, shut them down; part of the question is, under what authority?”<sup>4</sup> Director Grether’s comments, unfortunately, echo the remarks she made to the media during her first month in office, on August 12, 2016, as reported by MLive: “In regards to shutting the line down, Grether said ‘there is a process that’s in place and we don’t really have the control over that.’ The federal agency with that power is the Pipeline Hazardous Materials Safety Administration (“PHMSA”). In regards to those calling for Line 5 to be shut down, Grether said ‘their opinion is that it is an environmental hazard and we should not put the Great Lakes at risk. That is their opinion, but there is a not a process for us to do that.’ She said those folks should be making a case with federal regulators.”<sup>5</sup>

Yet the MDEQ, since at least 2001, has asserted the state jurisdiction over the bottomlands and waters of the Great Lakes to require permits under the Great Lakes Submerged Lands Act, MCL 324.32501 et seq., for Enbridge’s substantial modification of the Straits pipeline design by repeated requests to install anchor supports and brackets to suspend the lines in the water above the bottomlands.

Governor Snyder in 2014 similarly stated the state could do nothing, because the federal government had exclusive jurisdiction over the *safety standards* for the pipelines. Later, after Governor Snyder appointed a task force to study the matter, the Task Force, headed by the MDEQ and Attorney General Schuette, concluded that the State of Michigan had jurisdiction under the 1953 Easement because of the State’s ownership of the bottomlands and waters, the Great Lakes Submerged Lands Act, and the Michigan Public Service Commission’s jurisdiction

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<sup>3</sup> Enbridge has applied for permits under the GLSLA for 198 anchor supports to implement a new or materially changed pipeline design for Line 5 in the Straits.

<sup>4</sup> Beth LeBlanc, “Coast Guard: Good fortune that Straits spill was minor,” Detroit News, May 14, 2018, <https://www.detroitnews.com/story/news/politics/michigan/2018/05/14/coast-guard-good-fortune-straits-spill-only-minor/608335002/>

<sup>5</sup> Garrett Ellison, “New DEQ director says calls to shut down Enbridge Line 5 are premature,” MLive, August 23, 2016, [http://www.mlive.com/news/index.ssf/2016/08/shut\\_down\\_line\\_5\\_calls\\_are\\_pre.html](http://www.mlive.com/news/index.ssf/2016/08/shut_down_line_5_calls_are_pre.html)

over location and changes or construction of crude oil pipeline. In point of legal fact, the siting and construction of crude oil pipelines, as distinct from *safety measures* and *natural gas* pipelines, are *not* regulated by the federal government.

Governor Snyder, in the fall of 2017, unilaterally entered into his own agreement with Enbridge that calls for a resolution of the pipeline threats in the Straits, and specifically requires Enbridge, who signed the agreement, to submit to the jurisdiction of the State of Michigan under the Great Lakes Submerged Lands Act, MPSC, and other laws and regulations. These laws require exercise of state jurisdiction, control and power to fully evaluate, suspend the flow of oil pending such evaluation, and require Enbridge to conduct studies and prove no other alternative to the Straits and Line 5 exists. So far, the state has not demanded these legal requirements.

Let us be clear: The Michigan attorney general have legal authority under the public trust doctrine to seek voidance of the easement for Line 5. There is precedent for such action. *In Frank J. Kelley, Attorney General for the State of Michigan, ex rel, Michigan Natural Resources Commission, Michigan Department of Natural Resources, and the Director of the Michigan Department of Natural Resources v. Consumers Power Company and The Detroit Edison, Supreme Ct. No. 98019*, the attorney general sought a declaratory judgment that a lease for state bottomlands authorized under the Great Lakes Submerged Lands Act should be determined void because activities conducted under the lease were inimical to the state's public trust resources.

In the case *Attorney General v. Con Power*, the Michigan Court of Appeals held that "because the fish resources destroyed by the plant are held in trust by the state for the people, the state is empowered to bring a civil action to protect those resources." 202 Mich App 74; 508 NW2d 901 (1993).

In *Phillips Petroleum v. Mississippi*, the U.S. Supreme Court held that there are no constitutional limits limiting state recognition of preexisting public trust rights.

It is a basic tenet of public trust jurisprudence that when a state conveys tidelands and shorelands to a private company, it conveys only the *jus privatum*, and retains the *jus publicum*, or public authority interest, for itself.

Since 2014, FLOW, Oil and Water Don't Mix, Michigan tribes, and residents and threatened citizens and businesses in the Straits, including Mackinac Island, have documented in numerous research reports and communications to you that Michigan owns and has jurisdiction over the use, occupancy, construction and protection under the easement of the public waters, bottomlands, and public and treaty-protected interests in the Straits, Lake Michigan and Lake Huron.<sup>6</sup>

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<sup>6</sup> See, for example, FLOW & Oil & Water Don't Mix Partners, "Re: Lack of Transparency and Compliance Concerning Terms and Conditions of Enbridge's 1953 Line 5 Pipeline Easement & the State's Perpetual Public Trust Authority To Protect These Great Lakes Waters," July 1, 2014, <http://flowforwater.org/wp-content/uploads/2014/06/2014-07-01-FINAL-Line-5-Governor-Ltr-Sign-On.pdf>; FLOW, "Eliminating The Line 5 Oil Pipelines' Unacceptable Risk To The Great Lakes Through A Comprehensive Alternatives Analysis And Systems Approach," December 24, 2015, <http://flowforwater.org/wp-content/uploads/2015/12/FLOW-Composite-Report-12-14-15-FINAL-1.pdf>; FLOW & Oil & Water Don't Mix, "Recommendation to the State of Michigan to Terminate the 1953 Line 5 Easement with Enbridge," April 13, 2016, <http://flowforwater.org/wp->

The time for full application of Michigan's interests, jurisdiction, and control is now.

More than 60 communities, 15 tribes and tribal groups, and hundreds of businesses have called for state leaders to shut down Line 5 before Enbridge's next oil spill pollutes the Great Lakes. Many other pipelines with excess capacity deliver oil to Sarnia and other regional refineries, but these are the only Great Lakes we will ever have.

For these reasons, the undersigned demand that you immediately withdraw and/or correct your statements that Michigan does not have jurisdiction, control, or the power to enforce its easement, protect its public trust interests and title, or enforce its authority under the Great Lakes Submerged Lands Act and the MPSC siting laws and regulations. Moreover, for the reasons documented before all of you over the past four years, and part of your public record and the public record before the Michigan Pipeline Safety Advisory Board, you are again requested to take immediate action to address what is an obvious and grave threat to the waters, bottomlands, public trust, public property, private property, and public health of the citizens of Michigan.

Sincerely yours,



James Olson  
President



Elizabeth R. Kirkwood  
Executive Director

cc: U.S. Senator and Hon. Gary Peters  
U.S. Senator and Hon. Debbie Stabenow

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[content/uploads/2016/04/FINAL\\_OWMD-Sign-On-Letter-to-Gov-AG-DEQ-DNR.pdf](#); FLOW, "Public Comments On The Joint Application Of Enbridge Energy To Occupy Great Lakes Bottomlands For Anchoring Supports To Transport Crude Oil In Line 5 Pipelines In The Straits Of Mackinac And Lake Michigan [NO. 2HBVGKO-35JE]," August 24, 2016, <http://flowforwater.org/wp-content/uploads/2016/08/FLOW-8-24-16-Final-Letter-to-DEQ-USCOE-Joint-App-Enbridge-for-Supports-GLSLA-CWA.pdf>; FLOW, "New Evidence Compels State Of Michigan To Enforce Easement Violations And Eliminate Crude Oil Transport In Line 5 In The Straits Of Mackinac," March 9, 2017, <http://flowforwater.org/wp-content/uploads/2017/06/Final-Letter-re-corrosion-violations-3-9-17-SIZE-ADJUSTED.pdf>; FLOW, "Public Comments 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 [HNCAR90-WAHM0]," May 11, 2018, <http://flowforwater.org/wp-content/uploads/2018/05/FINAL-FLOW-public-comments-on-Anchor-Permit-05-11-18.pdf>.

**From:** [noreply@engagingplans.org](mailto:noreply@engagingplans.org) on behalf of [MI Petroleum Pipelines](#)  
**To:** [MiPetroleumPipelines](#)  
**Subject:** Form submission from: Contact Us  
**Date:** Thursday, June 21, 2018 5:32:06 PM

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Submitted on Thursday, June 21, 2018 - 5:16pm  
Submitted by anonymous user: 23.115.225.14  
Submitted values are:

Your Name: Marion Mangi  
Your Email Address: [marionmangi54@gmail.com](mailto:marionmangi54@gmail.com)  
Your Phone Number: 414-541-0365  
Subject: Submit Information/Comments  
Attachment:

Your Message: I recently read an article in them Milwaukee Journal about the proposal to tunnel under the Straits of Mackinac for Line 5. I am strongly opposed to this. We should be directing our commerce toward using green energy and to disband the use of pipelines that could damage our precious natural resources.

The results of this submission may be viewed at:  
<https://mipetroleumpipelines.com/node/5/submission/388>

**From:** [noreply@engagingplans.org](mailto:noreply@engagingplans.org) on behalf of [MI Petroleum Pipelines](#)  
**To:** [MiPetroleumPipelines](#)  
**Subject:** Form submission from: Contact Us  
**Date:** Tuesday, July 10, 2018 4:13:37 PM

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Submitted on Tuesday, July 10, 2018 - 4:13pm  
Submitted by anonymous user: 107.77.193.219  
Submitted values are:

Your Name: Jamie Winters  
Your Email Address: [nayrwinters@yahoo.com](mailto:nayrwinters@yahoo.com)  
Your Phone Number: 2315296952  
Subject: Submit Information/Comments  
Attachment:

Your Message: Please protect our waters, our state and our lives. Shut down line 5! It is the only viable option to protect our biggest asset, the Great Lakes.

The results of this submission may be viewed at:  
<https://mipetroleumpipelines.com/node/5/submission/389>



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

July 15, 2018

Governor Rick Snyder State of Michigan P.O. Box 30013 Lansing, Michigan 48909 snyder@michigan.gov	Attorney General Bill Schuette G. Mennen Williams Building, 7 <sup>th</sup> Floor 525 West Ottawa Street P.O. Box 30212 Lansing, Michigan 48909 miag@michigan.gov
Director Heidi Grether Michigan Department of Environmental Quality P.O. Box 30458 Lansing, Michigan 48909-7958 gretherh@michigan.gov	Director Keith Creagh Michigan Department of Natural Resources Executive Division P.O. Box 30028 Lansing, Michigan 48909 creaghk@michigan.gov
Director Sally Talberg Michigan Public Service Commission P.O. Box 30221 Lansing, Michigan 48909 talbergs@michigan.gov	

VIA ELECTRONIC SUBMISSION

**RE: FLOW (FOR LOVE OF WATER) PUBLIC COMMENTS AND REPORT ON ENBRIDGE’S STUDIES AS REQUIRED PURSUANT TO THE NOVEMBER 2017 GOVERNOR – ENBRIDGE AGREEMENT ON THE LINE 5 PIPELINES IN THE STRAITS OF MACKINAC AND LAKE MICHIGAN**

Dear Governor Snyder, Attorney General Schuette, Michigan Department of Environmental Quality (“MDEQ”) Director Grether, Michigan Public Service Commission (“MPSC”) Director Talberg, Michigan Department of Natural Resources (“MDNR”) Director Creagh:

For Love of Water (“FLOW”) submits the following formal public comments for the public record regarding the proposed decisions and actions the State of Michigan should take under the Michigan Constitution and laws of Michigan and the Agreement entered into between Governor Snyder and Enbridge on November 27, 2017 (“Agreement” or “November 2017 Agreement”).

Published on the Michigan Pipeline Safety Advisory Board’s (“PSAB”) website, the State of Michigan’s formal notice requested public comments on Enbridge’s technical studies for the express purpose of guiding the future of Line 5, including the full replacement of this pipeline under or in the Straits of Mackinac, under the St Clair River, and across Michigan. The state’s notice appears to favor a commitment to the continued operation of Enbridge’s 65-year-old Line 5 throughout Michigan for decades to come. In the spirit of this public notice and request for thoughtful comments, FLOW submits the following analysis, comments, and conclusions regarding the path the State of Michigan and its

agencies should take. Specifically, FLOW's analysis and comments address: (1) the November 2017 Agreement's flaws and non-compliance with the laws and Constitution of Michigan; (2) the Enbridge Straits Alternatives report; (3) the Water Crossings of Line 5 report; and (4) the supplemental reports concerning Anchor Strike Mitigation, Coating Technologies, and Underwater Leak Detection. In order to provide a meaningful review of Enbridge's supplemental reports, however, the comment period from June 29, 2018 until July 15 is deficient and should be extended to a minimum of 30 days. Most importantly, however, a review of Enbridge's supplemental reports is secondary to the primary issues, problems, and actions that should be addressed before any decision or further implementation for any replacement lines or other actions called for by the November 2017 Agreement.

## **I. SUMMARY OF COMMENTS AND RECOMMENDED ACTIONS**

FLOW submits the following conclusions and recommendations based on our careful review and analysis of the Agreement and the above-described reports and studies:

1. The Agreement is invalid because the Governor and MDEQ did not "take care that the laws are faithfully executed" before signing the Agreement as required by Michigan Constitution, Art. 5, Sec. 8, and the Great Lakes Submerged Lands Act ("GLSLA").<sup>1</sup> The Governor took the law into his own hands by ignoring the GLSLA and other laws before signing the Agreement. Specifically, the Agreement constitutes an "agreement" for the "use of bottomlands" of the Great Lakes, (i.e. the "replacement" of existing dual pipelines in the Straits with a new, single line alternative tunnel, open cut, or horizontally drilled location and construction), contrary to and without the authorization for such an agreement required by Sections 32502, 32503, and other sections of the GLSLA and its rules.<sup>2</sup>
2. The Agreement unlawfully narrows the scope of alternatives to Line 5 occupying the bottomlands of the Great Lakes contrary to the governing laws of the GLSLA, the Michigan Environmental Protection Act ("MEPA"),<sup>3</sup> and MPUC laws. Under these laws, Enbridge is required to demonstrate that there is no substantial impairment to the waters and no feasible and prudent alternative to the twin pipelines and Line 5, including alternative design capacity, routes, and other measures throughout its system. Instead, the Governor short-circuited the mandates under public trust, environmental, and public utility law to fully and comprehensively determine potential risks, impacts, and whether alternatives exist, such as the doubled-capacity in Enbridge's new Line 6B (now called 78) across southern Michigan, along with other reasonably minor adjustments compared to the replacement and long-term operation of Line 5.
3. The Agreement allows Enbridge to apply for and obtain all the approvals and permits necessary to construct and build a replacement "tunnel" or horizontally drilled line under the St. Clair River. Such permit approvals are also subject to the public trust of the state and citizens under the Inland Lakes and Streams Act ("ILSA"). Once more, the Governor and state officials have prematurely decided and usurped the rule of law required to make a decision about Line 5 under the St. Clair River.

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<sup>1</sup> MICH. COMP. LAWS §32501 et seq.

<sup>2</sup> MICH. COMP. LAWS §§32502, 32503; GLSLA Rule 1015.

<sup>3</sup> GLSLA Rule 1015; see also MICHIGAN ENVIRONMENTAL PROTECTION ACT, MICH COMP. LAWS §324.1701 et seq.; *Michigan State Highway Commission v. Vanderkloot*, 392 Mich 159, 185-187 (1974); *Gensco v. MDEQ*, 250 Mich App 45 (Mich. Ct. App. 2002); *Buggs v. Michigan Public Service Comm'n*, 2015 WL 15995 (Mich. Ct. App. Nos. 31508, 315064, Jan. 13, 2015).



4. The Agreement fails to follow the rule of law by not requiring Enbridge to conduct its own environmental impact and alternative studies “replacement” of Enbridge’s Line 5 in the Straits, Line 5 in or under the St. Clair River, and the implicit long-term operation of Line 5 across Michigan. By its terms, the Agreement narrowed the range of alternative actions by the State of Michigan and Enbridge to the overall replacement and long-term commitment to Enbridge and Line 5.
5. On its face, the Agreement combined Line 5, the Straits, and St. Clair River replacements without an independent evaluation of potential and cumulative impacts and alternatives to Line 5 in its entirety. Instead, the law requires projects affecting public trust bottomlands to evaluate risks, impacts, and alternatives.<sup>4</sup> As a result, the Agreement violated the rule against segmentation of projects affecting public trust bottomlands, waters, fisheries, navigation, boating, and other public trust uses, and private riparian properties, drinking water systems, and public health risks to the State of Michigan.
6. The Agreement does not acknowledge the current failing Line 5 pipeline infrastructure in the Straits of Mackinac and Enbridge’s unlawful efforts to characterize its screw anchors as repair and maintenance in order to avoid a comprehensive state and federal review of the entire underwater Line 5 structure. For over 15 years, Enbridge has created a new and altered design for Line 5 in the Straits that includes the continuing installation of 198+ anchor saddles and supports to elevate the lines in the water column off the lakebed, which in turn increase the chances for a successful anchor strike and pipeline rupture.
7. The Agreement imposes substantial taxpayer expenses on assisting and supporting permission for Enbridge to proceed with a tunnel or similar replacement of a crude oil pipeline under or in the bottomlands of the Great Lakes.
8. The Enbridge reports, Michigan Technological University (“MTU”) reports, and other reports confirm that the nature and extent, risks, and instability of soils, geology, and soils under the Straits of Mackinac are unknown or uncertain. As a result, no final decision should be made on the feasibility of constructing a tunnel or other alternative until the completion of an independent and comprehensive geotechnical study.

Based on the foregoing analyses and conclusions, FLOW advises and urges the Governor, Attorney General, DEQ, DNR, and MPSC to refrain from making any decisions regarding any alternative replacement or other matter called for in the Agreement until current proceedings or actions related to Line 5 are lawfully approved or otherwise are in compliance with the Michigan Constitution and laws of Michigan.

## **II. THE GOVERNOR’S NOVEMBER 2017 AGREEMENT WITH ENBRIDGE**

The Governor’s 2017 Agreement with Enbridge has directly impacted the citizens of Michigan and tribes without their public participation or consultation. By sidelining a three-year public process, this Agreement has effectively approved Enbridge’s continued and uninterrupted flow of 23 million gallons of oil each day

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<sup>4</sup> *Id.*, fn 3, *supra*; see also FLOW report to Michigan Pipeline Advisory Board, Director, MDEQ, Attorney General Schuette, Dec.14, 2015, Part I, A Proper Legal Framework and Principles for Comprehensive Alternatives Analysis, pp. 7-13( <http://flowforwater.org/wp-content/uploads/2015/12/FLOW-Composite-Report-12-14-15-FINAL-1.pdf>).

through the Great Lakes and Michigan's waterways. In addition, the Governor's 2017 agreement has resulted in the following:

- An assurance to Enbridge to replace Line 5 under the St. Clair River with a tunneled line using a horizontal directional drilling method;
- An assurance to Enbridge to replace Line 5 in the Straits of Mackinac with a new line in a trench or tunnel;
- A waiver of the requirement for Enbridge to prove that using Line 6B across southern Michigan was not a feasible and prudent alternative to Line 5;
- A complicit agreement that all of Line 5 could then be replaced to guarantee that Enbridge could continue transporting crude oil or heavy tar sands in the future;
- An agreement that Enbridge could continue to use the failing Line 5 design and structures without the legal authorization under the GLSLA and MEPA and the Constitution;
- A tacit agreement that Enbridge can use the failing Line 5 design and support structures during the five or more years it would take to plan, construct, and entirely replace Line 5 with the tunnels in the Straits and St. Clair River;
- A private agreement that ignores over three years of independent studies that show most of Line 5's oil is transported to Sarnia, Canada, not Michigan.
- A denial of the Pipeline Safety Advisory Board's opportunity to complete the two independent risk and alternatives studies and to make corresponding recommendations related to the future of Line 5 in Straits;
- A denial for affected citizens, communities, local units of government, and tribes to have an opportunity to participate, comment, and obtain protection of property, water, and public uses threatened by Line 5; and
- A denial of due process of the law for affected citizens, local units of government, and tribes.

The Agreement has left the public voiceless and has unfairly allowed Enbridge to influence how the state will proceed on deciding the crucial fate of the entire Line 5, including its Straits of Mackinac and St. Clair River crossings. An investigative news report from Bridge Magazine<sup>5</sup> broke last week to raise fundamental questions about the uncomfortably cozy on-going negotiations and revolving-door relations between the State of Michigan and Enbridge in crafting and announcing this Agreement. FOIA documents revealed that the State of Michigan's departments, Michigan Agency for Energy ("MAE") and MDEQ sharing talking points with Enbridge lobbyists prior to the release of the November 27 Agreement, and that MAE's Executive Director now works in the private sector as an expert consultant representing Enbridge as one of her first clients.

In addition, the timing of the announcement of this privately negotiated deal between Enbridge and the State of Michigan was particularly jarring. In late October 2017, Enbridge disclosed that it knew as early as 2014 about areas of coating damage on the underwater oil pipes related to its anchor screw installations but did not acknowledge the damage to state or federal officials.<sup>6</sup> This is very significant because Enbridge knowingly misled both state and federal agencies in authorizing multiple 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. Rather than enforcing this and other related easement violations, the State of Michigan

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<sup>5</sup> Jim Malewitz, "Email Cast Doubt About Michigan's Ties to Enbridge in Line 5 Debate," Bridge Magazine, July 11, 2018 <https://www.bridgemi.com/michigan-environment-watch/emails-cast-doubt-about-michigans-ties-enbridge-line-5-debate>

<sup>6</sup> Officials: Enbridge Knew About Line 5 Coating Gaps Tuesday, Paint Square News, October 31, 2017 <https://www.paintsquare.com/news/?fuseaction=view&id=17583>

entered into a highly favorable agreement with Enbridge that empowered the corporation to develop its own reports advocating for a tunnel replacement in the Straits and St. Clair River crossings.

It's been eight years since Enbridge's Line 6B disaster along the Kalamazoo River and the people of Michigan are still without a thorough and independent alternatives analysis and risk assessment of Enbridge's Line 5. A [new poll](#)<sup>7</sup> conducted by the National Wildlife Federation ("NWF") shows that the majority of Michiganders across every region and political party want Line 5 shut down, and 84 percent are concerned about a Line 5 oil spill in the Great Lakes. Instead, the citizens of Michigan are watching their taxpayer dollars being spent to verify Enbridge's self-serving reports.<sup>8</sup>

Most significantly, this Agreement further delays much needed and immediate state action to address the ongoing risk of a catastrophic pipeline oil spill in the Great Lakes. This risk is not unfounded given the decaying conditions of the 65-year-old pipeline<sup>9</sup> and the recent April anchor strike that dented Line 5 in three locations and spilled approximately 600 gallons of dielectric fluid into Lake Michigan.<sup>10</sup> In addition, Enbridge's proposed tunnel imposes a five to ten year delay depending on likely legal and technical challenges, and thus is not a realistic solution to Line 5's looming threat that could cause over \$6.3 billion in economic impact to the State of Michigan and its citizens. The Agreement perpetuates the status quo and rewards Enbridge by externalizing the company's risks on the citizens of Michigan, the tribes, and the Great Lakes. In sum, this Agreement circumvents the rule of law and abrogates the state's primary public trust duties as trustee of the Great Lakes waters and bottomlands.

**A. The Governor's Agreement with Enbridge Violates the Duty to Take Care to Faithfully Follow the Law Mandated by Art. 5, Sec. 8 of the Michigan Constitution.**

Article 5, Section 8 of the Michigan Constitution clearly provides:

Each principal department shall be under the supervision of the governor unless otherwise provided by this constitution. The governor *shall take care that the laws be faithfully executed.*

The governing law to use of public trust bottomlands and waters is the GLSLA and its sections 32502 and 32503.<sup>11</sup> This is the law that governs the State of Michigan's decision on whether or not Enbridge's Line 5

<sup>7</sup> National Wildlife Federation. "New Poll: Michigan Voters Overwhelmingly Support Shutting Down Line 5," (May 2018) <https://nwf.org/Home/Latest-News/Press-Releases/2018/05-24-18-Michigan-Voters-Line-5>

<sup>8</sup> Jim Malewitz, "Cost to Michigan of Trusting Enbridge on Line 5: \$255 per hour," Bridge Magazine, <https://www.bridgemi.com/michigan-environment-watch/cost-michigan-trusting-enbridge-line-5-255-hour> (last visited July 13, 2018).

<sup>9</sup> Jim Malewitz, "'History of Failure' Highlights Risks Outside Straits of Mackinac," Bridge Magazine, July 11, 2018 <https://www.bridgemi.com/michigan-environment-watch/history-failure-highlights-line-5-risks-outside-straits-mackinac>

<sup>10</sup> Emily Lawler, *Line 5 Damaged, Likely from Same Anchor Strike that Caused Spill*. See [https://www.mlive.com/news/index.ssf/2018/04/anchor\\_strike\\_responsible\\_for.html](https://www.mlive.com/news/index.ssf/2018/04/anchor_strike_responsible_for.html) (last visited July 13, 2018).

<sup>11</sup> MICH. COMP. LAWS §§324.32502, 32503 et seq. Section 32502... This part shall be construed so as to preserve and protect the interests of the general public in the lands and waters described in this section, to provide for the sale, lease, exchange, or other disposition of unpatented lands and the private or public use of waters over patented and unpatented lands... whenever it is determined by the department that the private or public use of those lands and waters will not substantially affect the public use of those lands and waters for hunting, fishing, swimming, pleasure boating, or navigation or that the public trust in the state will not be impaired by those agreements for use, sales, lease, or other disposition. Section 32503. (1) Except as otherwise provided in this section, the department, after finding that the public trust in the waters will not be impaired or substantially affected, may enter into agreements

can continue to occupy the state's public trust waters. This statutory public trust law mandates that the MDEQ must authorize any agreement for occupancy or use of navigable waters and bottomlands pursuant to the legal and regulatory public trust standards of no impairment.<sup>12</sup> Constitutionally, all departments and officials of every agency, including the Attorney General, are subject to the same mandates and limitations of the Michigan Constitution and laws of the legislature. In this case, the Governor, the executive agencies and departments, including MDEQ, MDNR, MPSC, MAE, and the Attorney General, must follow and execute the statutory public trust law of the GLSLA and other applicable state laws.

The Agreement improperly calls for a "replacement" pipeline in the Straits of Mackinac and therefore narrows the scope of alternatives for Line 5 in the Straits. By narrowing the scope of alternatives, the Governor's Agreement fails to take care that the laws of the GLSLA are faithfully executed. This is because the GLSLA, MEPA, and requirements of the MPSC collectively mandate submission by Enbridge and determinations by the executive branch through the MDEQ and MPSC that potential adverse impacts are minimized and that a showing demonstrates no feasible and prudent alternative. These findings must be made prior to any one alternative being selected. Therefore, the Governor's Agreement with Enbridge violated Art. 5, Sec. 8 by waiving and narrowing the agreement's only alternative for Enbridge to examine: a "replacement" pipeline in the Straits and under the St. Clair River. In other words, this Agreement has not been authorized consistent with the public trust standards for use and occupancy of the Great Lakes bottomlands or waters. Moreover, the effect of the Governor's Agreement is to allow Enbridge to continue indefinitely with a new or replaced Line 5 in its entirety without submission, authorizations, permits or approvals required by law.

#### **B. Independent of the Constitutional Violations of Law, the Agreement between the Governor and Enbridge Failed to Comply with Other Laws and Legal Requirements.**

1. Contrary to Rule 1015 of the GLSLA, MEPA, Inland Lakes and Streams Act ("ILSA"), MPSC law, the Agreement improperly narrowed the range of Line 5's potential impacts and alternatives to a "replacement" pipeline in both the Straits of Mackinac and the St. Clair River.

The GLSLA applies to occupancy, use, improvements, and other activities on, in or under Great Lakes bottomlands and waters.<sup>13</sup> In addition to all other requirements, no approval or permit can be granted by MDEQ "unless the department determines both of the following: (a) that the adverse effects to the environment, public trust, and riparian interests... are minimal...; and (b) That there is no feasible and prudent alternative to the applicant's proposed activity which is consistent with the reasonable requirements of the health, safety, and welfare."<sup>14</sup>

The MDEQ must make these findings *prior* to selecting any one alternative. The Agreement, however, has bypassed the department's legal required independent fact finding of no adverse impacts and no feasible and prudent alternative, and has instead unilaterally selected the "replacement" tunnel alternative as the preferred alternative. In short, the Agreement has circumvented the GLSLA and Rule 1015.

2. Similarly, the Agreement provides for Enbridge to locate, construct and operate a "replacement" Line 5 pipeline under the St. Clair River without complying with the state's

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pertaining to waters over and the filling in of submerged patented lands, or to lease or deed unpatented lands, after approval of the state administrative board.

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> GLSLA Rule 1015.

sovereign public trust ownership and interest in the bottomlands of the river and/or the waters over the bottomlands of the river.

The St. Clair River is a part of a connecting international waterway between Lake Huron and Lake St. Clair, the Detroit River, and Lake Erie. Michigan received sovereign title and control of all navigable waters at the time of statehood in 1837 under the “equal footing doctrine.”<sup>15</sup> Subsequently, the Michigan Supreme Court ruled under the common law, that the title and ownership of the bottomlands and the waters of the Great Lakes was held by Michigan in public trust.<sup>16</sup> As to inland lakes and streams, the Court ruled that the private title to bottomlands under navigable inland lakes and inland rivers was in the adjacent riparian owner to the center of the lake or stream.<sup>17</sup> However, the Court also ruled that the riparian private title was subject to the state’s residual public trust interest that cannot be alienated, subordinated without the state’s express authorization by statute or by a department’s determination as delegated by law. The private riparian interest or *jus privatum* is always subject to *jus publicum*, which is the paramount rights in navigable waters and the lands under them in order to protect navigation and the public trust.<sup>18</sup>

Where there is no such express legislative or department authorization, the use, improvement or alternation of riparian bottomlands is unlawful. For example, the Inland Lakes and Streams Act (“ILSA”) delegates authority to the MDEQ to issue permits for use, occupancy, alternation, improvement or similar activity on bottomlands of lakes or stream. A permit cannot be approved unless there is no impairment of the public trust, riparian interests, or the environment, and, further, unless it is demonstrated that there is no feasible and prudent alternative to the proposed conduct or activity.<sup>19</sup>

The Agreement calling for a replacement Line 5 single pipeline under the St. Clair River has not been permitted by the MDEQ under the ILSA. Therefore, the Agreement does not comply with the ILSA and its rules. Like Rule 1015, the ILSA rules require a showing that there is no feasible and prudent alternative.<sup>20</sup> In this instance, the alternative would include using other capacity and/or routes within Enbridge’s pipeline system or connecting systems, such as Line 6B/78 across southern Michigan.<sup>21</sup>

Enbridge or MDEQ may try to argue that the “tunnel” under the St. Clair River is private riparian land and therefore the ILSA and the GLSLA do not apply, citing *McMorran Milling v. C.H. Little Co.* However, for the reasons stated above, any private riparian title or *jus privatum* is technically bare title for the exercise of riparian interest, and is always subject to the paramount state’s sovereign and public trust interest in the waters and bottomlands, the *jus publicum*.<sup>22</sup>

<sup>15</sup> *Shively v. Bowlby*, 14 S. Ct. 548 (1894) (title to bottomlands “vested absolutely” in states in trust for citizens on admission to the U.S.); *State v. Venice of America Land Co.*, 160 Mich. 680 (1910); *Glass v. Goeckle*, 473 Mich. 667 (Mich. 2005).

<sup>16</sup> *Id.*, *State v Venice of American Land Co and Glass*.

<sup>17</sup> *McMorran Milling Co. v C.H. Little Co.*, 201 Mich. 301 (1918).

<sup>18</sup> *Id.*, *McMorran*, at p. 309-310. (“Whatever the nature of the interest of a riparian owner in the submerged lands in front of his upland bordering on a public navigable water, his title is not as full and complete as his title to fast land which has no direct connection with the navigation of such water. It is a qualified title, a bare technical title, not at his absolute disposal, as is his upland, but to be held at all times subordinate to such use of the submerged lands and of the waters flowing over them as may be consistent with or demanded by the public right of navigation.”).

<sup>19</sup> *Illinois Central R. Rd. v. Illinois*, 146 U.S. 287 (1892); *Obrecht v. National Gypsum Co.*, 361 Mich. 399 (Mich. 1960).

<sup>20</sup> MICH. COMP. LAWS §324.30106.

<sup>21</sup> See FLOW’s Public Comments on Dynamic Rick Final Alternatives Analysis Report, dated December 22, 2017 (<http://flowforwater.org/wp-content/uploads/2018/01/FLOW-Comments-on-Final-Alternatives-Analysis-2017.12.21.pdf>).

<sup>22</sup> See fns 10 and 11, *supra*.

By its terms, the GLSLA does not address or grant authority to MDEQ to approve or grant any authorization or permit under the St. Clair River. If Enbridge or MDEQ are correct in asserting that the ILSA does not apply, then in effect, they must concede that there is no legislative grant or authority to alienate or authorize use, occupancy, or construction activity as to the state's sovereign, paramount public trust interest in the bottomlands of the St. Clair River. Even though these bottomlands are privately titled, as noted above, the private title remains subject to the state's residual public trust interest. If the public trust in riparian bottomlands under inland rivers or lakes cannot be alienated (which it cannot),<sup>23</sup> then there must be a legislative grant authorizing MDEQ to allow the use or activity. Short of such express authorization consistent with the public trust, there is no authority, and a replacement pipeline and private occupancy would be unlawful.

3. The Agreement unlawfully short-circuited the duty to consider and determine likely or potential adverse impacts and the existence of feasible and prudent alternatives to the entire Line 5 contrary to the principle of non-segmentation.

As noted above, the Agreement calls for a replacement of the existing Line 5 dual lines in the Straits, the Line 5 pipeline under the St. Clair River, and a review and consideration of 400 river or water crossings that have been identified for Line 5 in Michigan from Superior, Wisconsin to Sarnia, Canada. The Agreement addresses a single or related part of a single project, namely the replacement and indefinite location, siting, use, and operation of Line 5 in Michigan. While the Agreement requires the replacement tunnels or similar alternatives to obtain necessary permits and approvals under federal, state, and local law or regulations, the Agreement did not consider and/or determine the impacts or effects and alternatives to this overall project, which presumes the rebuilding of the entire 645-miles of Line 5 in Michigan and Wisconsin.

As previously addressed in a separate letter to the state dated April 11, 2018, FLOW set forth the legal prohibition of dividing a larger project into smaller segments to avoid or narrow consideration of impacts, likely effects, or alternatives to proposed conduct.<sup>24</sup> The Governor entered into the 2017 Agreement without consideration of the impacts, likely effects, and alternatives to Line 5 as a whole. Accordingly, the Agreement is contrary to law, and any decisions must be delayed until the state has required Enbridge and the MDEQ, MDNR, and/or MPSC under proper legal proceeding and the rule of law to do so.

## **C. Procedural and Substantive Comments on Enbridge's 5 Reports Required under the Governor's 2017 Agreement with Enbridge**

### **1. Procedural Comments**

After nearly nine months of analysis, in July 2015, the Michigan Petroleum Pipeline Task Force released its final report, recommending an independent review and analysis of Line 5's risk and alternatives. Immediately following, the Michigan Attorney General Bill Schuette acknowledged that Line 5 presents an unacceptable risk stating that "you wouldn't site, and you wouldn't build and construct pipelines

<sup>23</sup> See *Shively v. Bowlby*, 14 S. Ct. 548 (1894).

<sup>24</sup> See fn 4, *supra*, and FLOW's Non-segmentation letter to MPSC and DEQ, dated April 11, 2018 (<http://flowforwater.org/wp-content/uploads/2018/04/Final-FLOW-letter-to-MPSC-and-DEQ.pdf>).

underneath the Straits today”<sup>25</sup> and that the days of Line 5 were numbered.<sup>26</sup> Shortly after, the State of Michigan negotiated with Enbridge to fund an independent risk report and independent alternatives report to the tune of \$3.5 million. Pursuant to the Governor’s Executive Order, the PSAB was charged to implement the recommendations of the Task Force and to oversee the two Line 5 independent reports on risk and alternatives. Almost two years after the Task Force report was released in June 2017, the risk report was jettisoned because of conflict of interest problems with the independent contractor. The alternative report was released on November 20, 2017 for public comment and proved to be deficient as it failed to examine the alternative of transporting crude oil in existing pipelines around the Great Lakes. Exactly one week later on November 27, 2017, the Governor and Enbridge released this side agreement, which favored one alternative: a pipeline tunnel replacement under the Great Lakes and the St. Clair River.

The Governor’s 2017 Agreement with Enbridge does not call for an assessment of decommissioning Line 5, but rather stipulates that Enbridge shall proceed with detailed design and installation of the most appropriate option within 180 days of receiving all authorizations and approvals necessary for the construction of that option. Therefore, Governor Snyder’s agreement evades the fundamental question of whether Michigan needs Line 5 to supply the energy needs of the Upper Peninsula and if there are other reasonable and prudent alternatives that do not involve a pipeline across or under the Great Lakes and over 400 other water crossings.

Enbridge’s reports outline the procedures taken by the company to prepare the reports. However, the outlines that are provided in Enbridge’s reports are not fully transparent and leave many procedural details unclear to the public and state decision makers. For example, the Water Crossings report states that Enbridge worked with “the State Technical Team” to identify and evaluate water crossing by Line 5. However, under further inspection, the only definition provided for “the State Technical Team” is “state representatives.” This ambiguous definition does not give the people of Michigan the opportunity to understand who in the state government is working with Enbridge on this issue, and what credentials these individuals possess.

In addition, the reports released on June 29 were not comprehensive, and in fact, contradicted the earlier Straits Alternative report Enbridge provided to the state on June 18. These reports attempt to offer piecemeal fixes to a complex system problem that demands a holistic solution to eliminate the imminent risks to the Great Lakes and connecting tributaries.

Furthermore, the July 15 deadline for comments concerning Enbridge’s reports published on June 29 is an inadequate amount of time for technical and legal professionals to provide thoughtful comments on the reports and fate of Line 5. The public must have a sufficient amount of time to properly form and share their opinion on the future of Line 5.

## 2. Substantive Comments

**Lack of Adequate Geotechnical Information and Evaluation:** Both Enbridge’s alternatives report and Michigan Technological University’s Horizon Engineering Report recommends that a geotechnical study be performed before any “replacement” alternative is selected. This recommendation is in response to the

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<sup>25</sup> Rick Pluta, “Task force says Enbridge’s Line 5 should keep operating,” Interlochen Public Radio, July 15, 2015 <http://interlochenpublicradio.org/post/task-force-says-enbridges-line-5-should-keep-operating>

<sup>26</sup> Jim Malawitz, “Michigan Truth Squad: Bill Schuette talks tough on Line 5 pipeline,” Bridge Magazine, June 15, 2018 <https://www.bridgemi.com/michigan-truth-squad/michigan-truth-squad-bill-schuette-talks-tough-line-5-pipeline>



uncertainties surrounding the Mackinac Straits geology. Any decision regarding the replacement of Line 5 in the Mackinac Straits must be postponed or denied until a comprehensive geotechnical study of the Mackinac Straits is concluded.

**Water Crossings Report:** Enbridge's Water Crossing Report reveals that Line 5 crosses nearly 400 Michigan waterways, which is roughly double the number that state decision makers originally thought. This finding highlights the immense risk Line 5 possesses not only in the Straits of Mackinac, but across the State of Michigan. All the water crossings identified in the report are connected to the Great Lakes hydrological system and all pose a risk to the health of the Great Lakes and the Michigan people. According to the National Wildlife Foundation's FOIA review, since 1968, Enbridge's Line 5 has ruptured at least 29 times on land, spilling over 1.1 million gallons of oil into Michigan's environment.<sup>27</sup> Enbridge's Water Crossing Report fails to address any of these Line 5 spills or the company's Line 6B spill in the Kalamazoo River that caused between 840,000 and 1.1 million gallons of tar sands oil to enter the river.<sup>28</sup>

Enbridge's Water Crossing Report also discloses that the company's current process for establishing baseline environmental sensitivity maps are based on information supplied at the federal level. The maps do not utilize Michigan-specific species and habitat data to supplement current data sources. This finding emphasizes the lack of coordination between the State and Enbridge over Line 5's 65-year history in the State of Michigan.

The report prioritized 74 different water crossing with 17 of those crossing occurring between Rock River and the Straits of Mackinac. These water crossing are prioritized because of their unique characteristics that make the overall consequences and costs of a potential release significantly higher for the localized area and the State of Michigan as a whole.

Enbridge's Water Crossing Report also identified 16 rare wetland communities that they believe are of the highest priorities to protect and restore in any recovery effort. However, 12 of the 16 rare wetland communities identified in the report were last surveyed before 1993. Having current surveys of these prioritized areas is key to any efficient and effective recovery efforts Enbridge might have in the future.

In addition, on page 8 of the Water Crossing Report, Enbridge only presents its economic numbers on how Line 5 benefits the State of Michigan. The report never acknowledges that these numbers are highly contested and that there are viable and economically feasible alternatives to supply the Upper Peninsula with propane and to transport crude oil from lower Northern Michigan to southern refineries. At a minimum, this report should include other reports like FLOW's 2015 Report<sup>29</sup> and Groundwork's 2018 Report<sup>30</sup> that demonstrate that Line 5 is not essential to Michigan's energy economy but rather threatens the Great Lakes water-dependent economy. Specifically, FLOW's 2015 report and subsequent technical reports found that 90-95% of Line 5's only returns to Canada, that only 18% of the propane in the Upper Peninsula comes from Line 5, and that propane can be transported in a new four-inch pipeline or other modes of transport from Superior to Rapid River.

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<sup>27</sup> National Wildlife Federation, *Why the Line 5 Oil Pipeline Threatens the Great Lakes*, Nov. 7, 2017, <http://blog.nwf.org/2017/11/why-the-line-5-oil-pipeline-threatens-the-great-lakes/> (last visited July 13, 2018).

<sup>28</sup> *Id.*

<sup>29</sup> FLOW, *Eliminating the Line 5 Oil Pipelines' Unacceptable Risk to the Great Lakes Through a Comprehensive Alternatives Analysis and Systems Approach*, Dec. 14, 2015 <http://flowforwater.org/wp-content/uploads/2015/12/FLOW-Composite-Report-12-14-15-FINAL-1.pdf>

<sup>30</sup> Groundwork Center for Resilient Communities, *Canadian Profits, Michigan Risk: Line 5 threatens Michigan economy and environment, brings little in return*, May 2018 [https://www.bridgemi.com/sites/default/files/gw-line\\_5\\_report.pdf](https://www.bridgemi.com/sites/default/files/gw-line_5_report.pdf)



**Underwater Leak Detection Report:** Enbridge's Underwater Leak Detection Report concluded that all the alternatives discussed in the report could not provide continuous real-time monitoring that was practical, cost-effective, or operationally proven. Furthermore, Enbridge was not aware that any of the technologies proposed in the report had previously been applied for continuous operational underwater pipeline leak detection.

The proposed alternatives in the Underwater Leak Detection Report ranged in costs from \$4 to \$40 million. However, the report used a net present cost assuming a 20-year operating and maintenance period. This means that Enbridge intends to operate the Line 5 pipeline at the same or an increased capacity for at least the next twenty years through Michigan's waterways.

Both optical camera options outlined in the Underwater Leak Detection Report would require 1,800 cameras on the dual pipelines. Furthermore, all alternatives provided in the report require external inspection of the pipeline, which contradicts the most effective proposed alternative under Enbridge's Anchor Strike Mitigation Report.

**Coating Technologies Report:** Enbridge's Coating Technologies Report concluded that the only technology that can be readily deployed on the dual pipelines is cathodic protection close interval survey (CP CIS), which Enbridge plans to execute in the summer of 2018. This survey requires an electrical connection from the pipeline structure to a voltmeter, which then takes measurements along the pipeline. However, the CP CIS technology does not satisfy the small-defect detection element outlined in the report. Therefore, small leaks could still go undetected even with the implementation of the CP CIS technology. The Coating Technologies Report does not address the fact that Enbridge's screw-anchor engineering efforts that have caused the Line 5 to lose coating in over 80 locations. Enbridge's report fails to explain how Enbridge will attempt to remedy this major design flaw in the installation of 22 anchors this summer, and then a possible 48 more.

The Coating Technologies report set out four essential elements, with more specific objectives under each element. The four elements in the report are: (1) small-defect detection, (2) large-defect detection, (3) submarine/offshore readiness, and (4) applicability to the dual pipelines. None of the alternatives provided in the study satisfy all the objectives under the four elements.

**Anchor Strike Mitigation Report:** Enbridge's Anchor Strike Mitigation Report demonstrated that the probability of a failure of an anchor strike to the existing dual pipeline in the Straits of Mackinac are two to three times higher than the values provided in the November 2017 Dynamic Risk alternative analysis report.

Enbridge's report concludes that the most effective mitigation option is to cover the dual pipeline with a protective barrier consisting of approximately 360,000 cubic yards of gravel and rock. This protective barrier would not allow for visual inspection of the pipeline and would significantly impede any external maintenance that must be completed on Line 5 within the Straits of Mackinac. Furthermore, this protective barrier option also poses significant environmental risks including: disturbance to fish habitat, disturbance to lake vegetation, impacts to water clarity, as well as potential of exposure to toxins during construction.

Finally, Enbridge's Anchor Strike Mitigation Report does not address the recent anchor strike that caused an estimated 600 gallons of dielectric fluid to enter the waters of Lake Michigan and dented Line 5 underwater pipelines in three different locations. This is a significant reminder of the unacceptable risks Line 5 pose to the region's economic lifeblood, the Great Lakes, as well as the urgent need for the State of

Michigan to develop a phased and sensible decommissioning plan that ensures safe, reliable energy sources for citizens and businesses in Michigan.

### III. CONCLUSION AND RECOMMENDED COURSE OF CONDUCT AND ACTIONS

The Agreement improperly narrowed the impact and alternative studies to one exclusive alternative: the replacement and continuation of Line 5 in the Straits and the public trust waters and bottomlands of the State and its citizens. Based on the foregoing analysis and comments, FLOW recommends that the officials, departments, and State of Michigan take the following steps and actions:

1. Postpone or end implementation of the November 2017 Agreement unless and until Enbridge submits an application under the GLSLA and obtains approval of an agreement to use the bottomlands of the Great Lakes in the Straits of Mackinac consistent with the public trust in the waters and bottomland of the Great Lakes and the mandate to follow the rule of law under Art.5, Sec. 8 of the Michigan Constitution;
2. Postpone or end implementation of the Agreement until the Governor and state officials and departments have required, considered, and determined that there is no feasible and prudent alternative to the replacement of Line 5 in the Straits, St. Clair River, and to the proposed upgrade of Line 5 for continued use and operation in Michigan, as required by the GLSLA, Rule 1015 of the GLSLA, the MPSC public utility law for siting and necessity and convenience, and the MEPA;
3. Postpone any decision or implementation of the Agreement unless there has been a comprehensive study and determination of the likely and potential adverse impacts or effects to the water, air environment, and public health and property for the Straits crossing, the St. Clair River crossing, and the entire 645-mile Line 5, including the 400 water crossings;
4. Postpone all state decisions concerning a tunnel option or other alternative in the Straits unless 1 and 2 above have been satisfied, and a full geo-technological study of the extent of unconsolidated sediments, rocks and glacial materials, bedrock, limestone and other formations have been determined.
5. Postpone any decision regarding the supplemental studies on leak detections, coating, and strike mitigation until the state and MDEQ have provided adequate time for review and comment as intended by the public notice issued on June 29 (the time was simply too short to comply with the intent and purpose of the notice).

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,



James Olson  
President



Elizabeth R. Kirkwood  
Executive Director

cc: U.S. Senator Peters  
U.S. Senator Stabenow  
Representative Bergman  
Representative Kildee

**From:** [noreply@engagingplans.org](mailto:noreply@engagingplans.org) on behalf of [MI Petroleum Pipelines](#)  
**To:** [MiPetroleumPipelines](#)  
**Subject:** Form submission from: Contact Us  
**Date:** Wednesday, July 25, 2018 8:42:11 PM

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Submitted on Wednesday, July 25, 2018 - 8:41pm  
Submitted by anonymous user: 50.81.228.39  
Submitted values are:

Your Name: HOLLY M BERKOWITZ  
Your Email Address: [HOLLY-BERKOWITZ@MCHSI.COM](mailto:HOLLY-BERKOWITZ@MCHSI.COM)  
Your Phone Number: 319 330 0914  
Subject: Submit Information/Comments  
Attachment:  
Your Message:

Hi. I am puzzled why regulatory agencies across the US are rolling over as sluts to satisfy the primitive primal profiteering urges of the fossil fuel industries that have conspired to keep America addicted to deadly dirty fossil fuels, to burning Dead Heater Carbons that they have known for more than 40 years are causing and will continue to cause catastrophic Armageddon that they are blaming on my god erroneously.

That is not very honest.....as they continue to conspire to crush their own children's, family's futures criminally, their own nation's future treasonously, their own earth's future immorally, their own private future stupidly.

We need open, honest government modeled after our fragile but critical web for all life that links all living cells, seeds, seedlings, soils, selves, whole living systems productive, whole earth system balancing all critical flows and cycles of our air, atmosphere, climate, o2, water, oceans, h2o, watersheds photosynthetic to cool earth instead....to grow and produce both cooling o2 x cooling green circulating photosynthesis of cool green watersheds usually 5 to 10 degrees cooler than the Dead Heater Carbon addicted cities causing our 6th extinction/Anthropocene....while those that abuse religion for political/cash-driven gain blame call that heating chaos "Armageddon" "The Second Coming" "The Rapture" so they can fill their private bank account with deadly cashflow floods of by for fewer than only 1%....at my expense....crushing life on earth, crushing public worlds, crushing their own private worlds stupidly.

Ironically....we don't "need" fossil fuel addictions:

Adam and Eve did not "need" fossil fuel addictions or machines or deadly cashflow floods until they crushed the ability of their Garden of Eden to grow enough for them to consume enough.

Profound.

We don't need addictions to fossil fuel follies that are causing life on earth, that are crushing life's logic on earth.

Numerous scientists and engineers know that 100% Renewable Energy (and Efficiency and Storage) is 100% doable.... by 2030 (IRENA 2016)....by 2050 (100.org 2015)....if fossil fuel fools would help transition, to harvest free infinite flows of free, infinite, nurturing flows cycles of nature's gifts to us.....or get out of the way.

The results of this submission may be viewed at:  
<https://mipetroleumpipelines.com/node/5/submission/390>

# PIPELINE SAFETY ADVISORY BOARD



DEQ Director  
**Heidi Grether**

DNR Director  
**Keith Creagh**

## Proposed 2018 Meeting Dates

Date	Time	Location
May 14, 2018	9:00 AM – 3:30 PM	Lansing
August 6, 2018	9:00 AM – 5:00 PM	Lansing
October 15, 2018	1:30 – 3:30 PM	Location: TBA
December 10, 2018	1:30 – 3:30 PM	Location: TBA

## Executive Order 2015-14 Charges of the Pipeline Safety Advisory Board

Updated July 16, 2018

	Charge	Notes & Progress
1	Review and make recommendations for statutory, regulatory, and contractual implementation of the Michigan Petroleum Pipeline Task Force Report	See separate table
2	Identify areas of best practice in pipeline safety and siting across the United States that could be implemented in Michigan	The Siting Subcommittee's recommendations include areas of best practice that could be implemented from a regulatory standpoint. The MAE's whitepaper on liquid pipeline safety authority further addresses this charge.
3	Review and make recommendations on state policies and procedures regarding emergency response and planning for pipelines.	The MSP/EMHSD reviews state level guidance for emergency response as the state of Michigan's Emergency Management Program. The US Coast Guard, Area Contingency Plans and US EPA Inland Response Tactics Manual are reviewed routinely. Area specific contingency plans will be reviewed by state agencies to provide comment and review to these documents.
4	Review and make recommendations on state policies and procedures regarding pipeline siting.	The Siting Subcommittee introduced its recommendations to the board at the May 14, 2018 meeting. The document includes seven consensus recommendations and two additional non-consensus recommendations that should be considered by board members.
5	Review information submitted to the state in response to the Michigan Petroleum Pipeline Task Force Report	All information submitted to the State as been reviewed by PSAB members and State staff and has been made publicly available to the extent practicable.
6	Provide recommendations to increase transparency and public engagement on pipelines.	Several recommendations made by the Siting Subcommittee, if implemented, would increase transparency and public engagement. Additionally, long term plans for the petroleum pipeline website will further address this charge.

# 2015 Michigan Petroleum Pipeline Task Force Report Recommendations

Updated July 16, 2018

	Recommendation	Notes & Progress
Straits-Specific Recommendations	1 Prevent the Transportation of Heavy Crude Oil through the Straits Pipelines.	September 3, 2015 agreement prevents Enbridge from transporting heavy crude through the Straits Pipelines in the future (unless the pipeline is re-engineered). Transportation of heavy crude oil would present an unreasonable risk of ecological and economic harm.
	2 Require an Independent Risk Analysis and Adequate Financial Assurance for the Straits Pipelines.	A team led by Michigan Technological University was contracted to complete the Risk Analysis study in January, 2018. The report is expected to be completed before September, 2018 with an initial draft provided in July, 2018.
	3 Require an Independent Analysis of Alternatives to the Existing Straits Pipelines.	The Line 5 Independent Alternatives Analysis Final Report was completed in November, 2017.
	4 Obtain Additional Information from Enbridge.	The State of Michigan has and continues to request and obtain information from Enbridge on the Straits pipelines. The November 27th agreement requires ongoing semi-annual meetings between the State and Enbridge to further satisfy this recommendation.
Statewide Recommendations	1 Coordinate Mapping of Existing Pipelines among State Agencies.	Pipeline mapping data is compiled and maintained by the National Pipeline Mapping System (NPMS). The data is available to the states under requirements that it can only be shared publicly on a limited bases. Currently, Michigan's Freedom of Information Act disallows the State from agreeing to the NPMS' terms to obtain the data.
	2 Ensure State Agencies Collaborate on Emergency Planning and Spill Response.	All state agencies collaborate on updating the all-hazards Michigan Emergency Management Plan (MEMP) annually. State and local agencies will work with US Coast Guard on reviewing Area Contingency Plans as they are updated. In addition routine drills and exercises are conducted around the state for state agency participation as well as in the State Emergency Operations Center.
	3 Ensure Coordinated Emergency Response Training Exercises and Drills.	State and local organizations are encouraged to attend a yearly coordination workshop for training that occurs around the state.
	4 Ensure Regular State Consultation with the Federal Pipeline and Hazardous Materials Safety Administration (PHMSA) on Hazardous Liquid (including Petroleum) Pipelines.	Michigan Public Service Commission (MPSC) Staff maintain a working relationship with PHMSA Staff and continue to consult with PHMSA on significant matters relating to hazardous liquid pipelines.
	5 Consider Legislation Requiring State Review and Approval of Oil Spill Response Plans, Improved Spill Reporting, and More Robust Civil Fines.	HB 6201 was introduced on June 12, 2018. Agency Staff reviews are in progress and feedback will be provided.
	6 Evaluate Whether to Establish a Hazardous Liquids Pipeline Safety Program in Michigan.	The MAE Staff submitted a whitepaper to the PSAB in July of 2018 which assesses the considerations relating to a potential Hazardous Liquids Pipeline Safety Program in Michigan
	7 Consider Legislation or Rulemaking to Improve Siting Process for New Petroleum Pipelines.	The Siting Subcommittee introduced its recommendations to the board at the May 14, 2018 meeting. The document includes seven consensus recommendations and two additional non-consensus recommendations that should be considered by board members. The Subcommittee has not opined whether the recommendations should be implemented through legislation, rulemaking, or internal procedures.
	8 Consider Issuing an Executive Order Creating an Advisory Committee on Pipeline Safety.	Executive Order No. 2015-14 created the Pipeline Safety Advisory Board consisting of 16 members.
	9 Create a Continuing Petroleum Pipeline Information Website.	A website was created to make PSAB and relevant petroleum pipeline information available to the public. The State plans to maintain this website in some form for the foreseeable future. Website content will include information relating to: current pipelines in Michigan, new pipeline applications, major pipeline incidents, changes to regulation, etc.



The Task Force met seven times between August 2014 and April 2015, its efforts being supported by Work Groups that met regularly and more frequently during the same time period. As a result of the information gathered by the Task Force and its various Work Groups and after much consideration, the Task Force members unanimously adopted the following recommendations:

### Specific Recommendations regarding the Straits Pipelines

1. Prevent the transportation of heavy crude oil through the Straits Pipelines.
2. Require an independent risk analysis and adequate financial assurance for the Straits Pipelines.
3. Require an independent analysis of alternatives to the existing Straits Pipelines.
4. Obtain additional information from Enbridge relating to the Straits Pipelines.

### Statewide Recommendations

1. Coordinate mapping of existing pipelines among state agencies.
2. Ensure that state agencies collaborate on emergency planning and spill response.
3. Ensure coordinated emergency response training exercises and drills
4. Ensure regular state consultation with the federal Pipeline and Hazardous Materials Safety Administration (PHMSA) on hazardous liquid (including petroleum) pipelines.
5. Consider legislation requiring state review and approval of oil spill response plans, improved spill reporting, and more robust civil fines.
6. Evaluate whether to establish a Hazardous Liquids Pipeline Safety Program in Michigan.
7. Consider legislation or rulemaking to improve siting process for new petroleum pipelines.
8. Consider issuing an Executive Order creating an Advisory Committee on Pipeline Safety.
9. Create a permanent Petroleum Pipeline Information website.

It is the Task Force's view that each of the recommendations above would help protect the health, safety and welfare of Michigan's citizens, along with its environment. The Task Force urges the Governor, relevant agencies, and the Michigan Legislature to consider these recommendations as early as possible.

**For more information visit: [www.michigan.gov/](http://www.michigan.gov/)**





RICK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
EXECUTIVE OFFICE  
LANSING

BRIAN CALLEY  
LT. GOVERNOR

**EXECUTIVE ORDER  
No. 2015 - 12**

**CREATION OF  
PIPELINE SAFETY ADVISORY BOARD**

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY**

WHEREAS, Section 1 of Article V of the Michigan Constitution of 1963 vests the executive power of the state of Michigan in the Governor; and

WHEREAS, Section 2 of Article V of the Michigan Constitution of 1963 empowers the Governor to make changes in the organization of the Executive Branch or in the assignment of functions among its units that he considers necessary for efficient administration; and

WHEREAS, it is important that the state of Michigan ensure that oil and gas development and transportation is balanced with protecting public health, safety, and natural resources; and

WHEREAS, the state of Michigan recognizes the importance of oil and gas development, transportation, and use in the state's economy; and

WHEREAS, state government leaders undertook an extensive review of the nexus between energy transmission and environmental protection with formation of the Michigan Petroleum Pipeline Task Force; and

WHEREAS, a key finding of the task force was that effective coordination of state and local resources – including stakeholders in conservation and environment, oil and gas development, and transportation, and other state agencies dealing with energy production and transportation – is needed to provide necessary transparency and to implement other task force recommendations; and

WHEREAS, establishment of a Pipeline Safety Advisory Board within the Michigan Department of Environmental Quality will advise and assist in the implementation of matters relating to hazardous liquid and gas pipeline safety, routing, construction, operation and maintenance, and provide recommendations for statutory, contractual, or procedural changes to improve the safety of pipelines in this state;

NOW, THEREFORE, I, Richard D. Snyder, Governor of the state of Michigan, by virtue of the power and authority vested in the Governor by the Michigan Constitution of 1963 and Michigan law, order the following:

**I. CREATION OF THE PIPELINE SAFETY ADVISORY BOARD**

A. The Pipeline Safety Advisory Board (the "Board") is created as an advisory body to the Governor within the Michigan Department of Environmental Quality (the "Department").

B. The Board shall consist of the following 15 members who shall serve a term expiring on December 31, 2018.

- The director of the Department of Environmental Quality, or his/her designee from within the Department of Environmental Quality;
- The Attorney General, or his/her designee from within the Department of Attorney General;
- The director of the Department of Natural Resources, or his/her designee from within the Department of Natural Resources;
- The director of the Michigan State Police, or his/her designee from within the Department of State Police;
- The executive director of the Michigan Agency for Energy, or his/her designee from within the Michigan Agency for Energy;
- The chairperson of the Public Service Commission, or his/her designee from within the Public Service Commission;
- An individual representing federal response and recovery agencies, or his/her designee from within that federal response and recovery agency, who shall be appointed by the Governor;
- An individual representing an environmental group who shall be appointed by the Governor;
- An individual representing a statewide conservation group who shall be appointed by the Governor;
- An individual representing pipeline operators who shall be appointed by the Governor;
- An individual representing the oil and gas industry who shall be appointed by the Governor;
- An individual representing public universities who shall be appointed by the Governor;
- An individual representing the hospitality and tourism industry who shall be appointed by the Governor;
- A technical consultant with experience in pipeline operations and safety who shall be appointed by the Governor; and
- An individual representing the public who shall be appointed by the Governor.

C. A vacancy on the Board occurring other than by expiration of the term designated in section I.B. shall be filled in the same manner as the original appointment for the balance of the unexpired term.

## **II. CHARGE TO THE BOARD**

A. The Board shall act in an advisory capacity to the Governor and shall do all of the following:

1. Review and make recommendations for statutory, regulatory, and contractual implementation of the Michigan Petroleum Pipeline Task Force Report.
2. Identify areas of best practice in pipeline safety and siting across the United States that could be implemented in Michigan.
3. Review and make recommendations on state policies and procedures regarding emergency response and planning for pipelines.
4. Review and make recommendations on state policies and procedures regarding pipeline siting.
5. Review information submitted to the state in response to the Michigan Petroleum Pipeline Task Force Report.
6. Provide recommendations to increase transparency and public engagement on pipelines.

B. As directed by the Department Director, Department staff shall assist the Board with establishment of policies and procedures regarding the use of grants and other funds.

C. The Board shall provide other information or advice as requested by the Governor or the Department.

## **III. OPERATIONS OF THE BOARD**

A. The Board shall be staffed and assisted by personnel from the Department as directed by the Department Director. Any budgeting, procurement, and related management functions of the Board shall be performed under the direction and supervision of the Department Director.

B. The Governor shall designate the Chairperson(s) of the Board.

C. The Board may select from among its members a Vice Chairperson.

D. The Board may select from among its members a Secretary. Board staff shall assist the Secretary with recordkeeping responsibilities.

E. The Board may create committees and advisory panels from among its members to assist in policymaking recommendations.

F. A majority of the members of the Board serving constitutes a quorum for the transaction of the board's business. The Board shall act in making its recommendations by a majority vote of its serving members.

G. The Board shall adopt procedures consistent with Michigan law and this Order governing its organization and operations, and may establish committees and request public participation on advisory panels as the board deems necessary. The Board may adopt, reject, or modify any recommendations proposed by committees or advisory panels.

H. The Board shall meet at the call of the Chairperson and as may be provided in procedures adopted by the Board.

I. In developing recommendations, the Board may, as appropriate, make inquiries, studies, investigations, hold hearings, and receive comments from the public. The Board may consult with outside experts in order to perform its duties, including, but not limited to, experts in the private sector, organized labor, government agencies, and at institutions of higher education.

J. Members of the Board shall serve without compensation but may receive reimbursement for necessary travel and expenses according to relevant statutes and the rules and procedures of the Michigan Civil Service Commission and the Department of Technology, Management and Budget, subject to available funding.

K. The Board may hire or retain contractors, sub-contractors, advisors, consultants, and agents, and may make and enter into contracts necessary or incidental to the exercise of the powers of the board and the performance of its duties as the Department Director deems advisable and necessary, in accordance with this Order, and the relevant statutes, rules, and procedures of the Michigan Civil Service Commission and the Department of Technology, Management and Budget.

L. The Board may accept donations of labor, services, or other things of value from any public or private agency or person. Any donations shall be expended in accordance with applicable laws, rules, and procedures.

M. Members of the Board shall refer all legal, legislative, and media contacts to the Department.

#### IV. MISCELLANEOUS

A. All departments, committees, commissioners, or officers of this state or of any political subdivision of this state may give to the Board, or to any member or representative of the Board, any necessary assistance required by the Board or any member or representative of the Board, in the performance of the duties of the Board so far as is compatible with its, his, or her duties.

B. Any suit, action, or other proceeding lawfully commenced by, against, or before any entity affected by this Order shall not abate by reason of the taking effect of this Order.

C. The invalidity of any portion of this Order shall not affect the validity of the remainder of the Order.

D. The Board shall dissolve on December 31, 2018, at the expiration of the term of office of Board members provided in section I.B.

This Executive Order shall become effective upon filing.

Given under my hand and the Great  
Seal of the state of Michigan this  
3rd day of September,  
in the Year of our Lord Two Thousand  
Fifteen



  
RICHARD D. SNYDER  
GOVERNOR

BY THE GOVERNOR:

  
SECRETARY OF STATE

FILED WITH SECRETARY OF STATE

ON 9-3-15 AT 1:55 P.M.



RIK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS  
MICHIGAN AGENCY FOR ENERGY  
ANNE ARMSTRONG CUSACK  
EXECUTIVE DIRECTOR

SHELLY EDGERTON  
DIRECTOR

# Memorandum

**DATE:** July 20, 2018

**TO:** Pipeline Safety Advisory Board Members

**FROM:** Anne Armstrong Cusack, Executive Director, MI Agency for Energy

**SUBJECT:** Straits Pipeline Legislation – House Bill 6201

*The following information provides a summary of [House Bill 6201](#), introduced on June 12, 2018. This summary is provided to assist in your review of the legislation and is not intended to provide a comprehensive overview of the legislation. This is a summary only and nothing in this document should be interpreted as a position statement by the Agency.*

On June 12, 2018, Representatives Chatfield, Cole, Allor, and LaFave introduced House Bill 6201 which amends the Natural Resources and Environmental Protection Act. The bill requires straits pipeline operators to file spill prevention plans and spill contingency plans with the state. The legislation also sets up the parameters for reporting releases from straits pipelines and imposes fees and fines for any release of oil or gas from a pipeline or vessel operating within the straits.

## Definitions

The bill adds several definitions to the act including the following:

1. “Release” (§ 3101(w)) – the definition in the bill includes the “abandonment of a facility or vessel containing oil from which oil may enter the environment.”
2. “Straits gas or oil pipeline” (§ 3101(cc))
3. “Vessel” (§ 3101(ff)) – the definition includes “every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water . . . .” The definition does not include public vessels (defined at § 3101(v)).

## Enforcement

The Michigan Department of Environmental Quality is responsible for the enforcement of this act.

## Spill Prevention Plans

The owner/operator of a Straits gas or oil pipeline must submit a spill prevention plan to the DEQ for review and approval within 180 days of the effective date of the legislation. The department may accept spill prevention plans that have been prepared in response to other state or federal laws provided that such plans meet the minimum specifications of the legislation and any other requirements established by the DEQ through the rule making process. As an interim measure, the owner/operator of a Straits gas or oil pipeline must submit any existing spill prevention plans or procedures to the DEQ within 30 days of the effective date of the legislation. (§311d(1) – (3)).

The legislation specifics the minimum information that must be included in the spill prevention plan (§311d(4)). The DEQ may add requirements via the rule making process. The minimum requirements include the following:

- Details of the response methods to various size spills covered by the plan. (4a)
- Documentation of compliance with the Oil Pollution Act of 1990. (4b)
- Certification of proper training for supervisory and other key personnel. (4c)
- Certification that the pipeline has an operations manual. (4d)
- Certification of the implementation of an alcohol and drug use awareness program for personnel in charge of the pipeline. (4e)
- Description of the maintenance and inspection program and the current maintenance and inspection records of the pipeline. (4f)
- Description of the spill prevention technology that has been installed and a map or other figure depicting the locations of the technology. (4g)
- Description of any releases from the pipeline in the previous 5 years and measures taken to prevent reoccurrence. (4h)
- Provisions and timelines for incorporating identified measures that will provide the “best achievable protection” for the public health and environment. (4i)

The pipeline owner/operator must also submit a \$12,500 plan review fee for each geographic plan area or sub area covered in the spill prevention plan. After three years, the fee will be adjusted for inflation. (§311c(5))

A spill prevention plan can only be approved if the DEQ determines that the plan meets the requirements of the legislation and any applicable rules and provides the “best achievable protection” from spill damages caused by a discharge of oil into the waters of the state. If the spill prevention plan is not approved by the DEQ, the department must notify the pipeline owner/operator and a modified “approvable” plan must be submitted to the DEQ within 30 days. The department may authorize a longer response period if necessary. (§311c(6) – (7)) Approval of the spill prevention plan does not guarantee the adequacy of the plan nor is it a defense to liability imposed by law. (§311c (11)).

The spill prevention plan must be reviewed, updated if necessary, and resubmitted to the DEQ every 5 years or within 60 days of such a request from the DEQ. If the pipeline owner/operator

is aware of any significant changes impacting the spill prevention plan, the owner/operator must notify the DEQ. (§3111c (9) – (10)).

A pipeline owner/operator who fails to submit a spill prevention plan is liable for a civil fine of \$1,000 per day. (§3115b(5))

The spill prevention plan is exempt from disclosure under FOIA. (§3111c(12)).

### Contingency Plans

The owner/operator of a Straits gas or oil pipeline must submit a contingency plan for the containment and clean up of any gas or oil spill from a pipeline into the waters of the state to protect fisheries, wildlife, natural resources, and public and private property from such a spill. Within 30 days of the effective date of the legislation, the owner/operator must submit a copy of the existing contingency or spill response plan for the pipeline. Within 180 days of the effective date, a contingency plan in compliance with the requirements of the legislation must be submitted. The contingency plan may be consolidated with the spill prevention plan and contingency plans prepared to comply with other state or federal laws may be submitted provided they meet the minimum requirements of the legislation. The plan must be submitted to the DEQ which is responsible for reviewing and approving the contingency plan. (§3111e(1) – (3))

The contingency plan must demonstrate that the owner/operator has sufficient personnel, materials, and equipment to promptly and properly remove gas or oil (or both) to the maximum extent possible and to minimize damage to the environment resulting from a worst-case spill. (§3111e (4)) The plan must include the following:

1. Details of response methods to spills of various sizes from any oil facility covered by the plan. (4a)
2. A description of how the contingency plan relates to and is integrated with other relevant contingency plans that have been prepared or approved by the state or the Federal government. (4b)
3. Procedures for early detection of gas or oil spills and notification of those spills to the appropriate federal, state, and local authorities under applicable law. (4c)
4. The number, training preparedness, and qualifications of all dedicated and prepositioned personnel assigned to direct and implement the plan. (4d)
5. Provisions for training and periodic drills to determine personnel preparedness. (4e)
6. A description of the means to protect and mitigate environmental impacts and ensure the plan does not pose an unacceptable level of risk to the public or the environment. (4f)
7. Provisions for stationing containment and cleanup equipment and trained personnel at strategic locations to promptly and properly remove the spilled gas or oil. (4g)
8. Provisions for enlisting the assistance of additional trained and qualified personnel to implement the plan. (4h)
9. Provisions for disposal of recovered gas and oil. (4i)
10. The amount, type, and location of spill response equipment and the extent that other contingency plans rely on the same equipment. (4j)



11. Identification of the individual(s) responsible for supervising the plan implement and the designated point of contact for communications with government officials if a spill occurs. (4k)
12. Notification procedures. (4l)

The pipeline owner/operator must also submit a \$12,500 plan review fee for each geographic plan area or sub area covered in the contingency plan. After three years, the fee will be adjusted for inflation. (§3111e(5))

In evaluating contingency plans under this section, the DEQ must consider the following factors (§3111e(7)):

1. The adequacy of equipment (containment, cleanup, and communications), personnel, notification procedures and call lists, response times, and logistical arrangements for coordination and implement of response efforts. (7a)
2. The volume and type of gas or oil transported within the plan area. (7b)
3. History and circumstances surrounding prior gas or oil spills within the plan area. (7c)
4. Sensitivity of the environment, natural resources, and animal life in the plan area. (7d)
5. The extent to which reasonable, cost-effective measures to reduce the likelihood and impact of a spill have been incorporated into the plan. (7e)

The DEQ may approve the plan if it determines the plan meets the requirements of the legislation and any applicable rules, and that the plan includes sufficient personnel and resources to remove gas or oil promptly and properly and to minimize environmental damage. (§3111e(8)) If the DEQ determines a plan does not meet the minimum requirements of the legislation, the department must notify the pipeline owner/operator and a modified “approvable” plan must be submitted to the DEQ within 30 days. The department may authorize a longer response period if necessary. (§3111e(9)) Approval of the contingency plan does not guarantee the adequacy of the plan nor is it a defense to liability imposed by law. (§3111e (13))

The spill prevention plan must be reviewed, updated if necessary, and resubmitted to the DEQ every 5 years or within 60 days of such a request from the DEQ. If the pipeline owner/operator is aware of any significant changes impacting the spill prevention plan, the owner/operator must notify the DEQ. (§3111e(11) – (12)).

A pipeline owner/operator who fails to submit a contingency plan is liable for a civil fine of \$1,000 per day. (§3115b(6))

The spill prevention plan is exempt from disclosure under FOIA. (§3111e(14)).

### Release Reporting Requirements and Civil Liability

The owner/operator/manager of a Straits gas or oil pipeline from which a release occurs, as well as the person who causes a release, must report the release to 9-1-1 (§ 3111b) and the DEQ (§3111c(1)). Within ten days (or a shorter period determined by the DEQ), the individuals who reported the release must file an initial written report explaining the cause of the release, the

discovery of the release, and the measures that have and/or will be taken to prevent the recurrence of a similar release (§3111c(2)).

The legislation provides that DEQ may request that the Attorney General commence a civil action for relief in the event of a release of gas or oil from a Straits gas or oil pipeline or from a vessel into the waters of the state and that such relief would be in addition to other civil or criminal penalties established by other applicable law. (§3115b(1) – (2)) The legislation also set out the considerations for the Court in setting an appropriate fine. (§3115b(4))

In the event of a release, the owner/operator/manager of a Straits gas or oil pipeline or a vessel from which gas or oil are or may be released into the waters of the state and any other person responsible for causing such a release is liable for the following civil fines:

1. Each person liable for the release is jointly and severally liable for a civil fine of no more than \$37,500 for each day the release occurs. (§3115b(3a))
2. Where the release is the result of gross negligence or willful misconduct, each person liable for the release is jointly and severally liable for a civil fine of not less than \$150,000. (§3115b(3b))

#### Creation of the Gas and Oil Pipeline Fund

The legislation establishes the Gas and Oil Pipeline fund which, upon appropriation, is to be used for the activities of the DEQ and the Department of the Attorney General to investigate and bring enforcement actions for violations related to the reporting and filing requirements of the legislation, or for releases of oil or gas into the waters of the state under the provisions of the legislation. Appropriations from the fund may also be used to prevent or mitigate releases of gas and oil into the environment. (§3135) The fund is funded by the review fees associated with the spill prevention and contingency plans, as well as the civil fines imposed under the legislation for failure to file the required plans or for oil or gas releases into the waters of the state.

- B. Evaluate whether to establish a hazardous liquids pipeline safety program in Michigan.

# Liquids Pipeline Safety

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THE BENEFITS AND DRAWBACKS OF ESTABLISHING A  
HAZARDOUS LIQUIDS PIPELINE SAFETY PROGRAM IN  
MICHIGAN

JULY 2018

Michigan Agency for Energy  
ENERGY SECURITY SECTION

## Executive Summary

Pursuant to Statewide Recommendation #6 of the *Michigan Petroleum Pipeline Task Force Report*, the Energy Security Section staff of the Michigan Agency for Energy ("MAE") present the following document evaluating the relative merits of establishing a hazardous liquids pipeline safety program in Michigan. In this document, we first outline the various forms a liquids pipeline safety program could take and discuss how the form chosen impacts the respective roles of federal and state agencies as they coordinate to oversee liquids pipeline safety in Michigan. Next, we present a review of historical pipeline incident data, which is then used to compare the safety performance of liquids pipelines under federal safety jurisdiction versus the performance of those under state safety jurisdiction. Finally, we conclude by discussing the practical ramifications of establishing a liquids pipeline safety program in Michigan, including the expected costs, staffing needs, access to certain pipeline information, and the specific pipeline facilities that could fall under future state inspection or regulatory oversight.

Major takeaways include:

- Under federal law, Michigan is permitted to assume the inspection and regulatory oversight of the state's intrastate liquids pipelines as long as the state meets certain federal requirements.
- State inspection of interstate liquids pipelines is allowed at the sole discretion of the Pipeline and Hazardous Materials Safety Administration ("PHMSA"), though any suspected violations found by state inspectors must be referred to PHMSA for potential enforcement action.
- States are permitted to establish and enforce standards for intrastate pipelines that are stricter than the federal standards, but they may not do the same for interstate pipelines.
- Our analyses of historical liquids pipeline incident data find that for the nation as a whole, liquids pipelines under state oversight appear to be performing relatively evenly with those under federal oversight.
- If Michigan decides to establish an intrastate liquids pipeline safety program, and if it also requests and is granted permission from PHMSA to inspect the state's interstate liquids pipelines, it is estimated that the program would require:
  - 1.5 additional field engineers to conduct the necessary liquids pipeline inspections.
  - \$350,000 of annual funding to support the entire liquids safety program, of which up to 80% may be reimbursed by PHMSA.
  - State legislation that grants state staff the authority to inspect liquids pipelines and allows for the state's adoption and enforcement of the federal pipeline safety regulations and any state-determined pipeline safety regulations.
  - A minimum of 3 to 4 years to complete the prerequisites needed to begin operating a certified intrastate liquids program and at least six additional months to request and secure a PHMSA agreement allowing the state to inspect its interstate liquids pipelines.
- A state liquids safety program would give state staff access to company inspection records, spill response plans, and other information about the facilities they oversee, which could help inform the state's energy policy objectives and be useful in the event of a pipeline-related emergency.
- Recent actions by PHMSA suggest that if the state were to request authorization from PHMSA to inspect interstate liquids pipelines, it is unlikely that PHMSA would grant the request.
- Michigan had 3,517 miles of liquids pipelines in 2016, but only about 423 of those miles were from intrastate pipelines that would be fully regulated by the state in a liquids safety program.

## Introduction

In Statewide Recommendation #6 of the *Michigan Petroleum Pipeline Task Force Report*, the Michigan Agency for Energy (“MAE”) is tasked with evaluating the relative merits of establishing a hazardous liquids pipeline safety program in Michigan.<sup>1</sup> The staff of MAE’s Energy Security Section, with assistance from staff from the Michigan Public Service Commission (“MPSC”), has developed the following document in response to this task. This paper details our approach, our general findings, and makes efforts to place these findings into meaningful context.

To facilitate comprehension of this issue, this paper is divided into three sections which collectively speak to our overall charge.

**Section 1: Federal and State Roles in a Hazardous Liquids Pipeline Safety Program.** This section discusses the historical and regulatory underpinnings of the Federal Pipeline Safety Program, and perhaps most importantly, attempts to explain what it means – and does not mean – when a state requests to “take over” hazardous liquids pipeline safety from the federal government.

**Section 2: Analyses of Pipeline Safety Data.** In this section, through descriptive statistics and regression analysis, we seek a data-driven basis to inform decision-makers about whether it makes sense, from the perspective of safety outcomes, to establish a Hazardous Liquids Pipeline Safety Program in Michigan.

**Section 3: Ramifications of Establishing a Hazardous Liquids Pipeline Safety Program in Michigan.** This section discusses the costs, staffing requirements, regulatory implications, and other considerations which should be contemplated before deciding whether to establish a Hazardous Liquids Pipeline Safety Program in Michigan.

## Section 1: Federal and State Roles in a Hazardous Liquids Pipeline Safety Program

### **Background**

With the passage of the Natural Gas Pipeline Safety Act of 1968, Congress directed the U.S. Department of Transportation (“USDOT”) to promulgate minimum federal safety standards (“federal safety standards”) for the pipeline transportation of natural gas.<sup>2</sup> In 1979, Congress expanded USDOT’s safety authority to include the pipeline transportation of hazardous liquids such as gasoline and crude oil.<sup>3</sup> Subsequent policy changes shaped these authorities over time and ultimately produced the statutory and regulatory environment that exists today.<sup>4</sup> In many respects – though certainly not all – the regulation of natural gas pipelines is analogous to that of hazardous liquids pipelines. Indeed, several of the regulatory concepts discussed in this paper are directly applicable to both gas and liquids pipelines. Nonetheless, one should bear in mind that several important differences exist between the regulation

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<sup>1</sup> <https://mipetroleumpipelines.com/document/michigan-petroleum-pipeline-task-force-report>

<sup>2</sup> [http://www.emlf.org/clientuploads/directory/whitepaper/Diamond\\_Curry\\_13.pdf](http://www.emlf.org/clientuploads/directory/whitepaper/Diamond_Curry_13.pdf)

<sup>3</sup> Ibid.

<sup>4</sup> Statutory authorities for gas and hazardous liquids pipeline safety are described primarily in 49 USC § 601, and the associated regulations are contained primarily in 49 CFR § 190-199.

natural gas pipelines and hazardous liquids pipelines, and that this paper focuses on the latter in accordance with our charge from the *Task Force Report*.

In addition to being designated as the primary safety standard-making body for hazardous liquids pipelines, under 49 USC § 601 the USDOT is also the primary inspection and enforcement body, giving USDOT the authority to take actions to help ensure pipeline owners and operators comply with the federal safety standards. Federal pipeline safety activities are carried out by USDOT's Office of Pipeline Safety ("OPS"), which was created by Congress in 1968.<sup>5</sup> OPS is currently housed within USDOT's Pipeline and Hazardous Materials Safety Administration ("PHMSA"), an agency created in 2004 to focus specifically on ensuring the safe transportation of hazardous materials.<sup>6</sup>

### ***State Participation in Liquids Pipeline Safety***

Under federal law, a state<sup>7</sup> may assume from PHMSA some hazardous liquids pipeline safety authorities, if it chooses to do so, subject to certain restrictions and requirements. Some of these authorities may be assumed solely at the state's discretion, while others require the consent of PHMSA. In practice, states can assume four (4) main levels of involvement in liquids pipeline safety, ranging from no involvement to the maximum allowable by law. The levels are derived from the types of certifications and agreements that a given state might have with PHMSA. Listed in order of increasing state involvement, they are:

1. State without a Hazardous Liquids Pipeline Safety Program
2. State with an Intrastate Agreement for hazardous liquids pipelines<sup>8</sup>
3. State with a Certified Hazardous Liquids Pipeline Safety Program<sup>9</sup>
4. State with a Certified Hazardous Liquids Pipeline Safety Program and an Interstate Agent Agreement for hazardous liquids pipelines.<sup>10</sup>

Apart from ad-hoc agreements with PHMSA which temporarily alter a state's safety authority,<sup>11</sup> each state can be characterized as belonging to one of the four above groups. The groupings reflect differences in the types of safety authorities a state has assumed from PHMSA and whether these authorities apply to intrastate pipelines, interstate pipelines, or both.

For intrastate pipelines, a state may assume PHMSA's inspection authority over intrastate pipelines within that state's borders (Intrastate Agreement) or the entirety of PHMSA's regulatory authorities over these pipelines (Certification). To obtain certification, the state must first adopt the minimum federal safety standards found in 49 CFR, and state law must allow for the inspection of hazardous liquids pipeline operators and the enforcement of the safety standards. States with a certified program

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<sup>5</sup> <https://www.transportation.gov/50/timeline/accessible>

<sup>6</sup> <https://www.transportation.gov/transition/phmsa>

<sup>7</sup> For the purposes of this paper, "state" refers to the 50 U.S. states, the District of Columbia, and Puerto Rico.

<sup>8</sup> As described in 49 USC § 60106(a)

<sup>9</sup> As described in 49 USC § 60105

<sup>10</sup> As described in 49 USC § 60106(b)

<sup>11</sup> Though this paper focuses on formal, longer term safety arrangements with PHMSA, two temporary and/or ad-hoc arrangements bear mentioning. First, at the request of PHMSA, states may operate as an Interstate Agent on a temporary basis. Second, under the PIPES Act of 2016, a state with a certified intrastate program may request to jointly participate with PHMSA in the inspection of a specific interstate pipeline or pipeline facility.

are permitted to adopt more stringent safety standards if they choose to do so, provided these standards do not conflict with federal regulations. Importantly, certification for intrastate pipelines is not granted at the discretion of PHMSA; by law, it is granted to any state that requests it and that meets the certification requirements.

For interstate pipelines, a state may assume PHMSA's inspection authority over interstate pipelines within that state's borders (Interstate Agent Agreement), but it cannot assume PHMSA's standards-making or enforcement authorities for these pipelines. Thus, a state is not permitted to set more stringent safety standards for interstate pipelines, and any probable violations found during the state's inspection activities must be referred to PHMSA for potential enforcement action. It is important to note that regardless of state or federal preferences, PHMSA maintains sole legal authority to promulgate safety regulations for interstate hazardous liquids pipelines and to take enforcement actions for any violations thereof. Table 1 provides a summary of this information, showing for each of the four levels of involvement whether the state or federal government serves as the lead entity for the various pipeline safety activities listed.

**Table 1: Lead Government by State Program Status, Pipeline Type, and Oversight Activity Type**

	Inspection (Intrastate)	Regulatory/Enforcement (Intrastate)	Inspection (Interstate)	Regulatory/Enforcement (Interstate)
No State Safety Program	Federal	Federal	Federal	Federal
Intrastate Agreement	State	Federal	Federal	Federal
Certification	State	State	Federal	Federal
Interstate Agent and Certification	State	State	State	Federal

For 2018, fifteen states will operate certified hazardous liquids programs, with five of the fifteen also acting as interstate agents. No state will operate under an intrastate agreement, a mechanism which historically is rarely used. A review of historical data compiled by MAE's Energy Security staff shows that state hazardous liquids pipeline safety program statuses change little from one year to the next. Over the past fifteen years, the number of certified hazardous liquids programs ranged from thirteen to fifteen, and the number of states with an interstate agent agreement was either five or six. The last time a state operated under an intrastate agreement for hazardous liquids pipelines was in 2010. State program statuses are listed in PHMSA's *Guidelines for States Participating in the Pipeline Safety Program*.<sup>12</sup> State statuses for 2018 are captured from the *Guidelines* and shown as Figure 1.

<sup>12</sup><https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/pictures/2018%20State%20Guidelines%20Final%20with%20Appendices%202017-12-31.pdf>

**Figure 1: State Hazardous Liquids Program Statutes for CY2018**

**State Agencies Under Section 60105(a) Certification (15)**

Alabama	Maryland	Pennsylvania
Arizona	Minnesota	Texas
California (Fire Marshal)	New York	Virginia
Indiana	New Mexico	Washington
Louisiana	Oklahoma	West Virginia

**State Agencies Acting as Interstate Agents (5)**

Arizona	New York	Washington
Minnesota	Virginia	

**Section 2: Analyses of Pipeline Safety Data**

***Understanding Hazardous Liquids***

Before delving into the data analyses, a brief digression into what constitutes a “hazardous liquid” is warranted. Currently, a substance may be deemed a hazardous liquid either explicitly by statute or at the discretion of the Secretary of the Transportation.<sup>13</sup> For reporting purposes, PHMSA groups hazardous liquids currently transported via pipeline into five categories, which are listed and described in *Table 2*.

***Table 2: Hazardous Liquids Transported via Pipeline, by PHMSA Commodity Category***

<b>Hazardous Liquid Category</b>	<b>Description</b>
<b>Crude Oil</b>	Liquid petroleum produced from the ground
<b>Refined Petroleum Products</b>	Flammable, toxic, or corrosive products which are liquids at ambient conditions and are produced by the distilling and processing of crude oil or other unfinished hydrocarbons
<b>Highly Volatile Liquids (HVL) or Other Flammable or Toxic Fluids</b>	Liquids which produce a vapor cloud when released to the atmosphere and flammable or toxic fluids which are gases at ambient conditions
<b>Carbon Dioxide (CO<sub>2</sub>)<sup>14</sup></b>	A fluid consisting of more than 90 percent carbon dioxide molecules compressed to a supercritical state
<b>Biofuel</b>	Liquid fuels derived from biological feedstock

<sup>13</sup> 49 USC § 60101(a)(4)

<sup>14</sup> By definition, carbon dioxide is not considered a hazardous liquid. However, it remains a regulated commodity under 49 CFR 195, the regulations which govern the transportation of hazardous liquids by pipeline. For simplicity, this paper will refer to all commodities regulated under Part 195, including carbon dioxide, as “hazardous liquids.”



## ***Methodology***

Before any decision is made on whether to establish a Hazardous Liquids Pipeline Safety Program in Michigan, an important question to answer is whether available data indicates that doing so is likely result in improved pipeline safety outcomes. In attempting to answer this question, we'll rely primarily on PHMSA's Annual Report and Incident Data.<sup>15</sup> Our analyses were conducted in four discrete steps, each of which is discussed more fully now.

### Step 1 -- Compilation of Incident Data

Under 49 CFR 195.54, each pipeline operator is required to report incidents<sup>16</sup> for each failure in a pipeline system in which there is:

- A release of the hazardous liquid being transported resulting in an explosion or fire not intentionally set by the operator;
- A release of five gallons or more of the hazardous liquid being transported;<sup>17</sup>
- One or more fatality or injury resulting in in-patient hospitalization;
- \$50,000 or more in total incident costs, measured in 1984 dollars.

PHMSA categorizes reported incidents that reach more damaging thresholds<sup>18</sup> as "significant" and incidents which involve a serious injury or fatality as "serious." These labels are not mutually exclusive, but rather are increasingly narrow subsets of one another. More precisely, significant incidents are a subset of all reported incidents, and serious incidents are a subset of all significant incidents. Over the past 20 years (1998-2017), 6,847 hazardous liquids incidents have been reported to PHMSA nationwide, with approximately 40% receiving the "significant" designation and just under 1% being labeled "serious." A summary of this data for the nation and for Michigan is shown in *Table 3*.

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<sup>15</sup> <https://www.phmsa.dot.gov/data-and-statistics/pipeline/source-data>

<sup>16</sup> Federal regulations refer to reportable events involving the transportation of natural and other gases as "incidents," while those involving hazardous liquids are referred to as "accidents." For this paper, we'll use the terms interchangeably.

<sup>17</sup> Releases between five gallons and five barrels are not reportable if they are maintenance related, confined to company property or right-of-way, cleaned up promptly, do not exceed certain pollution thresholds, and do not meet any other reportable criteria.

<sup>18</sup> Incidents are deemed "significant" if they cause over \$50,000 (in 1984 dollars) of damages, release 5 or more barrels of HVL, release 50 or more barrels of non-HVL liquid, cause an unintentional fire or explosion, or cause a serious injury or fatality.

**Table 3: Reported Hazardous Liquids Incidents by Type, 1998-2017**

	All Reported Incidents		Significant Incidents		Serious Incidents	
	Nation	Michigan	Nation	Michigan	Nation	Michigan
<b>1998</b>	153	2	140	1	5	0
<b>1999</b>	167	3	147	3	9	0
<b>2000</b>	146	1	135	1	3	0
<b>2001</b>	130	3	108	2	6	0
<b>2002</b>	458	2	133	0	1	0
<b>2003</b>	432	5	122	3	2	0
<b>2004</b>	377	5	135	1	3	0
<b>2005</b>	369	3	129	1	4	0
<b>2006</b>	354	8	107	4	1	0
<b>2007</b>	332	8	109	0	5	0
<b>2008</b>	376	4	123	2	3	1
<b>2009</b>	342	4	110	1	3	0
<b>2010</b>	350	7	123	3	3	0
<b>2011</b>	344	4	139	2	1	0
<b>2012</b>	366	4	133	3	2	0
<b>2013</b>	401	7	166	3	4	0
<b>2014</b>	455	4	154	2	0	0
<b>2015</b>	460	2	181	1	1	0
<b>2016</b>	420	1	177	1	3	0
<b>2017</b>	415	8	157	1	1	0
<b>Total</b>	6,847	85	2,728	35	60	1

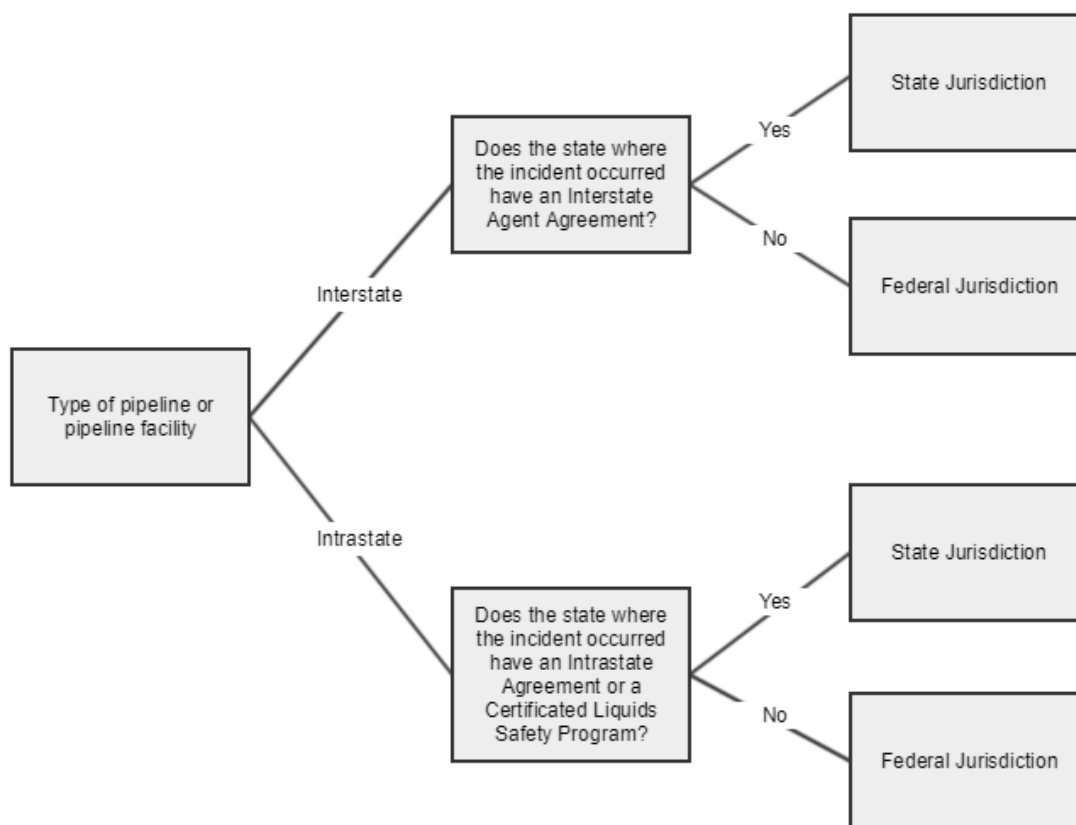
For our analyses, we’ve chosen to focus on “significant incidents” as our data of interest. We chose to focus specifically on significant incidents, rather than all reported incidents, largely for two reasons. First, any analysis based on “all reported incidents” is complicated by the fact that PHMSA’s minimum reporting thresholds have changed several times over the years, whereas the thresholds that categorize an incident as significant have been more stable. Second, the vast majority of the economic, human health, and environmental damages associated with reportable incidents are captured in the significant incidents pool. For example, though significant incidents make up just 40% of all hazardous liquids incidents reported over the past 20 years, they account for over 99.1% of all barrels of liquid reported spilled nationally. In effect, restricting the analysis to significant incidents allows us to focus on incidents where meaningful societal costs are being incurred and which are therefore more pertinent to state interests.

#### Step 2 -- Determination of Primary Safety Jurisdiction

To reiterate, the fundamental question we’re attempting to answer is whether pipelines predominately under state safety oversight tend to have better or worse safety outcomes than those under federal oversight. As was discussed previously, states can and do have varying levels of involvement in liquids pipeline safety. Accordingly, no obvious demarcation exists that clearly establishes the point at which

the state, rather than PHMSA, becomes the primary safety authority for a given pipeline. Nonetheless, for the purposes of this paper, we deem the agency responsible for inspecting a pipeline as being primarily responsible for ensuring that pipeline's safe operation. A decision tree depicting the process taken to assign primary safety jurisdiction is depicted in *Figure 2*.

**Figure 2: Decision Tree to Assign Primary Safety Jurisdiction for Hazardous Liquids Pipelines**



While several years of significant incident data are available, constraints imposed by other data series forced us to restrict our analysis to a 13-year period (2004-2016). Specifically, PHMSA does not maintain complete records of when the various states attained or relinquished their intrastate agreement, certification, and/or interstate agent agreement statuses. However, based on the information PHMSA was able to provide along with some minor assumptions from our team, we were able to reasonably estimate these statuses from the current year back to 2004. Additionally, as of the time of this writing, operators' Annual Reports for 2017 were not yet available on PHMSA's website, effectively restricting our analyses to the years 2004-2016.

PHMSA's data shows that 1,786 significant incidents occurred nationwide between 2004 and 2016. From this data, our team was able to ascribe 1,756 of those incidents to a given state. The incidents that were discarded either contained incomplete location data or occurred within the Outer Continental Shelf ("OCS"). From there, the incidents were cross-referenced with PHMSA's raw incident data to determine whether each incident pertained to an interstate or intrastate pipeline, which was

subsequently referenced to historical safety jurisdiction data to make a state/federal determination for each incident. Altogether, this processing resulted in final usable pool of 1,753 significant incidents.

### Step 3 -- Analysis of Descriptive Statistics

#### **Analysis**

Inherent in our effort to compare federal and state pipeline safety performance is a key question about how best to measure such performance. For the purposes of this analysis, our team chose to evaluate pipeline safety performance based on the following six factors:

- number of serious injuries
- number of fatalities
- barrels of liquid spilled
- barrels of liquid lost
- incident costs
- incident frequency

A selection of descriptive statistics regarding the usable data pool are shown in *Table 4*.

***Table 4: Summary Statistics for Significant Incidents Data, 2004-2016<sup>19</sup>***

	Federal Jurisdiction	State Jurisdiction	Total
<b>Significant Incidents</b>	1,157	596	1,753
<b>Crude Oil</b>	476	264	740
<b>Refined Products</b>	403	176	579
<b>HVL, Flammable, or Toxic</b>	248	151	399
<b>Carbon Dioxide</b>	30	5	35
<b>Fatalities</b>	14	12	26
<b>Serious Injuries</b>	52	7	59
<b>Barrels Spilled</b>	1,027,958	449,844	1,477,801
<b>Net Barrels Lost</b>	437,881	270,558	708,440
<b>Total Cost (2018 USD)</b>	2,874,351,022	517,717,677	3,392,068,699
<b>Avg. Miles Under Jurisdiction<sup>20</sup></b>	132,825	55,667	188,492
<b>Interstate Miles</b>	124,703	9,918	134,621
<b>Intrastate Miles</b>	8,122	45,749	53,871

<sup>19</sup> Data in *Table 4* and *Table 5* reflect only the 1,753 significant incidents in our final dataset.

<sup>20</sup> Incorporates year-to-year changes, from 2004-2016, in the number of hazardous liquids pipeline miles under jurisdiction.

For various reasons, any direct comparison of the data in *Table 4* is problematic. We argue that the federal and state pools are likely to differ in important ways which are unrelated to the competency or rigor of the safety agencies who oversee them. For example, it's reasonable to expect the pool with more miles of pipeline to have a greater number of reported significant incidents. Similarly, if all else is equal, we expect the pool containing disproportionately larger diameter pipelines to be predisposed to larger spill volumes, or that the pool containing a greater proportion of very old pipelines – or perhaps a higher proportion of very new ones – could be expected to have relatively more incidents.

To mitigate some of these issues and to enable a “first pass” comparison, additional statistics were calculated. These statistics are shown in *Table 5*.

**Table 5: Additional Summary Statistics for Significant Incidents Data, 2004-2016**

	<b>Federal Jurisdiction</b>	<b>State Jurisdiction</b>	<b>Total</b>
<b>Per 1,000 Jurisdictional Miles</b>			
<b>Significant Incidents</b>	8.71	10.71	9.30
<b>Fatalities</b>	0.11	0.22	0.14
<b>Serious Injuries</b>	0.39	0.13	0.31
<b>Per Significant Incident</b>			
<b>Barrels Spilled</b>	888	755	843
<b>Net Barrels Lost</b>	378	454	404
<b>Total Cost (2018 USD)</b>	2,484,314	868,654	1,935,008
<b>Median Barrels Spilled</b>	67	60	65
<b>Median Net Barrels Lost</b>	5	5	5
<b>Median Total Cost (2018 USD)</b>	196,064	188,216	192,985

## **Findings**

As *Table 5* demonstrates, the results are mixed. By some measures, pipelines under state jurisdiction appear to be performing better than those under federal jurisdiction (e.g. total costs per incident), but by other measures they appear to be performing worse (e.g. number of incidents per jurisdictional mile). Additionally, as the Enbridge oil spill near Marshall, MI, demonstrates,<sup>21</sup> many of the “per incident” figures in *Table 5* are highly sensitive to the pull of extreme incidents. Despite having over 1,750 incidents in our dataset, the removal of a few key data points can change the magnitude of some metrics in *Table 5* drastically, and in some instances, it can change the direction of the difference as well. As such, our analysis of the foregoing descriptive statistics finds no clear evidence that hazardous liquids

<sup>21</sup> The cost of the Marshall Spill is over five times higher than the next most costly incident in our dataset, and it comprises approximately 28% of all costs incurred in the dataset.

pipelines under state jurisdiction are generally performing better (or worse) than those under PHMSA's jurisdiction.

#### Step 4 -- Regression Analysis

##### ***Analysis***

To further evaluate the question at hand, we now turn to regression analysis. In doing so, we use multivariate log-linear regression models to determine if there is a statistically significant difference in certain safety-related outcomes for pipelines under state jurisdiction versus those under federal jurisdiction. For the purposes of this analysis, we focus on the following two outcome variables which will serve as proxies for overall pipeline safety:

- Total incident cost
- Total barrels of product released during a pipeline incident

We then create and employ two regression models to help us examine whether a pipeline being under state safety jurisdiction versus federal safety jurisdiction has a statistically significant impact on incident costs and total barrels released. The two models control for the effects of several other variables which could contribute either to incident costs and/or total barrels spilled, such as:

- pipeline diameter
- pipeline pressure
- whether the incident occurred onshore or offshore
- type of commodity spilled
- incident cause

A more detailed explanation of the regression models, our methodology, and statistical results can be found in Appendix A.

##### ***Findings***

In both models the *Jurisdiction* dummy variable was not found to be statistically significant, suggesting that nationally, hazardous liquids pipelines under state jurisdiction are no more or less safe in terms of total incident cost or the quantity of barrels of hazardous liquids released than pipelines under federal jurisdiction. This is consistent with the findings from our Analysis of Descriptive Statistics, which also found no clear difference in overall safety performance between jurisdictions for the variables evaluated.

Before moving on, additional context about the above finding is warranted. First, it does not imply that an individual state's hazardous liquids program cannot – or is not currently – outperforming PHMSA. Rather, it concludes that state hazardous liquids programs collectively appear to be performing relatively evenly with PHMSA with respect to the metrics evaluated by our team. Indeed, Michigan may find it has certain advantages that other state programs and PHMSA do not, which could lead to improved liquids safety outcomes in Michigan. Second, the finding is tempered by the regression models' relatively low explanatory power, which suggests that there's likely a host of variables that were

not included in our models that also impact an incident's costs and/or release volumes. Third, even if we assume hazardous liquids pipeline safety outcomes under state oversight are roughly equal to those under PHMSA oversight, state programs provide other benefits that states may find exceed the program's cost to the state.

### Section 3: Ramifications of Establishing a Hazardous Liquids Pipeline Safety Program in Michigan

Based on our analyses in Section 2, pipelines under state safety jurisdiction appear to be performing relatively evenly with those under federal safety jurisdiction. Apart from expected safety outcomes, there are a host of other factors which the state should consider before deciding to pursue a hazardous liquids safety program. Below we discuss several of these factors.

#### ***Background***

Michigan has a long history in the safety regulation of pipelines. Michigan instituted its first pipeline safety regulations for natural gas pipelines in 1957 via MPSC Order No. D-3913. Michigan was involved in the adoption of the federal natural gas pipeline safety regulations in 1970, submitting comments during the federal rulemaking process. Much of the information discussed below is derived from the experiences of the MPSC staff who operate Michigan's Certified Gas Pipeline Safety Program. For the discussion below, it is assumed that if Michigan establishes a hazardous liquids pipeline safety program it would be housed under the MPSC and its provisions would be carried out by MPSC staff.<sup>22</sup>

#### ***Facilities***

To some degree, Michigan maintains its involvement in intrastate and interstate natural gas pipeline safety because its program is well-established and MPSC staff has considerable experience working with Michigan's natural gas pipeline operators. Another important factor, though, is that Michigan's certified Gas Pipeline Safety Program allows the state to have full regulatory control over the bulk of Michigan's gas pipeline infrastructure. In Michigan, there are over 58,000 miles of natural gas mains and over 54,000 miles of service lines, all of which are regulated by the MPSC under its Certified Gas Pipeline Safety Program.<sup>23</sup> There are also nearly 370 miles of regulated gas gathering lines in Michigan, and all but about 10 of those miles are regulated by the MPSC.<sup>24</sup> With respect to gas transmission pipelines in Michigan, roughly 60 percent of the over 8,600 miles reported by operators to PHMSA in 2016 are attributed to intrastate pipelines, which means most of the gas transmission pipeline in the state also falls under the MPSC's regulatory purview.<sup>25</sup> In total, out of the more than 120,000 miles of regulated

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<sup>22</sup> A non-MPSC led hazardous liquids pipeline safety program is also conceivable, though doing so would likely forego certain administrative efficiencies that would be expected if it were to join the existing gas safety program under the auspices of the MPSC.

<sup>23</sup> Per 2016 PHMSA Annual Reports, DOT Form PHMSA F 7100.2.1.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

gas gathering, transmission and distribution pipelines in Michigan, the MPSC's gas safety program has full regulatory oversight of all but around 3,500 of those miles, with these remaining miles partially overseen by the MPSC through its Interstate Agent Agreement with PHMSA.

Conversely, based on data submitted by liquids operators to PHMSA for 2016, only around 12 percent of all regulated hazardous liquids pipeline miles in Michigan belong to intrastate pipelines.<sup>26</sup> As such, if Michigan was to establish a Certified Hazardous Liquids Pipeline Safety Program today, only a fraction of Michigan's regulated liquids pipelines – around 423 miles – would be subject to the full regulatory control of the state. The remaining miles could be inspected by the state under an Interstate Agent Agreement with PHMSA, but operators of these pipelines would only be required to follow the federal safety regulations, and the ultimate authority to enforce compliance with the standards would remain with PHMSA. Additionally, while interstate agents may provide input into plans to inspect interstate pipelines, these plans are ultimately set by PHMSA, and therefore are not guaranteed to reflect the state's policy preferences.

A comparison of Michigan's regulated gas and liquids pipeline mileage for 2016 is shown in *Table 6*. *Table 7* shows the percentage of these miles that the state would have inspection and/or regulatory authority over, depending on the type of liquids program Michigan pursues and/or is granted by PHMSA.

**Table 6: Michigan Gas Pipeline and Liquids Pipeline Mileage, 2016<sup>27</sup>**

	Intrastate Regulated Gathering	Interstate Regulated Gathering	Intrastate Transmission	Interstate Transmission	Distribution
Gas Pipelines	357	10	5,188	3,485	112,653
Liquids Pipelines	0	0	423	3,094	0

**Table 7: Percentage of Mileage Hypothetically Subject to State Jurisdiction, 2016<sup>28</sup>**

	Intrastate Agreement		Intrastate Program		Intrastate Program and Interstate Agreement	
	Inspection	Regulatory	Inspection	Regulatory	Inspection	Regulatory
Gas Pipelines	97%	0%	97%	97%	100%	97%
Liquids Pipelines	12%	0%	12%	12%	100%	12%

<sup>26</sup> Per 2016 PHMSA Annual Reports, DOT Form PHMSA F 7000-1.1.

<sup>27</sup> From operators' Annual Reports to PHMSA.

<sup>28</sup> Ibid.



Stated directly, the classification of Michigan’s liquids pipelines hampers the state’s ability to exert the same level of regulatory control over its hazardous liquids pipelines that it has over its gas pipelines. Also, with far fewer miles under its jurisdiction, a potential Certified Hazardous Liquids Pipeline Safety Program would not have the same scale as Michigan’s existing gas program, which may produce operational challenges and contribute to higher per-mile program costs in the liquids program compared to those traditionally incurred in Michigan’s existing gas program.

While having regulatory control over the bulk of the liquids pipelines in the state is certainly beneficial in helping to drive statewide pipeline safety practices and policy, is not in and of itself essential to justify the establishment of a liquids pipeline safety program. In deciding whether to establish a Certified Hazardous Liquids Pipeline Safety Program in Michigan, state policymakers must evaluate, among other things, the individual pipelines that would fall under state regulatory control under a hypothetical liquids program and the likelihood of the state obtaining authorization from PHMSA to inspect interstate pipelines. To the extent that the state leaders may be more concerned with specific pipelines, pipeline operators, or pipeline commodities, the state must evaluate whether these elements are likely to fall under the oversight of the envisioned state liquids program or whether they are likely to remain largely outside the state program’s purview. This information is useful in helping the state understand whether a liquids safety program, or perhaps a different approach, is the most appropriate mechanism to achieve the state’s pipeline safety goals.

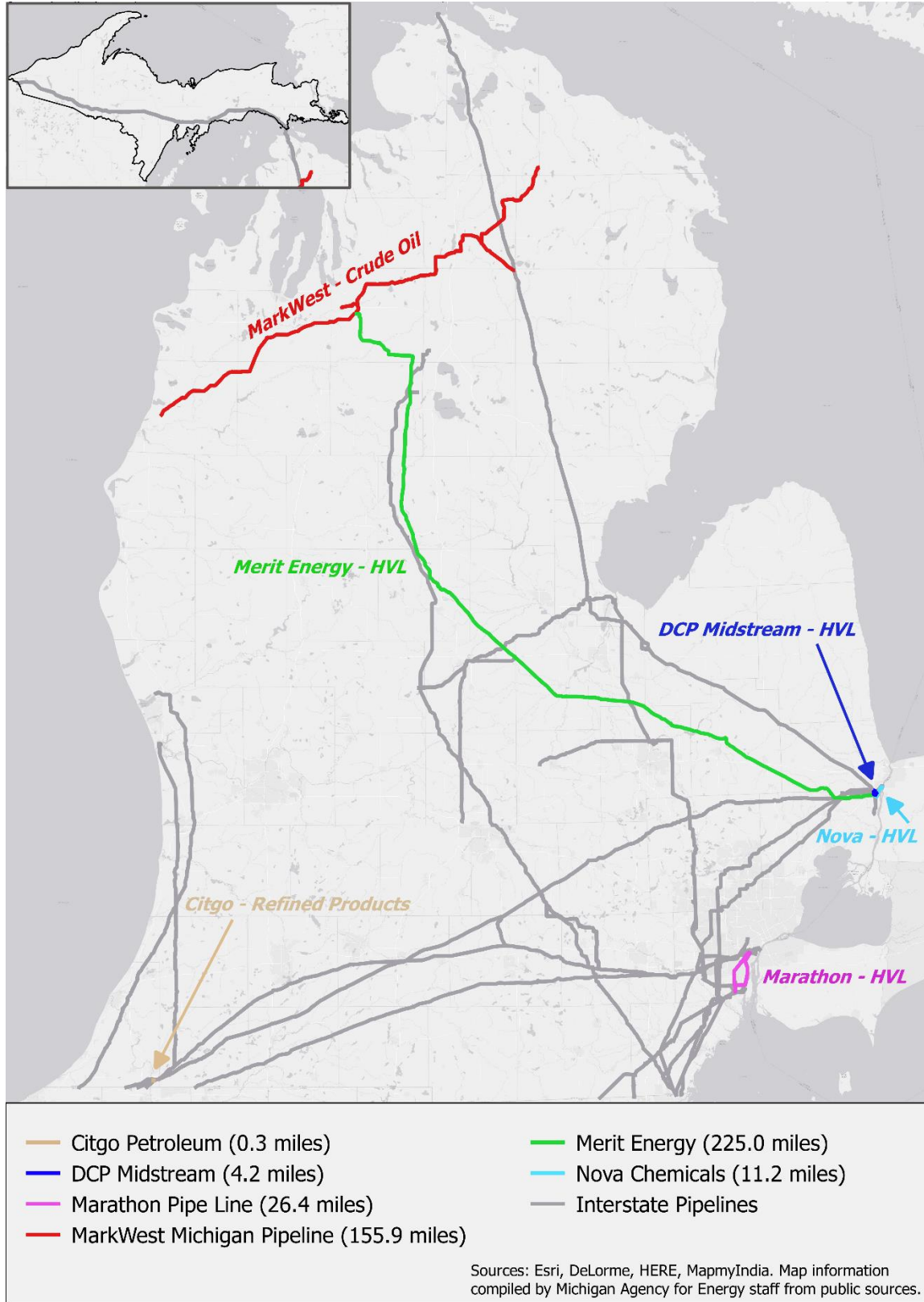
*Table 8* provides an overview of Michigan’s liquids pipeline mileage and tankage, by commodity type, as reported by pipeline operators for 2016. The data in *Table 8* is displayed graphically in *Figure 3*, which depicts Michigan’s liquids pipelines. Michigan’s intrastate pipelines, which consist of approximately 423 miles of pipeline, are highlighted and labeled in *Figure 3*. The operators of Michigan’s intrastate pipelines, as well as the class of commodity transported, are also denoted. Recall that it is intrastate pipelines that are subject to state inspection and regulation under a Certified Hazardous Liquids Pipeline Safety Program, while interstate pipelines, denoted in gray in *Figure 3*, are always regulated by PHMSA, but may be inspected by the state if PHMSA permits the state to do so.

**Table 8: Michigan's Hazardous Liquids Pipeline Mileage and Facilities, 2016<sup>29</sup>**

Commodity	Operator Name	Intrastate Miles	Intrastate HCA Miles	Interstate Miles	Interstate HCA Miles	Total Miles	Miles of Gathering	Interstate Tanks	Intrastate Tanks	Total Tanks
REFINED PP	AMOCO OIL CO			162.0	79.40	162.0	0.0	0	0	0
HVL FLAMM TOXIC	BUCKEYE DEVELOPMENT & LOGISTICS, LLC			3.3	3.32	3.3	0.0	0	0	0
REFINED PP	BUCKEYE PARTNERS, LP			392.3	316.71	392.3	0.0	54	0	54
REFINED PP	CITGO PETROLEUM CORPORATION (TERMINALS)	0.3	0.25			0.3	0.0	0	5	5
HVL FLAMM TOXIC	DCP MIDSTREAM	4.2	2.33			4.2	0.0	0	0	0
CRUDE OIL	ENBRIDGE ENERGY, LIMITED PARTNERSHIP			1,073.0	382.00	1,073.0	0.0	7	0	7
CRUDE OIL	ENBRIDGE PIPELINES (TOLEDO) INC			137.0	69.00	137.0	0.0	2	0	2
HVL FLAMM TOXIC	KINDER MORGAN UTOPIA LLC			66.0	59.11	66.0	0.0	0	0	0
CRUDE OIL	MARATHON PIPE LINE LLC			61.4	61.40	61.4	0.0	8	0	8
REFINED PP	MARATHON PIPE LINE LLC			121.1	112.90	121.1	0.0	3	0	3
HVL FLAMM TOXIC	MARATHON PIPE LINE LLC	26.4	26.40			26.4	0.0	0	5	5
CRUDE OIL	MARKWEST MICHIGAN PIPELINE, LLC	155.9	27.48			155.9	0.0	0	3	3
HVL FLAMM TOXIC	MERIT ENERGY COMPANY	225.0	89.50			225.0	0.0	0	0	0
CRUDE OIL	MID - VALLEY PIPELINE CO			7.0	7.00	7.0	0.0	1	0	1
HVL FLAMM TOXIC	NOVA CHEMICALS (CANADA) LTD.	11.2	11.15			11.2	0.0	0	0	0
HVL FLAMM TOXIC	PLAINS MARKETING, L.P.			17.2	12.05	17.2	0.0	0	0	0
HVL FLAMM TOXIC	PLAINS PIPELINE, L.P.			61.6	51.70	61.6	0.0	0	0	0
CRUDE OIL	SUNOCO PIPELINE L.P.			117.6	107.40	117.6	0.0	6	0	6
REFINED PP	SUNOCO PIPELINE L.P.			52.5	49.40	52.5	0.0	2	0	2
HVL FLAMM TOXIC	SUNOCO PIPELINE L.P.			164.1	142.70	164.1	0.0	0	0	0
REFINED PP	WOLVERINE PIPELINE CO			658.0	324.69	658.0	0.0	4	0	4
<b>Grand Total</b>		<b>422.9</b>	<b>157.11</b>	<b>3,094.1</b>	<b>1,778.78</b>	<b>3,517.0</b>	<b>0.0</b>	<b>87</b>	<b>13</b>	<b>100</b>

<sup>29</sup> From PHMSA's Pipeline Mileage and Facilities online repository.

**Figure 3: Michigan's Hazardous Liquids Pipelines, 2016**



## Staff and Training

Under PHMSA's guidelines,<sup>30</sup> a state participating in the safety oversight of pipelines within its borders must first determine the staffing levels it needs to complete all required inspections. Staffing determinations take into account the number of pipeline operators in the state, the number of operating districts for each operator, and characteristics of each operator and/or pipeline system. The MPSC's gas safety program currently consists of 11 field engineers. MPSC's gas safety staff estimates that a combination intrastate and interstate hazardous liquid pipeline safety program would require 1.5 additional field engineers to complete the required inspections. Additional staff would be required for administration and supervision of the program.

PHMSA's guidelines also outline required training for the supervision and inspection staff in the state program. To be fully qualified to conduct all liquid pipeline safety inspections, PHMSA currently requires an individual take 18 training courses plus additional web-based training courses. MPSC staff assesses it would take two to three years to train a new individual to be able to proficiently conduct liquid pipeline safety inspections.

## Cost and Funding

MPSC staff estimates that a combination intrastate and interstate hazardous liquid pipeline safety program would require \$350,000 worth of funding to support the field engineers and the administration and supervision of the program. This figure was derived via a per-inspector proration of the MPSC's gas safety program's actual costs in 2017 as well as its expected costs for 2018. Detailed cost estimates for a potential combined intrastate and interstate hazardous liquids pipeline safety program in Michigan are shown in *Table 9*.

The State currently does not have a funding source to support a hazardous liquids pipeline safety program. PHMSA's grant program will partially support a state liquids program, generally covering between 60-80% of state program costs. PHMSA grant amounts are subject to availability of federal funds, and in any event cannot exceed 80% of actual state program costs. State programs are also subject to audit, and states must ensure their program has an adequate amount of field staff and administrative staff to meet PHMSA grant requirements.

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<sup>30</sup><https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/pictures/2018%20State%20Guidelines%20Final%20with%20Appendices%202017-12-31.pdf>

**Table 9: Cost Estimates for Combined Intrastate and Interstate Hazardous Liquids Program**

<b><u>DIRECT COSTS</u></b>	2018 Gas Pipeline Safety Program Budget	# of FTE (insp-person year) allocated				2017 Gas Pipeline Safety Program Payment Request	# of FTE (insp-person year) allocated		
		1.33	1.5	2			1.33	1.5	2
<b>Compensation for Personnel Services</b>									
Supervisory personnel	\$ 252,788	\$ 30,564	\$ 34,471	\$ 45,961		\$ 194,841	\$ 28,352	\$ 31,976	\$ 42,635
Supervisory fringe benefits	\$ 203,869	\$ 24,650	\$ 27,800	\$ 37,067		\$ 152,481	\$ 22,188	\$ 25,024	\$ 33,366
Inspection/Investigation personnel	\$ 780,505	\$ 94,370	\$ 106,433	\$ 141,910		\$ 616,229	\$ 89,670	\$ 101,132	\$ 134,842
Inspection/Investigation fringe benefits	\$ 627,253	\$ 75,841	\$ 85,535	\$ 114,046		\$ 505,741	\$ 73,593	\$ 82,999	\$ 110,665
Damage Prevention/Technical personnel	\$ 40,986	\$ 4,956	\$ 5,589	\$ 7,452		\$ 67,107	\$ 9,765	\$ 11,013	\$ 14,684
Damage Prevention/Technical fringe benefits	\$ 24,859	\$ 3,006	\$ 3,390	\$ 4,520		\$ 41,128	\$ 5,985	\$ 6,750	\$ 9,000
Administrative personnel	\$ 106,858	\$ 12,920	\$ 14,572	\$ 19,429		\$ 89,757	\$ 13,061	\$ 14,730	\$ 19,640
Administrative fringe benefits	\$ 94,782	\$ 11,460	\$ 12,925	\$ 17,233		\$ 78,230	\$ 11,384	\$ 12,839	\$ 17,118
<b>Activities</b>									
Communication and Transportation Costs	\$ 15,000	\$ 1,814	\$ 2,045	\$ 2,727		\$ 11,060	\$ 1,609	\$ 1,815	\$ 2,420
Training and Education costs	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
Travel Costs	\$ 120,000	\$ 14,509	\$ 16,364	\$ 21,818		\$ 101,718	\$ 14,801	\$ 16,693	\$ 22,258
<b>Materials and Equipment</b>									
Materials including cost of computing devices	\$ 115,305	\$ 13,941	\$ 15,723	\$ 20,965		\$ 78,501	\$ 11,423	\$ 12,883	\$ 17,178
Equipment and other capital expenditures	\$ 500,000					\$ 500,000			
<b><u>INDIRECT COSTS</u></b>									
Indirect costs incurred by State Agency	\$ 136,354	\$ 16,486	\$ 18,594	\$ 24,792		\$ 113,926	\$ 16,578	\$ 18,697	\$ 24,929
<b>TOTAL ESTIMATED COSTS</b>	\$ 3,018,559	\$ 304,517	\$ 343,440	\$ 457,920		\$ 2,550,720	\$ 298,409	\$ 336,551	\$ 448,735

*\*Highlighted columns indicate program cost estimates derived from MPSC Staff's assumption of 1.5 FTE for liquids pipeline inspectors. Upper bound and lower bound cost estimates, based on 2 FTE and 1.33 FTE of liquids pipeline inspectors, respectively, are also provided.*

## Statutory and Regulatory Considerations

To establish a hazardous liquids pipeline safety program in Michigan, a state statute must first be enacted to provide the authority to the state to conduct inspection and enforcement activities on hazardous liquids pipelines. A stable funding mechanism will also need to be created, whether by state law or otherwise, to carry out the authorities set forth in the above law.

As was noted previously, under federal law a state may assume safety jurisdiction over its intrastate pipelines if it meets specific requirements. On the other hand, recall that the authority to inspect interstate pipelines is granted at the discretion of PHMSA. In December 2014, PHMSA announced that it intended to rescind existing state Interstate Agent Agreements and not allow additional states to become interstate agents.<sup>31</sup> PHMSA officials later stated that the agency does not intend to discontinue existing Interstate Agent Agreements, but that it was sufficiently staffed to meet its inspection needs and it does not need additional interstate agents.<sup>32</sup> Further, a review of documents by MAE's Energy Security staff shows that the last time a new state reached an Interstate Agent Agreement with PHMSA to inspect hazardous liquids pipelines was at least 15 years ago, and perhaps much longer. A May 2018 report from the U.S. Government Accountability Office found four states in the past seven years who had requested Interstate Agent Agreements for gas and/or liquids pipelines but were denied.<sup>33</sup> With these developments in mind, there is considerable doubt whether PHMSA would choose to enter into an Interstate Agent Agreement with Michigan regarding its hazardous liquids pipelines. As such, if Michigan chooses to establish a hazardous liquids safety program, it must recognize that doing so may ultimately result in the majority of Michigan's liquids pipelines continuing to exist wholly outside of state safety jurisdiction.

In the event Michigan obtains intrastate certification but is denied an Interstate Agent Agreement with PHMSA, Michigan, upon request, is permitted to conduct a joint inspection with PHMSA of an interstate pipeline facility. This is a relatively new provision created by the Pipes Act of 2016, which as of April 2018, has not been requested by any state. Before it participates in a joint inspection, state leaders should know that some important caveats apply. First, the state must cover all costs associated with participating in joint inspections, as these costs, unlike traditional inspection costs, are not partially reimbursable via PHMSA grant funding. Second, the inspection plan is set by PHMSA, and state inspectors must follow the direction of PHMSA's lead inspector. Finally, upon completion of the joint inspection, states are not permitted to retain any inspection documents.

## Information Access

For the pipelines they inspect or regulate under a state hazardous liquids program, state pipeline safety staff would have a greater level of access to certain types of pipeline information. This would include regular access to company inspection records, maintenance documentation, and operations and maintenance procedures. Additionally, staff would have access to company spill plans, have a direct opportunity to comment the plans, and could use their understanding of the plans to help the state be

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<sup>31</sup> <https://pubs.naruc.org/pub.cfm?id=536D11B0-2354-D714-51D5-9E24030A9570>

<sup>32</sup> <https://www.gao.gov/assets/700/692059.pdf>

<sup>33</sup> Ibid.

better prepared in the event of an emergency. Staff would also have a “seat at the table” to participate in pipeline-related drills and exercises, which serve to increase overall state emergency preparedness.

Beyond direct access to information, drills, and exercises, it is anticipated that staff would, over time, build relationships with employees of liquids pipeline operators who could serve as resources to the state on various energy-related matters. These relationships may ultimately help the state obtain a better understanding of energy industry trends and developments which could support, hinder, or otherwise shape Michigan’s energy policy objectives.

## **Timeline**

Should Michigan decide to establish a hazardous liquids pipeline safety program, MPSC staff estimates the following time intervals would be required:

- The passing of state legislation for intrastate pipeline safety authority and funding is estimated to take one year.
- The state statute would have to allow for the adoption of the federal pipeline safety regulations and, if desired, additional state requirements, which is estimated to take an additional six months to one year.
- Training of new staff to be fully qualified to conduct liquids pipeline safety inspections is estimated to take two to three years.
- Once the staff are fully qualified, the state could apply to PHMSA for a certified intrastate liquids pipeline safety program, which is estimated to take an additional six months to one year, depending on the timing of when all the other requirements are completed.
- After the state pipeline safety program receives intrastate certification, the state would be eligible to apply for an Interstate Agent Agreement, which is estimated to take an additional six months to one year depending on the timing of the PHMSA Interstate Agent Agreement request and PHMSA’s grant periods.

While some of the actions above could run concurrently, at a minimum MPSC staff estimates it would take three to four years to stand-up an intrastate liquids pipeline safety program in Michigan. Securing an Interstate Agent Agreement, in the unlikely event it is granted by PHMSA, would require an estimated additional six to twelve months.

## **Conclusion**

As is discussed herein, there are a host of factors state leaders should consider before deciding whether to establish a hazardous liquids pipeline safety program. Each state has its own liquids pipeline infrastructure, cultural and natural resources, economic needs, and policy objectives, making the relative pros and cons of establishing a liquids pipeline safety program unique to each state. Michigan’s leaders must consider their pipeline safety and energy policy objectives, and using the information provided here and elsewhere, evaluate whether a liquids safety program is the favored mechanism among the options available to the state to meet some or all those objectives.

## **Appendix A: Regression Analysis Discussion**

### **Introduction**

In this paper we use multivariate log-linear regression models to determine if there is a statistically significant difference in certain safety-related outcomes for pipelines under state jurisdiction versus those under federal jurisdiction. Multivariate linear regression is a statistical method that allows researchers to summarize and study the relationship between an endogenous variable – the “predicted” variable – and a set of exogenous “predictor” variables. In this analysis we focus specifically on two endogenous variables which will serve as proxies for overall pipeline safety:

- Total incident cost
- Total barrels of product released during a pipeline incident

From these variables we develop two regression models – the Total Cost Model and the Barrels Released Model – to help us examine whether a pipeline being under state versus federal safety jurisdiction has a statistically significant impact on expected incident costs or barrels released.

### **Data Discussion**

The dataset used in the Analysis of Descriptive Statistics was largely reused for this analysis; however, to make it suitable for regression, some refinement of the data was necessary. Most notably, incidents that were missing data for key model variables were excluded. In general, these consisted of incidents where the total cost, released barrels, pipeline diameter, pipeline pressure, or jurisdiction were either not reported to PHMSA or could not be determined by MAE’s Energy Security staff. Incidents where carbon dioxide was the reported commodity released were also excluded from the dataset due to the relatively small amount of cases involving that commodity. An analysis of standardized residuals did flag some cases that could potentially be outliers, but these cases were ultimately kept in the dataset after further evaluation found these cases to seemingly be valid and that their inclusion did not significantly alter the regression results (i.e. model explanatory power, standard errors, variable sign, variable significance).

### **Total Cost Model**

The first model uses total incident cost, as reported to PHMSA, as the endogenous variable. The total incident cost reflects the estimated public and non-operator property damage, estimated cost of the operator’s property damage and repairs, estimated cost of the commodity lost, estimated operator emergency response costs, estimated operator environmental remediation costs, and any other estimated costs associated with the pipeline incident. The exogenous variables used for the Total Cost Model include pipeline diameter, barrels of commodity released, commodity class dummy variables, a jurisdiction dummy variable, and an offshore dummy variable. Although the focus of this analysis is to determine the statistical significance of a jurisdictional characteristic on pipeline safety, it is important to include variables from the dataset that conceptually would also have an impact on the endogenous variable. For this model:



- Pipeline diameter is included in the Total Cost Model because larger diameter pipelines transporting larger quantities of hazardous liquids could potentially release larger volumes when an incident occurs, making said incident costlier;
- The number of barrels released during the incident is also included, as it is reasonable to believe that as the quantity of barrels released increases, so too will the total cost due to the value of the product released, as well as greater environmental remediation costs;
- The offshore dummy variable captures variation in total costs due to the pipeline incident being in an aquatic environment, as pipeline incidents in water can require more advanced cleanup techniques and prove more difficult considering waves, tides, and currents;
- Two commodity class dummy variables for crude oil and refined petroleum are also included, capturing the variation in total cost associated from the release of different commodities. A third commodity, highly volatile liquids (HVL), is used as the base for which the crude oil and refined petroleum products dummy variables will be interpreted.

Undoubtedly, there are a multitude of factors beyond those listed above that might contribute to incident costs; however, largely due to data constraints, the model is limited to the variables noted above. The total cost multivariate log-linear regression model takes the form of:

$$LN\_Total\_Cost = B_0 + B_1(Barrels\_Released) + B_2(Crude\_Oil) + B_3(Jurisdiction) + B_4(Offshore) + B_5(Pipe\_Diameter) + B_6(Refined)$$

where *LN\_Total\_Cost* is the natural logarithm of reported total incident cost in 2018 dollars, *Jurisdiction* is a dummy variable representing an incident involving a pipeline under state jurisdiction, *Pipe\_Diameter* is the nominal pipe size measured in inches, *Barrels\_Released* is the unintentional volume of the commodity released, *Offshore* is a dummy variable representing hazardous liquids pipeline incidents that occurred offshore, *Refined* is the dummy variable representing incidents where refined petroleum products (diesel, gasoline, fuel oil) were released, and *Crude\_Oil* is the dummy variable representing incidents where crude oil was released.

## Total Cost Model Results and Discussion

Below are the results from the Total Cost Model which include a correlation matrix (*Table A1*)<sup>34</sup> and a regression statistics, coefficient estimates, and an analysis of variance (ANOVA) summary (*Table A2*).

**Table A1: Total Cost Model Variable Correlation Matrix**

	<i>LN Total Cost</i>	<i>Barrels Released</i>	<i>Pipe Diameter</i>	<i>Refined</i>	<i>Crude Oil</i>	<i>Jurisdiction</i>	<i>Offshore</i>
LN Total Cost	1.000						
Barrels Released	0.317	1.000					
Pipe Diameter	0.256	0.098	1.000				
Refined	0.225	-0.098	-0.011	1.000			
Crude Oil	-0.058	-0.055	0.222	-0.636	1.000		
Jurisdiction	-0.064	-0.034	-0.061	-0.062	0.062	1.000	
Offshore	0.119	-0.002	0.039	-0.076	0.119	-0.047	1.000

<sup>34</sup> Importantly, *Table A1* also serves to verify the linear regression assumption of no perfect multicollinearity.

The results show that the strongest correlations with the endogenous variable (*LN\_Total\_Cost*) are *Barrels\_Released* (0.317), *Pipe\_Diameter* (0.256), and *Refined* (0.225). These three correlation coefficients indicate a positive, although weak linear relationship between the variables. For reference, correlation coefficients greater than +/- 0.7 are generally considered strong. The main variable of interest, *Jurisdiction*, has a negative and very weak correlation coefficient of -0.066. The weak correlation coefficients across the board are an early indication that the total cost regression model's explanatory power may be weak.

**Table A2: Total Cost Model Summary**

<b>Model: Total Cost</b>								
<b>Dependent Variable: LN_Total_Cost</b>								
	<b>R-Squared</b>	<b>Adj.R-Sqr.</b>	<b>Std.Err.Reg.</b>	<b>Std.Dep.Var.</b>	<b># Fitted</b>	<b># Missing</b>	<b>t(2.50%,969)</b>	<b>Confidence</b>
	0.244	0.239	1.551	1.778	976	0	1.962	95.0%
<b>Variable</b>	<b>Coefficient</b>	<b>Std.Err.</b>	<b>t-Statistic</b>	<b>P-value</b>	<b>Lower95%</b>	<b>Upper95%</b>	<b>VIF</b>	<b>Std. Coeff.</b>
Constant	11.310	0.132	85.882	0.000	11.052	11.569	0.000	0.000
Barrels_Released	0.000223	0.000019	11.790	0.000	0.000186	0.000260	1.058	0.339
Crude_Oil	0.452	0.137	3.292	0.001	0.183	0.722	1.906	0.127
Jurisdiction	-0.079	0.104	-0.759	0.448	-0.282	0.125	1.014	-0.021
Offshore	1.982	0.454	4.362	0.000	1.090	2.874	1.018	0.123
Pipe_Diameter	0.046	0.007020	6.501	0.000	0.032	0.059	1.114	0.192
Refined	1.333	0.143	9.304	0.000	1.052	1.614	1.802	0.349
<b>Source</b>	<b>Deg. Freedom</b>	<b>Sum Squares</b>	<b>Mean Square</b>	<b>F-Statistic</b>	<b>P-value</b>			
Regression	6	750.512	125.085	52.011	0.000			
Residual	969	2,330	2.405					
Total	975	3,081						

The above summary gives an R-squared value of 0.244 for the Total Cost Model. The R-squared gives the overall explanatory power of the model, and in the context of the Total Cost Model, it means that 24.4 percent of the variation in total cost can be attributed to the variation of the exogenous variables. The results from the ANOVA summary show a significant P-value at all confidence levels for the F-Statistic (52.011), therefore the hypothesis of zero slopes – that none of the exogenous variables are useful in predicting the endogenous variable – can be rejected. The slope coefficients for each exogenous variable are also shown in Table A2 above. The Total Cost Model equation with associated slope coefficients is:

$$LN\_Total\_Cost = 11.310 + 0.000223*Barrels\_Released + 0.452*Crude\_Oil - 0.079*Jurisdiction + 1.982*Offshore + 0.046*Pipe\_Diameter + 1.333*Refined$$

The P-Value for the main variable of interest, *Jurisdiction* (0.448), is not statistically significant at the 95 percent confidence level for the Total Cost Model. This means that jurisdictional authority did not explain variation in the total cost of hazardous liquids pipeline incidents. The remainder of the exogenous variables in the Total Cost Model are significant in explaining variation in total incident costs. Interpretations of the statistically significant exogenous variables for the Total Cost Model are presented below:

- **Barrels Released:** Holding all other variables constant, for every one-barrel increase in release quantity, total incident cost can be expected to increase by 0.02 percent.

- **Offshore:** Holding all other variables constant, offshore total incident costs are expected to be 625 percent greater than onshore incident costs.
- **Pipe Diameter:** Holding all other variables constant, for every inch increase in pipeline diameter, total incident cost can be expected to increase by 4.71 percent.
- **Refined:** Holding all other variables constant, pipeline incidents involving refined petroleum products can be expected to cost 279 percent more than incidents involving highly volatile liquids.
- **Crude Oil:** Holding all other variables constant, pipeline incidents involving crude oil can be expected to cost 57 percent more than incidents involving highly volatile liquids.

### Barrels Released Model

The Barrels Released log-linear multivariate regression model uses the number of barrels released during hazardous liquids pipeline incidents as the endogenous variable. The exogenous variables, which we suspect may impact the number of barrels released, include:

- A *Jurisdiction* dummy variable;
- An *Offshore* dummy variable;
- A variable for pipeline diameter (*Pipe\_Diameter*);
- A variable for pipeline pressure (*Accident\_PSIG*), and;
- Six dummy variables representing various causes for incidents, which are:
  - The *Corrosion* variable, for incidents that are caused by a failure of metal pipeline equipment that has been degraded by oxidization.
  - The *Excavation* variable, for incidents where the operator, the operator's contractor, or a third party was performing excavation at the time of the incident;
  - The *Incorrect\_Operation* variable, for certain incidents caused by human error, including incorrectly opening or closing a valve, overfilling or overpressuring equipment, or mismarking underground pipeline equipment prior to excavation.
  - The *Material\_Weld\_Equip\_Failure* variable, for incidents caused by the failure of pipeline components such as welds, joints, couplings, pipe seams, pipe bodies, seals, or valves because of improper manufacturing, construction, installation processes or because of in-service related stresses.
  - The *Natural\_Force\_Damage* variable, for incidents where earth movement, temperature, high winds, lightning, heavy rains/floods, or a similar natural force event was at fault for the release.
  - The *Other\_Outside\_Force\_Damage* variable, for incidents caused by things such as electrical arcing, fire/explosion, intentional damage, maritime activity, and vehicles not engaged in excavation.
  - A seventh variable named *All\_Other\_Causes*, which is excluded from the Barrels Released Model, serves as the base from which the six cause variables above will be interpreted. This variable includes incidents where the cause was unknown or could not be identified.

The Barrels Released multivariate log-linear regression model takes the form of:

$$LN\_Barrels\_Released = B_0 + B_1(Accident\_PSIG) + B_2(Corrosion) + B_3(Excavation\_Damage) + B_4(Incorrect\_Operation) + B_5(Jurisdiction) + B_6(Material\_Weld\_Equip\_Failure) + B_7(Natural\_Force\_Damage) + B_8(Offshore) + B_9(Other\_Outside\_Force\_Damage) + B_{10}(Pipe\_Diameter)$$

where *LN\_Barrels\_Released* is the natural logarithm of the quantity of barrels released, the *Jurisdiction*, *Offshore*, and *Pipe\_Diameter* variables remain the same as when used in the Total Cost Model, the *Accident\_PSIG* is the estimated pipeline pressure in psig<sup>35</sup> at the point and time of the incident, and the six cause variables collectively capture variation in the quantity of barrels released due to different incident causes.

## Barrels Released Model Results and Discussion

Below are the results from the Barrels Released Model which include a correlation matrix (*Table A3*) and a regression statistics, coefficient estimates, and an analysis of variance (ANOVA) summary (*Table A4*).

**Table A3: Barrels Released Model Variable Correlation Matrix**

	<i>LN_Barrels_Released</i>	<i>PIPE_DIAMETER</i>	<i>ACCIDENT_PSIG</i>	<i>CORROSION</i>	<i>EXCAVATION</i>	<i>INCORRECT OPERATION</i>	<i>MATERIAL/WELD/EQUIP FAILURE</i>	<i>NATURAL FORCE</i>	<i>OTHER OUTSIDE FORCE</i>	<i>Jurisdiction</i>	<i>Offshore</i>
<i>LN_Barrels_Released</i>	1.000										
<i>PIPE_DIAMETER</i>	-0.009	1.000									
<i>ACCIDENT_PSIG</i>	0.133	-0.110	1.000								
<i>CORROSION</i>	-0.117	0.021	-0.261	1.000							
<i>EXCAVATION</i>	0.225	-0.130	0.020	-0.390	1.000						
<i>INCORRECT OPERATION</i>	0.049	0.049	0.021	-0.150	-0.089	1.000					
<i>MATERIAL/WELD/EQUIP FAILURE</i>	-0.163	0.106	0.308	-0.473	-0.280	-0.108	1.000				
<i>NATURAL FORCE DAMAGE</i>	0.094	-0.057	-0.049	-0.185	-0.110	-0.042	-0.133	1.000			
<i>OTHER OUTSIDE FORCE</i>	0.030	-0.052	0.001	-0.179	-0.106	-0.041	-0.128	-0.050	1.000		
<i>Jurisdiction</i>	-0.014	-0.055	-0.033	0.111	-0.013	-0.044	-0.092	-0.044	0.037	1.000	
<i>Offshore</i>	-0.073	0.039	-0.069	-0.072	-0.030	-0.021	-0.065	0.319	-0.025	-0.046	1.000

*Table A3* shows that the *Excavation* dummy (0.225), *Material\_Weld\_Equip\_Failure* dummy (-0.163), and *Accident\_PSIG* (0.133) variables have the strongest correlations with the endogenous variable. The correlation matrix shows weak relationships between the variables, particularly in our main exogenous variable of interest, *Jurisdiction*, which is near zero.

<sup>35</sup> Pounds per square inch gauge (psig), in this context, is a measure of the fluid pressure inside the pipeline relative to the outside pressure.

**Table A4: Barrels Released Model Summary**

<b>Model: Barrels Released</b>								
<b>Dependent Variable: LN_Barrels_Released</b>								
	<b>R-Squared</b>	<b>Adj.R-Sqr.</b>	<b>Std.Err.Reg.</b>	<b>Std.Dep.Var.</b>	<b># Fitted</b>	<b># Missing</b>	<b>t(2.50%,960)</b>	<b>Confidence</b>
	0.123	0.114	2.476	2.631	971	0	1.962	95.0%
<b>Variable</b>	<b>Coefficient</b>	<b>Std.Err.</b>	<b>t-Statistic</b>	<b>P-value</b>	<b>Lower95%</b>	<b>Upper95%</b>	<b>VIF</b>	<b>Std. Coeff.</b>
Constant	4.278	0.481	8.900	0.000	3.335	5.222	0.000	0.000
ACCIDENT_PSIG	0.001134	0.000210	5.410	0.000	0.000722	0.001545	1.157	0.176
CORROSION	-0.818	0.458	-1.786	0.074	-1.718	0.081	7.968	-0.152
EXCAVATION_DAMAGE	0.678	0.479	1.416	0.157	-0.262	1.617	5.527	0.101
INCORRECT_OPERATION	-0.001652	0.622	-0.003	0.998	-1.222	1.219	1.952	-0.000112
Jurisdiction	-0.066	0.167	-0.397	0.692	-0.394	0.261	1.023	-0.012
MATERIAL_WELD_EQUIP_FAILURE	-1.611	0.472	-3.413	0.001	-2.537	-0.685	6.675	-0.266
NATURAL_FORCE_DAMAGE	1.089	0.573	1.901	0.058	-0.035	2.213	2.442	0.090
Offshore	-2.818	0.765	-3.682	0.000	-4.320	-1.316	1.133	-0.118
OTHER_OUTSIDE_FORCE_DAMAGE	-0.197	0.576	-0.342	0.733	-1.327	0.933	2.322	-0.016
PIPE_DIAMETER	0.022	0.011	2.040	0.042	0.000853	0.044	1.060	0.063
<b>Source</b>	<b>Deg. Freedom</b>	<b>Sum Squares</b>	<b>Mean Square</b>	<b>F-Statistic</b>	<b>P-value</b>			
Regression	10	828.381	82.838	13.512	0.000			
Residual	960	5,886	6.131					
Total	970	6,714						

The above summary gives an R-squared value of 0.123. This means that just 12.3 percent of the variation in *Barrels\_Released* can be attributed to the variation of the exogenous variables. The results from the ANOVA summary show a significant P-value at all confidence levels for the F-statistic (13.512), therefore the hypothesis of zero slopes – that none of the exogenous variables being useful in the prediction of the endogenous variable – can be rejected. The slope coefficients for each exogenous variable are also shown in *Table A4* above. The Barrels Released Model equation with associated slope coefficients is:

$$\begin{aligned} \text{LN\_Barrels\_Released} = & 4.278 + 0.001134*\text{ACCIDENT\_PSIG} - 0.818*\text{CORROSION} + 0.678*\text{EXCAVATION\_DAMAGE} - \\ & 0.001652*\text{INCORRECT\_OPERATION} - 0.066*\text{Jurisdiction} - 1.611*\text{MATERIAL\_WELD\_EQUIP\_FAILURE} + \\ & 1.089*\text{NATURAL\_FORCE\_DAMAGE} - 2.818*\text{Offshore} - 0.197*\text{OTHER\_OUTSIDE\_FORCE\_DAMAGE} + \\ & 0.022*\text{PIPE\_DIAMETER} \end{aligned}$$

The associated P-value for *Jurisdiction* (0.695), is not statistically significant at the 95 percent confidence level for the Barrels Released Model. Thus, we find no statistically significant linear dependence of barrels released on jurisdiction. Corrosion (0.074), excavation damage (0.157), incorrect operation (0.998), natural force damage (0.058), and other outside force damage (0.733) were also not statistically significant at the 95 percent confidence level. The remainder of the exogenous variables in the model are significant in explaining variation in barrels released. Interpretations of the statistically significant exogenous variables for the Barrels Released Model are presented below:

- **Offshore:** Holding all other variables constant, incidents occurring offshore are expected to have 94 percent fewer unintentionally released barrels of hazardous liquids than incidents occurring onshore.

- **Material/Weld/Equipment Failure:** Holding all other variables constant, incidents caused by material/weld/equipment failure can be expected to have 80 percent fewer unintentionally released barrels of hazardous liquids than incidents caused by unidentified reasons.
- **Accident PSIG:** Holding all other variables constant, for every one-unit increase in pipeline pressure, the quantity of barrels released can be expected to increase by 0.11 percent.
- **Pipe Diameter:** Holding all other variables constant, for every one-inch increase in pipeline diameter, the quantity of barrels released can be expected to increase by 2.2 percent.

## Regression Analysis Findings

In both models the *Jurisdiction* dummy variable was not found to be statistically significant, suggesting that nationally, hazardous liquids pipelines under state jurisdiction are no more or less safe in terms of total incident cost or the quantity of barrels of hazardous liquids released than pipelines under federal jurisdiction. This is consistent with the findings from the Analysis of Descriptive Statistics, which also found no clear difference in overall safety performance between jurisdictions for the variables evaluated.

These conclusions are tempered somewhat by the models' relatively low R-squared values. Low R-squared values can sometimes be an indication of model misspecification or that a model fails to include relevant variables. Regarding this analysis, however, it is believed that the low explanatory power of the models is likely attributable to the overall randomness and complexity of hazardous liquids pipeline incidents. We argue that there are likely a litany of variables which could plausibly impact an incident's costs and release volumes, making reliable prediction of these characteristics extremely difficult.

Another noteworthy finding from the regression analyses was that the offshore dummy variable was significant for both the Total Cost and Barrels Released models. The Total Cost Model showed that hazardous liquids pipeline incidents occurring offshore were significantly more expensive (625 percent) than onshore incidents, even though the Barrels Released Model showed that hazardous liquids pipeline incidents occurring offshore release 94 percent fewer barrels than onshore incidents. Additionally, though not unexpectedly, pipeline diameter was also significant in both models.

C. Consider Legislation or Rulemaking to Improve Siting Process for New Petroleum Pipelines.

## Recommendations for Liquid Pipeline Siting

### Pipeline Safety Advisory Board Subcommittee

Travis Warner, Michigan Agency for Energy – Subcommittee Chair

Jennifer McKay, Tip of the Mitt Watershed Council – Subcommittee Member

Shawn Lyon, Marathon Pipeline LLC – Subcommittee Member

## I. Background

At the June 12, 2017 meeting of the Michigan Pipeline Safety Advisory Board (PSAB), a subcommittee was created and tasked with addressing an item listed in Executive Order No. 2015-14 creating the PSAB. The charge below was the focus of this subcommittee.

*4. Review and make recommendations on state policies and procedures regarding pipeline siting.*

The subcommittee was tasked with developing a document that addresses this charge and will be considered by the PSAB for further recommendation. As the designee on the PSAB for Michigan Public Service Commission Chairman, Sally Talberg, Travis Warner was designated to serve as chair of this subcommittee. Jennifer McKay, Policy Director for Tip of the Mitt Watershed Council, and Shawn Lyon, Vice President of Operations for Marathon Pipe Line LLC, volunteered and were designated as members of the subcommittee.

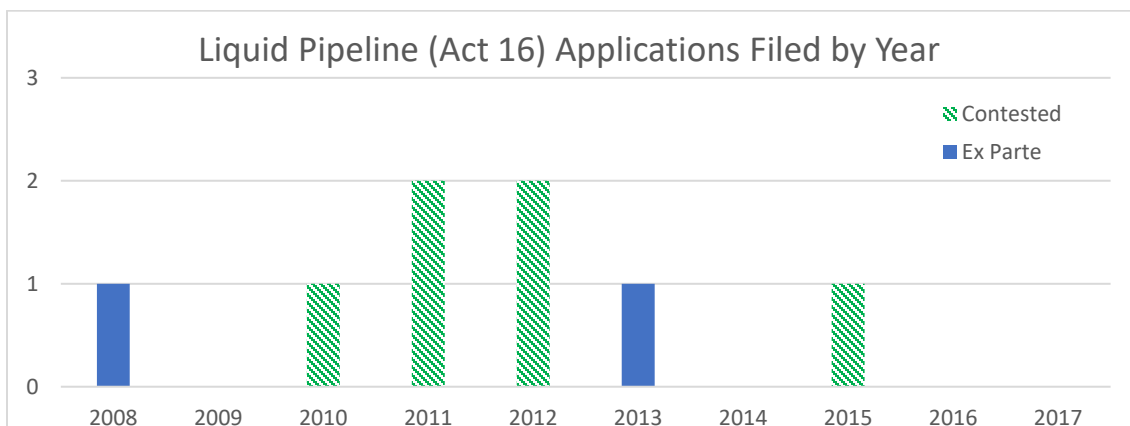
## A. Hazardous Liquid Pipeline Siting

In the U.S., siting decisions for interstate and intrastate liquid pipelines are made at the state and local level. Unless the proposed project crosses federal lands, there are no required approvals from federal agencies prior to construction. State involvement varies significantly relating to liquid pipeline siting. Some states have virtually no involvement in siting while other states have an extensive review and approval processes. In Michigan, siting authority for crude oil and petroleum product pipeline siting is granted to the Michigan Public Service Commission (“MPSC” or “Commission”) under [Public Act 16 of 1929](#) (Act 16) MCL 483.1 et seq.

Act 16 grants the MPSC broad power to “control, investigate, and regulate a person....(b) engaging in the business of piping, transporting or storing crude oil or petroleum, or any of the products thereof, or carbon dioxide substances within this state.” MCL 483.3(1)(b) Further the statute provides that a “person” as defined is “granted the right to condemn property by eminent domain..... (a) to transport crude oil or petroleum or carbon dioxide substances and (b) to locate, lay, construct, maintain and operate pipelines for the purposes of subdivision (a).” MCL 483.2 Act 16 also allows the Commission to “make all rules, regulations, and orders, necessary to give effect to and enforce the provisions of this act.” MCL 483.8 To date, the Commission has not enacted any rules under Act 16. In addition to the

statute, Michigan Administrative Rule R 792.10447 contains minimum requirements for information that must be included in any application. This includes the name and address of the applicant; the city, village, or township affected; and the nature of the utility service to be furnished.

The MPSC has processed eight applications under Act 16 over the past decade. The graph below shows the number of applications filed by year to provide context for this document. During this time period, the MPSC has received an average of 0.8 liquid pipeline applications per year. It should be noted that four of the five applications processed between 2011 and 2013 related to construction of one pipeline, however, each application was handled independently by the MPSC. Also of note, all of the projects below were eventually approved by the MPSC either by its own approval or approval of a settlement agreement between the parties involved.



## B. Current Hearing Process and Public Involvement

Once an application under Act 16 is received, MPSC staff review the application and make a determination if it can be handled on an *ex parte* basis, foregoing a full hearing process, and saving time and expense for all parties involved. Applications handled on an *ex parte* basis are typically shorter and smaller diameter projects for which the applicant has already acquired all the necessary rights of way. In these cases, MPSC staff work directly with the applicant to review the application and draft an approval order for submission to the Commission for consideration. Any project that requires new right of way or involves highly developed or environmentally sensitive areas triggers a formal administrative hearing, beginning with a prehearing conference. Upon scheduling a prehearing conference, the MPSC's Executive Secretary sets forth noticing requirements the applicant must meet prior to the prehearing conference. While noticing requirements for Act 16 applications are not detailed in the statute, as a matter of administrative practice, the Executive Secretary requires the applicant to provide notice to each landowner from whom it has not acquired the property rights for the proposed pipeline, and to all cities, incorporated villages, townships, and counties which may be traversed by the proposed pipeline. In addition, the Executive Secretary requires the notice of hearing to be published in daily newspapers in the counties that the proposed pipeline would traverse. Any interested parties may file petitions to intervene within the time frame designated in the notice of hearing. At the prehearing conference, the Administrative Law Judge (ALJ) sets a schedule for the case and rules on any petitions to intervene.



From this point, the hearing process proceeds according to the [Rules for Practice and Procedure Before the Commission](#). After the evidentiary portion of the process, the Administrative Law Judge files a Proposal for Decision to be considered by the Commission for a final decision. In limited cases, the Commission may choose to forego the Proposal for Decision step and “read the record,” shortening the time in which the final decision is made. At any point after an application is filed, the MPSC welcomes public comment in either written or verbal form. Comments are posted to the e-docket or included in the hearing transcript.

## C. Current MPSC Basis for Decisions

Act 16 does not provide guidance relating to specific criteria that the Commission should consider in making its decision relating to pipeline applications. Historically, this has resulted in varying interpretations for how applications should be handled. In 2012, the Commission issued an order in docket no. U-17020, which stated:

“.... Generally, the Commission will grant an application pursuant to Act 16 when it finds that (1) the applicant has demonstrated a public need for the proposed pipeline, (2) the proposed pipeline is designed and routed in a reasonable manner, and (3) the construction of the pipeline will meet or exceed current safety and engineering standards.”

These points are broad and require additional context as they apply to real situations.

### (1) The applicant has demonstrated a public need for the proposed pipeline.

This requirement is broad and includes a wide array of variables. Liquid pipelines are generally proposed to either replace aging infrastructure, or to satisfy a market imbalance by constructing additional infrastructure. In some cases, both needs may be met by a single project. The “public need” of a project is generally described as the short and long term local, statewide, regional, or national benefits to a project. These benefits are often difficult to quantify, and the protected nature of the industry adds to the difficulty of acquiring the information necessary to make this determination.

### (2) The proposed pipeline is designed and routed in a reasonable manner.

The route proposed by the applicant is typically reviewed in detail by the MPSC staff. Route considerations typically involve human impacts and environmental impacts. Human impacts often relate to the proximity of the pipeline to dwellings, the number of landowners impacted, the amount of new right-of-way needed, and the inconvenience to landowners caused during construction. Under the Michigan Environmental Protection Act the MPSC must consider the impact of the proposed pipelines on the environment. Specifically, past case law explains that the MPSC must consider:

- i. Whether the proposed project would impair the environment;
- ii. Whether there was a feasible and prudent alternative to the impairment; and,
- iii. Whether the impairment was consistent with the promotion of the public health, safety, and welfare in light of the state’s paramount concern for the protection of its natural

resources from pollution, impairment or destruction. *State Hwy Comm v Vanderkloot*, 329 Mich 159, 185; 220 NW2d 416 (1974)

Environmental impacts generally consist of short and long-term impacts of the construction and operation of the pipeline. Short-term impacts may include tree clearing, interruptions to farming or other land use, waterbody crossings, and any other impacts to a previously undisturbed area. Long-term impacts of a safely operated pipeline are generally limited to pipeline and right of way maintenance but there is some amount of environmental risk due to the potential for a rupture or spill. The hearing process allows for parties in the case (in addition to MPSC staff) to provide testimony relating to the route and environmental impact. In many cases, staff has proposed alternative routes in its testimony or coordinated with the applicant and intervenors to make variations to the proposed route through a settlement agreement. In recent years, in part due to recommendations by the Michigan Petroleum Pipeline Task Force Report, the MPSC staff has solicited input from other state and federal agencies in reviewing applications, primarily with regard to routing. These agencies include the Michigan Department of Environmental Quality (MDEQ), the Michigan Department of Natural Resources (MDNR), the Michigan Department of Transportation (MDOT), the Pipeline and Hazardous Materials Safety Administration (PHMSA), and the Michigan State Historic Preservation Office (MSHPO). For recent pipeline applications, MPSC staff also hosted meetings and invited these agencies to review the route and discuss specific issues that warrant additional consideration. Staff utilized this information in testimony that was ultimately considered by the Commission in those decisions.

(3) The construction of the pipeline will meet or exceed current safety and engineering standards.

While this requirement is critically important to all pipeline construction, the MPSC currently does not oversee the safety of hazardous liquid pipelines. This oversight is currently managed by the U.S. Department of Transportation's PHMSA, acting through the Office of Pipeline Safety. The Office of Pipeline Safety is responsible for the enforcement of 49 CFR Part 195 which includes requirements for design, construction, pressure testing, operation and maintenance, operator qualification, and corrosion control. In a recent case, the MPSC staff asked PHMSA to review the proposed specifications and provided PHMSA's determination as an exhibit to testimony in the case. This was sufficient to satisfy this requirement. Although PHMSA is the governing body in these cases, this should remain a major consideration in Act 16 proceedings.

## D. Staff Time and Expense

In 1973, the MPSC instituted a fee schedule for Act 16 applications. The fee was \$100 for a pipeline under 25 miles in length and an additional \$50 for each additional 25 miles. This fee schedule remained in effect until the Commission's order on March 10, 2017 in Case No. U-18115 adjusted the fee schedule. The resulting fees for an Act 16 filing approved by the order are \$2,000 for a filing that can be handled *ex parte*, and \$10,000 for a filing that is subject to the hearing process. Although the time requirement for pipeline cases can vary greatly, there was insufficient data available from past cases to create a more precise fee schedule. The Commission opted for a two-tier structure and stated that, "These changes will bring a much-needed update to the fee structure and will mitigate any concern that other regulated sectors are subsidizing gas producers and pipeline operators."

## II. Consensus Subcommittee Recommendations

### 1) Promote public awareness and participation.

The process of siting pipelines can be overwhelming to members of the general public that have never been involved in a similar process. Without an effective means for getting questions answered, public stakeholders may be left confused by the potential impacts of a project and how they can participate. The subcommittee has several recommendations that the State should consider implementing to promote public awareness and participation:

- a) Develop a comprehensive guide describing Michigan's siting process for pipelines. At a minimum, the guide should include:
  - i. Relevant rules and statutes and how they apply. A focus should be on the MPSC's authority, eminent domain, the hearing process, etc.
  - ii. Detailed explanation of the MPSC hearing process and typical schedule.
  - iii. How and when the public may file written or verbal comments, petition to intervene, or otherwise participate in the process.
  - iv. Information that should be included in an application.
  - v. Criteria that the MPSC will consider in its decision.
- b) If needed, the MPSC should schedule a separate hearing dedicated to receiving public comment.
- c) Leverage the MPSC's updated e-docket system to make information easily accessible to the public on proposed pipeline projects.
- d) Allow for the option to sign up for an email distribution list that would notify subscribers of applications or other relevant filings.
- e) Require companies proposing a pipeline project to hold one or more public outreach events as determined in the pre-application meeting with MPSC staff, described further in Recommendation #3 below.
- f) Designate and post contact information for a member (or members) of the MPSC staff as a resource for questions relating to each case.
- g) Promote involvement from local governments and organizations with local interests and knowledge. Prioritize MPSC staff availability to meet with the applicant and/or other stakeholders and discuss concerns or considerations with the project.

### 2) Codify and improve noticing requirements.

As discussed above, any application that is not handled *ex parte* triggers a formal administrative hearing process and the MPSC's Executive Secretary schedules a Prehearing Conference and prescribes specific noticing requirements. Under the Michigan Administrative Hearing Rules, these notices must be provided no less than 14 days prior to the date set for the prehearing conference. While there are general noticing requirements within the Michigan Administrative Hearing Rules, requirements for who must be noticed for Act 16 applications are not defined and are instead set by the Executive Secretary for each case. Current practice is to require notification to affected landowners for which the company has not yet acquired rights of way and to include a copy of the notice of hearing in local newspapers. To

codify existing noticing practice, promote additional state agency involvement, and promote public involvement earlier in the process; the subcommittee recommends that:

- a) The noticing requirements currently utilized by the MPSC's Executive Secretary for Act 16 applications be formalized through statute or rule. Specifically, applicants should be required to:
  - i. Provide notice to each landowner from whom it has not acquired the property rights for the proposed pipeline.
  - ii. Provide notice to all cities, incorporated villages, townships, and counties which may be traversed by the proposed pipeline.
  - iii. Publish the notice of hearing in daily newspapers in the counties that the proposed pipeline would traverse.
- b) The MPSC's Executive Secretary should include additional State agencies in noticing requirements for Act 16 applications. These agencies should include the MDEQ, MDNR, MDOT, MSHPO, and any additional agencies deemed appropriate by the Executive Secretary and the MPSC Case Coordinator.

### **3) Codify and improve application requirements.**

The subcommittee recommends that application requirements should be added to Act 16 as an amendment or through new rules promulgated under the statute. This recommendation would promote complete application filings allowing a more efficient and thorough review by the public, the MPSC and its staff. This would provide an additional benefit to industry by clearly stating what information is expected to be included in an application. Specific recommendations include:

- a) Require applicant to present a pre-application draft to MPSC staff and meet to discuss any obvious deficiencies prior to filing and a public outreach plan including dates and locations for public outreach events. The number and locations of public events should be appropriate for the project and should be approved by the MPSC Staff.
- b) Require the following information to be included in Act 16 applications in addition to any other relevant considerations.

#### *Proposed Application Requirements for Public Need Analysis*

- Overall purpose of the project and the need that the project is intended to satisfy, including but not limited to:
  - Public safety
  - Energy reliability
  - Market imbalances
  - Economic drivers
  - Environmental stewardship
- Explanation of system level alternatives that were considered to meet the above needs and why they were not chosen as the preferred option. Alternatives may include:
  - No action
  - Utilizing available capacity in existing infrastructure
  - Upgrading or re-configuring existing facilities or infrastructure

- Short and long term market considerations for the product to be transported, which may include energy conservation efforts, future supply and demand trends, effects of governmental policy, etc.
- Anticipated benefits to local, state, and regional residents.
- Estimated construction costs of the project.

*Proposed Application Requirements for Routing and Construction Analysis*

- An explicit statement from the applicant that the project will comply with any and all federal and state safety requirements.
- Provide the Company's response plan for the proposed pipeline as required 49 CFR Part 194.
- A list of all required permits for the project, including the responsible agency and the application status.
- Complete engineering and operating specifications.
- Addresses for properties in which the pipeline will cross within 25 feet and details on methods for mitigating inconveniences caused by construction to homeowners and businesses.
- Road crossings and the type of construction proposed.
- Other underground facilities located within the proposed right of way.

*Proposed Application Requirements for Alternative Route Analysis*

- A description of major route alternatives including details relating to location, cost, technology to be employed, etc.
- A comparative environmental impact analysis for major route alternatives considered. At a minimum, the analysis should include a map, a description of the habitats traversed and proposed methods of installation for each route alternative.

*Proposed Application Requirements for an Environmental Impact Review*

- Explanation for how the company will avoid, minimize, and mitigate any impairments to the environment.
- Documented threatened or endangered species habitats located within the proposed right of way or would otherwise be affected by construction.
- Areas where invasive species have been observed or identified at proposed construction sites and mitigation methods that would be used to minimize the spread of the invasive species.
- Historical or culturally sensitive areas within the proposed right of way.
- Sensitive natural resources within the proposed right of way, including:
  - Federally designated wild and scenic rivers,
  - State or federally designated wilderness or environmental areas, and
  - Rare or unique ecological types.
- Proposed permanent right of way and temporary work space requirements.
- A re-vegetation and site restoration plan.
- Waterbody crossings and the type of construction proposed. (including wetland, river, stream, and drain crossings)
- Storm water management plan and erosion control methods.
- Recreational sites within the area affected by construction and operation of the facility.

#### **4) Expand the environmental impact review process to include other state agencies.**

The subcommittee recommends that the MPSC design a process for gathering and incorporating input from other state and federal agencies in a timely manner to inform the MPSC's decisions. Relevant agencies, including the MDEQ, MDNR, MDOT and MSHPO, should sign a memorandum of understanding with the MPSC to implement this process and dedicate necessary resources for cases that necessitate certain agency involvement. The goal would be to assist the Commission in determining the most feasible and prudent route and to avoid potential conflicts in agency-specific permitting processes that may arise after the MPSC's decision. Any eventual MPSC decision under Act 16 should not be construed to satisfy the requirements of any other statute or environmental review.

#### **5) Codify the criteria used by the MPSC in making decisions.**

Act 16 does not provide specific criteria for the Commission and its staff to consider in decisions relating to applications. The MPSC has used the three general requirements mentioned above to make its determination in recent cases. The subcommittee recommends that similar versions of those requirements listed below should be adopted as an amendment to Act 16 or as rules under the statute. These would provide consistent interpretation of the criteria that will be considered in future applications which will assist applicants in drafting applications and will help to guide MPSC staff's review.

- (1) the applicant has demonstrated that the public need for the proposed pipeline outweighs the impact to the public and the environment.
- (2) the proposed pipeline is designed and routed in a reasonable manner with no feasible and prudent alternative.
- (3) the construction of the pipeline will meet or exceed current safety and engineering standards established and enforced by the Pipeline and Hazardous Materials Safety Administration.

#### **6) Tribal Consultation**

Proposed pipelines could impact tribal lands and property, as well as rights protected under treaties. Currently there is no formal Tribal consultation process with Michigan's federally recognized Tribes for pipeline siting. For each application that is filed, the subcommittee recommends that MPSC case coordinator should consult with the State and MPSC tribal liaisons and make a determination if formal tribal consultation is needed. Any consultation should involve participation from MPSC leadership and staff. Additionally, written record of the consultation should be submitted to the case docket.

#### **7) Track staff time and expense required for review.**

As discussed above, applicants are required to pay up to \$10,000 for an application under Act 16. Costs associated with the application review typically consist of time requirements for multiple members of staff, staff's counsel, the ALJ, and the Commission. As discussed in Case No. U-18115, resources required to review applications vary significantly depending on the size and nature of the

project but the fees established in this case are sufficient to cover expenses for the majority of applications. That said, cases have infrequently exceeded this amount in the past. Staff resources to review applications have not been tracked historically so the incremental amount is not accurately known. The subcommittee recommends that all State staff involved in liquid pipeline siting cases begin tracking resource requirements for pipeline cases handled by the Commission. Tracking and maintaining basic data relating to these expenses would help to determine future fee increases or the financial impacts of changes in the review process.

### III. Recommendations for Further Discussion

#### 1) Siting of Crude Oil and Petroleum Product Pipelines in or beneath the Great Lakes

There are a number of pipelines within the Great Lakes Basin. There exists only one hazardous liquids pipeline in the open waters of the Great Lakes. Open waters of the Great Lakes is defined as the waters above lands covered per Part 325, Michigan's Submerged Lands Act of the NREPA: "the lands covered and affected by this part are all of the unpatented lake bottomlands and unpatented made lands in the Great Lakes, including the bays and harbors of the Great Lakes, belonging to the state or held in trust by it, including those lands that have been artificially filled in." A pipeline located in these open waters of the Great Lakes has the potential to undermine the health of the Great Lakes. To address this concern, the subcommittee agreed that three recommendation variations should be presented to the PSAB for further discussion. For the purpose of these recommendations, "pipeline" should be defined as those that fall under the current authority granted by Act 16.

Variations to consider:

1. Amend Act 16 to prohibit the authorization of pipelines on or beneath the lake bottomlands of the Great Lakes, per Part 325.
2. Amend Act 16 to prohibit the authorization of exposed pipelines on the lake bottomlands of the Great Lakes, per Part 325. Pipelines constructed beneath the lake bottomlands may be authorized if it can be shown that the risk of product reaching the Great Lakes is minimal and that the pipeline will be constructed and operated with minimal adverse impact to the environment and landowners. Further, construction could be prohibited if the pipeline would not meet a pre-determined depth threshold beneath the lakebed. If adopted, this depth threshold would require additional analysis and discussion.
3. Allow MPSC to determine appropriate siting for pipelines in Michigan based upon Act 16 and any associated rules. Ensure MPSC procedures provide appropriate environmental safeguards for the Great Lakes and preserve flexibility to accommodate future energy demands of all Michigan residents.



## 2) Environmental Justice Analysis

In February of 2017, Governor Rick Snyder created the Environmental Justice Work Group (EJWG). The EJWG was formed “to develop and provide recommendations to the Governor that improve environmental justice awareness and engagement in state and local agencies” and to “examine policy and recommend for implementation environmental justice guidance, training, curriculum, and policy that further increases quality of life for all Michiganders.” A report generated by the EJWG in March, 2018 includes a list of twenty-four Policy Recommendations that are meant to provide a framework for Michigan in advancing environmental justice. Policy Recommendation #3, included below, could be interpreted to apply to pipeline projects.

### *3. Require environmental justice analysis in permitting applications (consensus)*

- The State shall require all environmental permit applicants (and transportation projects) to provide an environmental justice analysis that evaluates the impact, and any disproportionate impact, of the permitted activity on environmental justice communities, and any steps that can be taken to reduce or eliminate such impacts.*

The subcommittee discussed this to some extent but due to time constraints and the need for additional context surrounding the recommendation, has chosen not to adopt this as a consensus recommendation specific to Act 16 applications. Furthermore, the subcommittee has included this as a topic for additional discussion for the PSAB.

- D. Review and make recommendations on state policies and procedures regarding emergency response and planning for pipelines.

## **State Policies on Emergency Response and Planning for Pipelines**

Information sharing with elected officials:

If the Governor's office requests information on an emergency from any state agency director, deputy director, or emergency management coordinator (EMC); that agency EMC will forward information to the Michigan State Police, Emergency Management and Homeland Security Division's (MSP/EMHSD) duty officer who may work with the MSP/EMHSD command to set an initial briefing call to discuss the event and formalize an information sharing chain. At a minimum the MSP/EMHSD will facilitate the passing of information to the Governor's office. The MSP/EMHSD is the designated emergency management program for the State, and any emergency situation that may impact residents of the state or requires multiple local or state agency involvement should flow through MSP/EMHSD for information sharing purposes. MSP/EMHSD may not take a leadership role in the management of an incident if it falls within the authority of a state agency (i.e. dam safety, drinking water system issues, or contaminated site clean-up for the Michigan Department of Environmental Quality (MDEQ)). The MSP/EMHSD will assemble information from various sources and provide the Governor's office a daily brief.

During major events, regular briefings may be established after the initial call as incident or agency heads require them, including participation from: local leaders, the legislature, and the congressional delegation.

Ensuring adequate planning and training coordination:

- The MSP/EMHSD as the state emergency management lead will continue to work with local, state, and federal agencies to incorporate high-risk emergency situations into their planning documents. All state agencies will collaborate on updating the all-hazards Michigan Emergency Management Plan (MEMP) annually.
- The United States Coast Guard completes [Area Contingency Plans \(ACP\)](#) for all the great lakes and connector waterways. These ACP's are updated annually, with larger evaluation and editing completed every four years. The update of these plans is completed by the Area Committee designated for each geographical area. The MDEQ EMC will work with each area committee to disseminate information to all applicable state agencies and subject matter experts.
- Special strategies for responding to an oil-in-water situation require quick development and execution of specialized tactics. One of these tactics being In-

situ Burning, the MDEQ will continue working with the US Coast Guard and EPA on ensuring pre-planning and internal processes are established.

- Yearly, MSP/EMHSD conducts a state training and exercise workshop for local and state agencies to compile training that will be completed in the upcoming year. This is also an opportunity to discuss training needs and emerging issues that need additional exploration to build the state's emergency response capabilities. This workshop is integral in coordinating any multi-jurisdictional training or exercise needs for pipeline safety or oil-in-water response.
- Local fire and emergency management teams could benefit from a public outreach/planning coordinator from major pipeline/transmission companies. Major rail lines have a public outreach/emergency planning individual (dangerous goods officer) that works with local fire to identify hazards within the rail industry.
- All state agency Public Information Officer's should participate in an emergency response Joint Information Center to be familiar with processes and procedures for coordinating public messaging among multiple agencies when part of a Unified Command.

From MSP/EMHSD

## **PIPELINE TRAINING AND EXERCISE**

### **Training:**

- Fiscal Year 2018, Quarter 1: Paradigm Liaison Services - Coordinated Response Pipeline Safety Training (Ingham County, Delhi Township)
- Fiscal Year 2018, Quarter 2: Pipeline Safety Training (Hillsdale County)
- Fiscal Year 2018, Quarter 2: Pipeline Response Training (Macomb County)
- Feb 7, 2018: Pipeline Safety Program - Community responders were invited to a meet and greet and a one-hour training refresher. (Hosted in Berrien County, Berrien County and Cass County attended)
- February 2018: HazMat Pipeline Responder Training (Washtenaw County)
- March 14, 2018: Pipeline Training (Roscommon County)
- August 2018: Crude Oil Trans. For Decision Makers Training (Otsego County)
- February 2019: HazMat Pipeline Training (Washtenaw County)
- December 2019: Pipeline Training (St. Joseph County)
- February 2020: HazMat Pipeline Responder Training (Washtenaw County)
- December 2020: Pipeline Training (Van Buren County)

Emergency Management and Homeland Security Training Center (EMHSTC) has provided training to Pipeline facilities in Michigan: Wolverine, Buckeye, Miller (to name a few). These pipeline facilities typically train their personnel to manage releases at their terminal or pumping station locations. Some are Haz Mat Tech others are Haz Mat Operations with Incident Command training.

First responder training is available for jurisdictions by contacting the pipeline company running through their jurisdiction. Awareness level training typically provided.

EMHSTC delivers pipeline training in their technician level program and operations programs. This is primarily information sharing

EMHSTC is reviewing needs and specific training options for managing pipeline releases through a one-day workshop.

Training should be jurisdictional specific and those potentially affected are responsible for planning and response to hazmat spills and releases.

#### **Planned Exercises:**

- January 2019: USCG Oil Spill (Presque Isle Township)
- January 2020: USCG Oil Spill (Presque Isle Township)

MSP/EMHSD is in contact with the US Coast Guard on exercises and will integrate as appropriate.

#### **Additional Information:**

CoRE Program - Training with pipeline and gas distribution companies within communities is offered, including participation in a simulated product release and work discussion based exercise. This program is facilitated by Paradigm Liaison Services and F/Lt. Joseph Shier, Sault Ste. Marie Post, Eighth District, Michigan State Police.

#### **Recommendations for Petroleum Pipeline Safety Task Force Consideration**

Based on analysis of current response capabilities and procedures, the following four recommendations will ensure all-hazard plans fully address the risks from petroleum transportation.

1. The state emergency management lead continues to work with local, state, and federal agencies to incorporate high-risk emergency situations into their planning documents including pipeline and oil-in-water/hazardous material response.
  - Path to achieving recommendation: The Michigan State Police, Emergency Management and Homeland Security Division (MSP/EMHSD) will review and update the Michigan Emergency Management Plan (MEMP) to include additional information on pipeline emergency response, hazardous material response planning, and oil-in-water planning. Additional stand-alone plans will be reviewed and updated as needed to reflect the changes made in the MEMP.

2. The DEQ Emergency Management Coordinator will work with each US Coast Guard Area Committee to disseminate information to all applicable state agencies and subject matter experts.
  - Path to achieving recommendation: The DEQ Emergency Management Coordinator will lead the departmental review of Area Contingency Plans. Various other staff serve on Area Committees, but the DEQ Emergency Management Coordinator will be the formal point of contact for updating and reviewing the plans. The plans will be sent to appropriate DEQ and other state agency staff to review and provide comments.
3. Major pipeline utilities designate a hazardous goods/safety training position to assist local emergency management, fire, and police in emergency planning and training preparation for response to pipelines.
  - Path to achieving recommendation: Major pipeline operators in the state should provide a person to act as a liaison between local fire, police, and emergency management, for emergency planning and preparedness training.
4. All state agency public information officers (PIO) should participate in an emergency response Joint Information Center to be familiar with processes and procedures for coordinating public messaging among multiple agencies when part of a Unified Command.
  - Path to achieving recommendation: State agency PIO's should be familiar with the operation of a joint information center that is run following guidance from FEMA. State agency PIO's should be familiar with the operation of the State Emergency Operations Center PIO. Regular drills and exercises are available for PIO's to be able to practice. These are coordinated by MSP/EMHSD.



November 27, 2017

The Honorable Rick Snyder  
Governor, State of Michigan  
Romney Building  
111 S. Capitol Avenue  
P.O. Box 30013  
Lansing MI 48909  
USA

Dear Governor Snyder:

This agreement, which is signed today between Enbridge and the State of Michigan, sets forward a plan to improve coordination between Enbridge and the State for the operation and maintenance of Enbridge's Line 5 pipeline located in Michigan, while providing enhanced transparency to the citizens of Michigan.

Enbridge is committed to the letter and spirit of this important agreement and to the actions outlined in the agreement that move us toward a longer-term set of decisions about the future of pipeline operations. We strongly affirm our recognition of the Great Lakes as an international treasure that must be preserved now and for future generations.

We appreciate the emphasis that you, other state leaders and the public place on the stewardship responsibilities that come with being part of the Great Lakes community. We also will do our part through the meaningful and concrete actions contained in this agreement.

Sincerely,

A handwritten signature in black ink, appearing to read 'Al Monson'.

**AGREEMENT BETWEEN THE STATE OF MICHIGAN AND ENBRIDGE ENERGY,  
LIMITED PARTNERSHIP AND ENBRIDGE ENERGY COMPANY, INC.**

This Agreement is entered between the State of Michigan (referred to herein as “the State”), AND Enbridge Energy, Limited Partnership and Enbridge Energy Company, Inc., formerly known as Lakehead Pipe Line Company, Inc. (collectively referred to herein as “Enbridge”) concerning those segments of Enbridge’s Line 5 that are located within the State of Michigan.

WHEREAS, the segments of Line 5 located within Michigan extend 547 miles, from the border of Wisconsin near Ironwood, Michigan to Marysville, Michigan, where it crosses the St. Clair River to the border with Sarnia, Ontario (“St. Clair River Crossing”);

WHEREAS, the segments of Line 5 located within Michigan must be operated and maintained in compliance with all applicable laws that are intended to protect the public health, safety, and welfare and prevent pollution, impairment, or destruction of the natural resources of the State of Michigan, including the unique resources of the Great Lakes;

WHEREAS, the continued operation of Line 5 through the State of Michigan serves important public needs by providing substantial volumes of propane to meet the needs of Michigan citizens, supporting businesses in Michigan, and transporting essential products, including Michigan-produced oil to refineries and manufacturers;

WHEREAS, the State issued an “Easement” to Lakehead Pipeline Company, Inc. (“Lakehead”), subsequently renamed Enbridge Energy Company, Inc., on April 23, 1953 pursuant to Act No. 10, PA 1953 “for the purpose of erecting, laying, maintaining and operating” an approximate 4-mile segment of Line 5 across the Straits of Mackinac (“Straits”) upon determining that such crossing would “be of benefit to all of the people of the State of Michigan and in furtherance of the public welfare”;

WHEREAS, in accordance with the Easement, Enbridge constructed two parallel pipelines, each 4.09-miles long (referred to herein as the “Dual Pipelines”) across the Straits in 1953 (referred to as the “Straits Crossing”), and since that time continues to operate and maintain such pipelines as part of Line 5;

WHEREAS, the State and Enbridge recognize that the Straits Crossing and the St. Clair River Crossing are located in the Great Lakes and connecting waters that include and are in proximity to unique ecological and natural resources that are of vital significance to the State and its residents, to tribal governments and their members, to public water supplies, and to the regional economy and the Crossings are also present in important infrastructure corridors;

WHEREAS, the State and Enbridge recognize that other important ecological and natural resources are located near other segments of Line 5 that cross or approach other waters of the State that are also of vital significance to the State and its residents, to tribal governments and their members, to public water supplies, and to the regional economy;

WHEREAS, the State and Enbridge desire to establish additional measures and undertake further studies with respect to certain matters related to Enbridge's stewardship of Line 5 within Michigan and the transparency of its operation;

WHEREAS, the State acknowledges that the stipulations specified in this Agreement are intended to further protect ecological and natural resources held in public trust by the State of Michigan, and that the terms of this Agreement will serve Enbridge's interest by providing clarity as to State's expectations concerning the safety and integrity of Line 5;

NOW, THEREFORE, the parties further agree as set forth below.

## **I. STIPULATIONS**

Enbridge and the State agree to the following measures, which are designed to increase coordination between the State and Enbridge concerning the operation and maintenance of Enbridge's Line 5 pipeline located in the State of Michigan, including enhancing its operation in the interest of the citizens of Michigan.

A. Increased Coordination Between the State and Enbridge: In order to enhance coordination with the State concerning the operation and maintenance of Line 5 located in the State of Michigan, and to facilitate the implementation of the measures described at Paragraphs B-G below, the Parties agree as follows:

1. The State will provide in a timely fashion and at its own costs, personnel to participate in the Evaluations and Assessments specified in Paragraphs D-G, and will initially designate such personnel within 30 days of execution of this Agreement. In the event that the State does not designate such personnel by the time that Enbridge is ready to move forward with such Evaluations and Assessments, Enbridge may proceed with initiating the Evaluations and Assessments specified in Paragraphs D-G before the State has designated personnel to participate, provided that Enbridge will update such personnel on any work done prior to their participation.
2. The State will further provide designated representatives to participate in the stewardship and transparency consultations and communications to be carried out under this Agreement.



3. Enbridge will provide the State's representative with the opportunity to fully and directly participate in the preparation of Studies and Assessments specified in Paragraphs D-G below. As part of this effort, Enbridge will make available to the State's representative data and other materials generated under this Agreement, including but not limited to geologic, engineering, or other technological information concerning Line 5 located in the State of Michigan and Enbridge's implementation of the measures described herein. Enbridge will also make available to the State all requested information concerning the operation, integrity management, leak detection, control room operations, and emergency preparedness for Enbridge's Line 5 pipeline located in the State of Michigan. Enbridge and the State agree to work cooperatively to identify the nature and scope of the information to be provided, focusing on that which is most relevant to the State's interests.
4. Enbridge will facilitate the ability of State-designated representatives to participate in semi-annual reviews that Enbridge agrees to conduct to assess the operating plans for Enbridge's Line 5 located within the State of Michigan.
5. Enbridge and representatives designated by the State agree to meet semi-annually to discuss any changes to engineering parameters, risks, new technologies, and innovations pertaining to the operation and maintenance of Line 5 located within the State of Michigan and the U.S. portion of the St. Clair River Crossing.

B. Replacement of Line 5 St. Clair River Crossing: Enbridge will seek all US and Canadian authorizations and approvals (hereinafter "authorizations and approvals") necessary to replace Line 5's crossing of the St. Clair River ("St. Clair River Crossing") by the use of a horizontal directional drill ("HDD") method as expeditiously as practicable. Enbridge will begin compiling the information to support all applications for the authorizations and approvals necessary for the replacement of the St. Clair River Crossing upon the execution of this Agreement. By December 31, 2017, Enbridge will request pre-application consultations with the US regulatory agencies for which such pre-application consultations are necessary regarding the contents and requirements for the US authorizations and approvals for the replacement of the St. Clair River Crossing. Enbridge will report to the State the status of Enbridge's efforts to prepare applications for the US authorizations and approvals following completion of pre-application consultations. By February 28, 2018, Enbridge will file applications to seek all permits issued by the State of Michigan and by any of its political subdivisions necessary for the replacement of the St. Clair River Crossing, excluding those State of Michigan applications that are filed jointly with US federal agencies, including but not limited to the U.S. Army Corps of Engineers. No later than 240 days of the date on which this Agreement is fully executed, Enbridge will file

applications to seek all US federal and Canadian authorizations and approvals necessary for the replacement of the St. Clair River Crossing. No later than 180 days after obtaining all authorizations and approvals necessary to replace Line 5's crossing of the St. Clair River by the use of a HDD method, Enbridge will initiate the work necessary to replace that segment of Line 5.

C. Discontinuation of Line 5 Operations in the Straits During Sustained Adverse Weather Conditions: Enbridge will temporarily shut-down the operation of the Dual Pipelines while "Sustained Adverse Weather Conditions," as that term is defined in Appendix 1 to this Agreement, remain in effect in the Straits. The procedure that Enbridge is to employ during the presence of Sustained Adverse Weather Conditions is set forth in Appendix 1.

D. Evaluation of Underwater Technologies to Enhance Leak Detection and Technologies to Assess Coating Condition of the Dual Pipelines: Enbridge will provide the State with a copy of the report that is required to be prepared and submitted to the United States in accordance with Paragraphs 81-83 of the federal consent decree to assess the feasibility of installing an alternative leak detection system at the Straits (the "Consent Decree Report"). In accordance with Paragraph I.A.3 of this Agreement, Enbridge will provide the State's representative with the data used to generate the Consent Decree Report, and Enbridge will make the authors of that Consent Decree Report available to discuss its contents with the State's representative. Further, by June 30, 2018, Enbridge will review and assess any additional technologies that are not assessed in the Consent Decree Report to determine whether such other technologies would provide a viable additional benefit over and above the technologies that are already in place on the Dual Pipelines or those that Enbridge plans to implement to detect leaks as a result of the Consent Decree Report. Enbridge will also assess at the same time any technologies not currently in place that would allow it to detect damage to the coating of the Dual Pipelines. To the extent that Enbridge identifies any studied technologies that provide a viable additional benefit to detect leaks or damage to the coating of the Dual Pipelines, Enbridge will: (i) by August 30, 2018, file the necessary applications to seek all authorizations and approvals necessary to install or apply such technologies; (ii) proceed with the installation or application of such technologies no later than 365 days after receiving all approvals and authorizations necessary for their installation, or, to the extent that no approvals or authorizations are required, as expeditiously as practicable following the identification of the technologies.

E. Evaluation and Implementation of Measures to Mitigate Potential Vessel Anchor Strike: No later than June 30, 2018, Enbridge will complete a report that assesses options to mitigate the risk of a vessel's anchor puncturing, dragging, or otherwise damaging the Dual Pipelines. That report will, at a minimum, assess the following options: (i) measures to enhance shipping communication and warning technologies; and (ii) the use of protective barriers to further protect the Dual Pipelines from any risks posed by a vessel anchor coming into direct

contact with the Dual Pipelines. The report will assess the costs and engineering considerations associated with each alternative, as well as the potential environmental impacts that may result from the construction, operation, and maintenance of the alternatives. The report shall also identify a proposed timeline for seeking all regulatory approvals. Enbridge shall proceed with detailed design and installation of the most appropriate option within 180 days of receiving all authorizations and approvals necessary for the construction of that option.

F. Evaluation of Alternatives to Replace the Dual Pipelines: No later than June 15, 2018, Enbridge will prepare a report assessing the replacement of the Dual Pipelines across the Straits. That report will, at a minimum, include an assessment of the following alternatives: (i) placing a new pipeline or pipelines in a tunnel under the Straits; (ii) installing a new pipeline or pipelines under and across the Straits by the use of an HDD method; and (iii) installing a new pipeline or pipelines across the Straits with an open-cut method that includes secondary containment. The report will assess the costs and engineering considerations associated with each alternative, as well as the potential environmental impacts that may result from the construction, operation, and maintenance of the alternatives. The report will further identify the approvals or authorizations that would be necessary to construct, operate, and/or maintain each studied alternative.

G. Evaluation of Line 5 Water Crossings Other Than the Straits: Enbridge will work in coordination with a representative to be designated by the State to identify and evaluate water crossings by Line 5, other than the Straits, to assess measures to minimize the likelihood and/or consequences of a release at each water crossing location. No later than June 30, 2018, Enbridge will prepare and submit to the State plans that prioritize water crossings jointly identified by Enbridge and the State and that specify measures to minimize the likelihood and/or consequences of a release from Line 5 into such prioritized water crossings. The plans will include a schedule for implementing the measures described therein following Enbridge's receipt of all necessary authorizations and approvals.

H. Potential Further Agreement Concerning Pipelines Across the Straits: The State and Enbridge agree to initiate discussions, as soon as practicable following the completion of the evaluations required under Paragraphs D-G above, regarding a potential further agreement to address issues concerning actions related to pipelines across the Straits, with a goal of executing such an agreement by August 15, 2018.

## **II. AMENDMENT**

The State or Enbridge may propose in writing that this Agreement be amended. The State and Enbridge agree to consult in good faith in an effort to reach agreement on any proposed amendment. Any amendment agreed to by the State and Enbridge shall be effective on the date that any written amendment is executed by the State and Enbridge.

## **III. DISPUTE RESOLUTION**

The State and Enbridge agree that, should any dispute arise under this Agreement, the State and Enbridge shall in good faith attempt to resolve the dispute through informal negotiations. If the parties are unable to informally resolve such a dispute, either party may initiate proceedings in a court of competent jurisdiction to resolve the dispute.

## **IV. TERM AND TERMINATION**

The terms of this Agreement shall remain in effect until the commitments in Paragraphs I. B and I.D.-G above are fulfilled, except that the obligations in Paragraphs I.A and I.C shall continue unless and until the Agreement terminates automatically. This Agreement shall terminate automatically upon: (i) the permanent discontinuation of service by Enbridge on the Dual Pipelines; or (ii) placing into operation a replacement pipeline or pipelines across the Straits that has been approved by the State pursuant to applicable permitting procedures.

## **V. COMPLIANCE WITH APPLICABLE LAW**

The State and Enbridge acknowledge and agree that Enbridge's operation of Line 5 remains subject to the requirements of all applicable state and federal law, the Easement, the September 3, 2015 Agreement with the State that prohibits Enbridge from transporting heavy crude oil on Line 5 within the State of Michigan, and the terms of any easement granted by the State for Line 5 and agree that nothing in this Agreement is intended to relieve Enbridge of its obligation to comply with or waive any rights that Enbridge and the State may have under such laws or to supersede or displace applicable state law, regulation or requirement, or any federal law, regulation, or requirement that is applicable to the operation or maintenance of Line 5, including but not limited to the Pipeline Safety Act (including its preemption provisions); the Protecting Our Infrastructure of Pipelines and Enhancing Safety Act of 2016 (Public Law 114-183); any regulation or order issued by PHMSA or any other federal agency; or the Consent Decree entered into between Enbridge and the United States, in *United States v. Enbridge Energy, Limited Partnership, et al.*, No. 1:16-cv-914, ECF No. 14 (E.D. Mich., entered May 23, 2017), which specifies certain investigation, integrity management, leak detection, valve

placement, and emergency response measures to prevent discharges of oil or hazardous substances into or upon the waters of the United States or adjoining shorelines.

## VI. ENTIRE AGREEMENT

This Agreement constitutes the whole of the agreement between the parties concerning the matters addressed in this Agreement.

## VI. EXECUTION

This Agreement may be executed in counterparts without the necessity that the Parties execute the same counterpart, each of which will be deemed an original but which together will constitute one and the same agreement. The exchange of copies of this Agreement by electronic or hard-copy means shall constitute effective execution and delivery thereof and may be used in lieu of the original for all purposes.

FOR THE STATE OF MICHIGAN



Name: Rick Snyder

Title: Governor

Dated: 11/27/2017

FOR ENBRIDGE ENERGY, LIMITED  
PARTNERSHIP

BY: ENBRIDGE PIPELINES (LAKEHEAD)  
L.L.C. AS GENERAL PARTNER



Name: Bradley F. Shamla

Title: Vice President, U.S. Operations

Dated: 11/27/2017

FOR ENBRIDGE ENERGY COMPANY,  
INC.



Name: Bradley F. Shamla

Title: Vice President, U.S. Operations

Dated: 11/27/2017

## Appendix 1

### Enbridge Line 5 – Sustained Adverse Weather Conditions Procedure

This Appendix is designed to facilitate an effective emergency response to a potential release incident by specifying procedures for a systematic approach by Enbridge to temporarily shut down Line 5 in the Straits of Mackinac during Sustained Adverse Weather Conditions. Enbridge shall maintain a record of its use of the procedure and make it available to the State. If an alternate near-real time data point becomes available following the execution of this agreement, Enbridge shall notify the State in writing of Enbridge's intent to use alternate data sources and the parties will work cooperatively to revise this Appendix to account for the alternative data source.

#### Definitions:

**Sustained Adverse Weather Conditions:** Conditions in which median wave heights in the Straits of Mackinac over a continuous 60-minute period are greater than 8 feet based on "Near-real Time Data," or in its absence "Modeled Data."

**Near-real Time Data:** The wave height data derived from Buoy 45175 (Mackinac Straits West) of the Great Lakes Research Center of Michigan Technological University's Upper-Great Lakes Observing System (UGLOS).

**Modeled Data:** Modeled wave height data based on real-time data inputs that is available on the NOAA Great Lakes Coastal Forecasting System (GLCFS) Nowcast model at a representative point in the Straits.

**Forecasted Data:** Data available on the NOAA Great Lakes Coastal Forecasting System Forecast model at a representative point in the Straits.

#### Enbridge Line 5 Procedures – Sustained Adverse Weather Conditions

Step #	Action
1	Enbridge or Enbridge Consultant (collectively "Enbridge Monitor") will continuously monitor Near-real Time Data, or in its absence Modeled Data, to identify Sustained Adverse Weather Conditions at the Straits.
2	When Sustained Adverse Weather Conditions are forecasted based on Forecasted Data, the Enbridge Monitor will inform the Control Center Operations Shift Supervisor, at which point the Control Center Operations will prepare for the potential that an unplanned shut down of Line 5 at the Straits may be required.
3	When Near-real Time Data, or in its absence Modeled Data, indicate that Sustained Adverse Weather Conditions are occurring at the Straits, the Enbridge Monitor will immediately contact the Control Center Operations Shift Supervisor.
4	The Control Center Operations Shift Supervisor will promptly call the Enbridge Great Lakes On-Call Manager to advise them that Sustained Adverse Weather Conditions exist at the Straits.

5	The Enbridge Great Lakes On-Call Manager will request, no later than 15 minutes after being notified in Step #4 above, that the Control Center Operations shutdown Line 5. If real time conditions in the Straits determined by the Enbridge Great Lakes On-Call Manager indicate Sustained Adverse Weather Conditions do not exist, the Great Lakes On-Call Manager will advise the Control Center Operations Shift Supervisor that Line 5 should not be shutdown. In that event, the Enbridge Monitor will continue to monitor conditions as per Step 1 for changes that indicate that Sustained Adverse Weather conditions may be present and the other Steps in this Appendix shall be followed should the Enbridge Monitor determine that such conditions are present.
6	Unless advised otherwise by the Enbridge Great Lakes On-Call Manager as per step 5 above, Control Center Operations will perform a controlled emergency shut down of Line 5 and isolate the segment across the Straits.
7	While shut down, the Enbridge Monitor will continuously monitor Near-real Time Data, or in its absence Modeled Data, to identify the continuance of Sustained Adverse Weather Conditions at the Straits.
8	When Near-real Time Data, or in its absence Modeled Data, indicates the Sustained Adverse Weather Conditions no longer exist at the Straits, the Enbridge Great Lakes On Call Manager and Control Center Operations Admin On Call will authorize the restart of Line 5.
9	Control Center Operations will safely restart Line 5.



## Line 5 Market Impacts/Alternatives

Energy Security Section  
Michigan Agency for Energy



## Introduction

- At the Feb. 26, 2018 PSAB meeting, Alex Morese discussed some of the research his section has done evaluating the benefits Line 5 presents to Michigan's energy supply and alternative pathways for Michigan's energy needs should Line 5 become unavailable. It was requested that his oral presentation be written up for review.
- Some caveats:
  - The US petroleum market has shifted drastically over the last 10-12 years with increases in domestic production, new and repurposed pipelines and infrastructure, changing domestic and international demand, etc.
  - It is impossible to predict how the market would react to the loss of Line 5, so any alternatives are speculative in nature. Due to the unregulated nature of the petroleum market, the State has little control over market changes, rates, or investments.
  - Data has been used from Dynamic Risk's Alternatives analysis and publicly available sources such as the Department of Energy (DOE) and Energy Information Administration (EIA), and Michigan Department of Environmental Quality (MDEQ), etc.



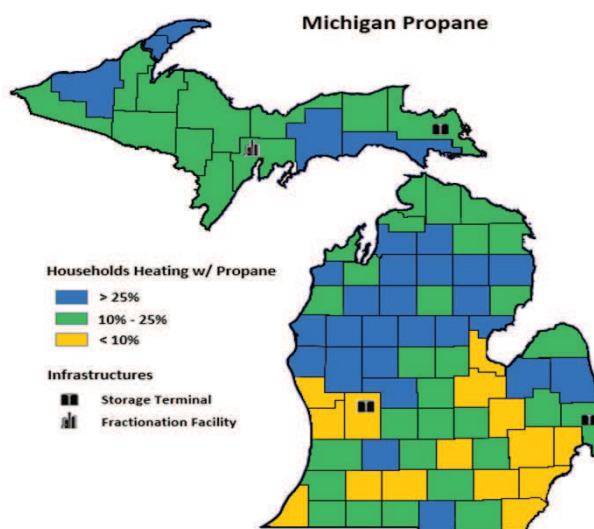
## Introduction cont'd

- Our Approach

- This is not approached from the standpoint that Line 5 is universally good or bad. We think, as many do, that the line presents both benefits and risks to Michigan.
- Generally speaking, MAE Staff has been looking at this in two steps:
  - First, at a high level, answer the question “what does Michigan use Line 5 for?”
  - Second, for each of these use cases, evaluate the feasibility of Line 5 alternatives.
- In this vein, we have settled on 4 major use cases for Line 5 which we have investigated further:
  - Adds propane supply to the UP via Rapid River terminal
  - Adds propane supply to the LP via Sarnia terminal
  - Provides transportation of Northern Michigan crude to the market
  - Supplies crude oil to Detroit and Toledo refineries

## Residential Usage in MI

Data from the 2016 American Community Survey (Census Bureau) estimates that approximately 18% of UP households (22,000), use propane as a primary heat source. This compares with approximately 8% or 300,00 households in the lower peninsula.



## Michigan Propane Usage

- Dynamic Risk (DR) estimates that Rapid River can produce up to 30 million gallons of propane a year. If accurate, Rapid River has the capacity to produce enough propane to supply the majority of the UPs demand.
- It's impossible to specifically track the flow or production of propane based on publicly available data. Product made in one location may be transported elsewhere for sale, and visa versa.
- Specific company data from the main petroleum players in the state is required for further analysis. We have not been given access to this data.

	MI Households using Propane *	Average Usage	Estimated Annual Usage
<b>Upper Peninsula</b>	22,050	1,141	25,159,050
<b>Lower Peninsula</b>	296,979	1,141	338,853,039
<b>Michigan (total)</b>	<b>319,029</b>		<b>363,980,400 **</b>

\* American Community Survey (ACS) 5-year estimate (2012-2016)

\*\* 2011-2015 Average Annual Michigan LPG Consumption (Gallons)

Note: due to rounding, slight discrepancies may occur

## Overview of Plains Infrastructure

Plains Midstream owns and operates a significant amount of pertinent petroleum infrastructure in Michigan and Ontario, including:

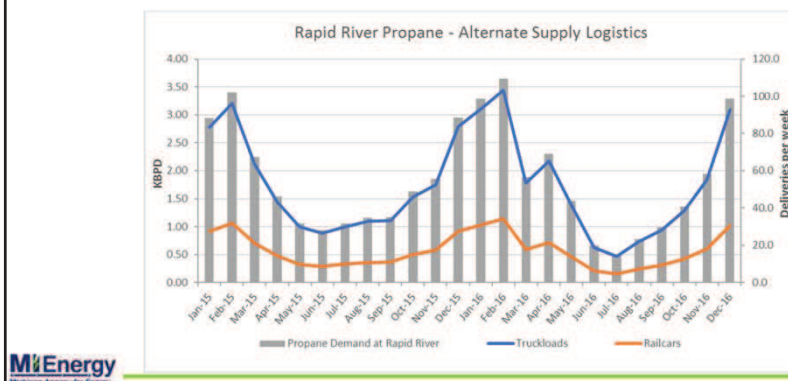
	Storage Terminals	Fractionation/Storage
<b>Michigan</b>	Alto, Kincheloe, St. Clair	Rapid River
<b>Ontario, Canada</b>	Windsor	Sarnia

According to data from EIA survey form 814, nearly *70 percent* of reported Michigan propane imports in 2017 were by Plains Midstream.

## UP Propane Alternatives

- Owen (240 miles) and Superior (290 miles) Wisconsin are the nearest supply points in which a pipeline could be used to transport propane to Rapid River or the Upper Peninsula.
  - It is unknown whether either of these locations have adequate excess production capacity.
- Although technically possible, a new propane pipeline is likely infeasible due to economics (cost of construction and the seasonality of propane demand).
- The most viable alternative transportation methods likely include train and/or truck deliveries.

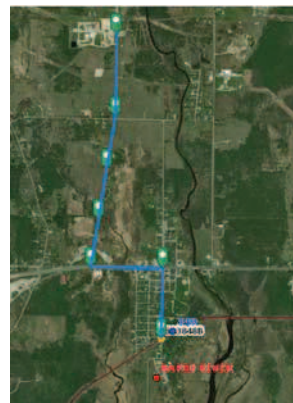
Data in chart below taken from DR's Alternatives Analysis report and public sources.



## UP Propane by Rail

Transporting propane by rail is common in the Upper Midwest, including to Kincheloe in the Eastern Upper Peninsula, and to Alto in the Lower Peninsula.

- Using imagery from the Federal Rail Administration, the nearest Canadian National line appears about two miles by road. Options could include:
  - A new rail line delivering NGL or propane to Rapid River facilities.
  - Construction of rail spur for unloading of propane and moving/adding storage onsite.
- Rail transport is not immune to challenges. Inclement weather and track/yard congestion has the potential to cause delays to deliveries.
  - This could result in reduced reliability, increased price volatility, and higher prices than with Line 5.



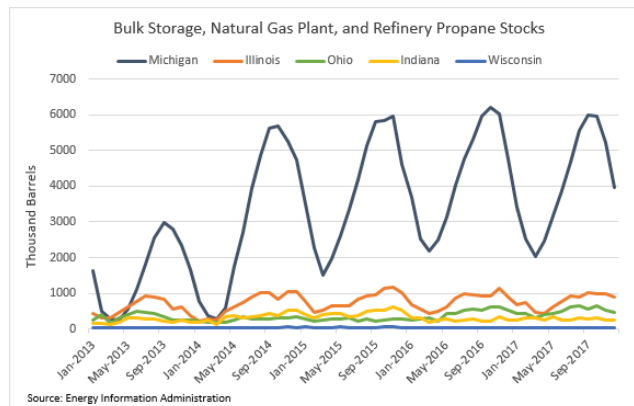
## Lower Peninsula Propane

- A significant percentage (as much as 75%) of the propane *available* in the Lower Peninsula is derived from NGL that is shipped via Line 5 to Sarnia and returned to Michigan.
  - Difficult to nail down precise figures due to business confidentiality
  - Other states benefit from Michigan's storage and purchase propane for transport back to their respective territories
- Disruption to the delivery of NGL and production of propane in Sarnia would have immediate and serious impacts to Michigan and the region.
- Michigan has the ability to store large quantities of propane and other fuels at St. Clair and Marysville. Without alternative supply, these one-of-a-kind assets would be stranded and reduce our resiliency to supply disruptions.
  - Plains St. Clair storage terminal: 2 million barrels\*
  - DCP Midstream Partners Marysville storage terminal: 8 million barrels\*

\* Storage figures are for all products, not just propane

## Propane Storage in Michigan

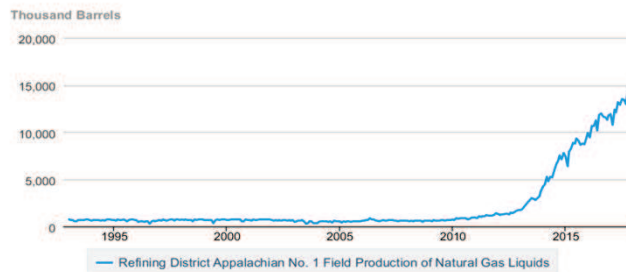
The chart below shows propane stocks for Michigan and several surrounding states. Michigan has historically kept more propane in storage compared to our neighbors. Stock levels preceding the heating season the past few years in Michigan have been near six million barrels, while some states remain well below one million barrels.



## Sarnia NGL Alternative

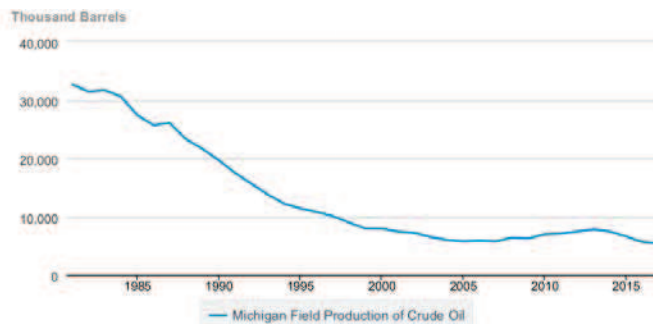
NGL production/supply as a byproduct of natural gas shale plays in Pennsylvania and Ohio has risen and could likely replace deliveries to Sarnia via Line 5, however there is currently no means to move the product into Michigan. Additional pipeline capacity would be needed, and may be operating near the waters of the Great Lakes.

**Refining District Appalachian No. 1 Field Production of Natural Gas Liquids**



## Michigan Crude Oil Production

- Many oil wells in Northern Michigan were drilled years ago and their production is declining. Without Line 5, marginal wells may no longer be economically viable. Increased transportation costs could effectively shorten the producing lives of these wells.



## MI Oil Production

- An analysis of the Michigan Department of Environmental Quality (MDEQ), Oil, Gas, and Mineral Division (OGMD) oil and gas production database indicates that nearly half of the producing oil wells included in the database as of December 2017, acquired production status prior to 1980.

Producing Oil Wells in Michigan, 2017

Decade Production Began	Number of Wells	% of Total	Cumulative %
1910's	157	3%	3%
1920's	1	0%	3%
1930's	411	8%	11%
1940's	934	17%	28%
1950's	631	12%	40%
1960's	165	3%	43%
1970's	264	5%	48%
1980's	1176	22%	70%
1990's	431	8%	78%
2000's	784	15%	92%
2010's	425	8%	100%
<b>Total</b>	<b>5379</b>		

Note: that the oil and gas production database does not include all production in the state, but does include all production in the database at the time it was last updated.

## Michigan Crude via Line 5

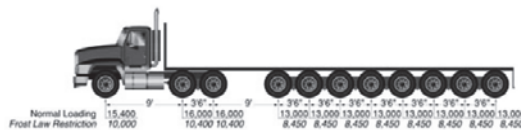
- In 2016, Michigan produced about 15,000 bpd of crude oil, and almost 2/3 of that (10,000 bpd) moved to market via Line 5.

Year	Michigan Crude Oil Production (Barrels)	Markwest Michigan Pipeline Injections of Crude Oil Into Line 5 (Barrels)	Proportion Transported by Line 5
2012	7,445,000	3,412,058	46%
2013	7,771,000	3,548,243	46%
2014	7,406,000	3,516,970	47%
2015	6,528,000	3,648,778	56%
2016	5,616,000	3,426,902	61%

Sources: EIA & FERC Form 6 Filings

## Lewiston by Truck

- Without Line 5, Dynamic Risk estimated that transportation costs for Northern Michigan oil producers would rise by about \$2.40/bbl.
  - This assumes that the product would be moved by truck to Marysville, if product was moved farther to Toledo or elsewhere, producers' costs would be even greater.
- According to the Alternatives Analysis, crude oil receipts into Line 5 from the Lewiston Terminal vary from 7-12 thousand bpd and equivalent truckloads of 30-50 per day would be needed for transportation.
  - 42 truckloads/day to move approximately 10,000 bpd
- MAE staff believes it may be possible to transport the 10,000 bpd with approximately 30 truckloads under no seasonal weight restrictions, and 63 truckloads with seasonal weight restrictions.



**MiEnergy**  
Michigan Agency for Energy

## Lewiston by Rail

- The Lake State Railway Company operates a state-owned rail line originating near Bay City, MI and terminating near Gaylord, MI. This rail line is approximately 16 miles (as the crow flies) west of the Lewiston Terminal and could potentially be used to transport Northern Michigan oil production to market. According to their website, various commodities can be shipped on this rail line, including petroleum products.
- This would require new rail spur construction for loading and offloading, similar to Rapid River.

### Lake State Railway Company



Lake State Railway Company accessed at <https://www.lsrc.com/services/servshipping/>

**MiEnergy**  
Michigan Agency for Energy

## Alternative Refinery Supply

Exact figures on the percentage of crude oil Line 5 supplies to refineries in Toledo and Detroit are not known at this time.

- It is likely that these refineries could find additional product via alternative routes, however this would strain capacity, raise prices, and contribute to a more fragile supply picture for the near future.
- Dynamic Risk estimated the cost impact to Michigan consumers at \$.02 cents per gallon. It is important to understand that while the daily price fluctuates on average much more than this, what we are talking about is a consistent addition to the bottom line, a new floor. The long term price impact of that two cents equates to an additional expenditure of **120 million dollars/year** to Michigan consumers.
  - MI will consume approximately 6 billion gallons of gasoline and diesel fuel in 2018.

## Final Thoughts

- Outside of these specific use cases, Line 5 also has a regional impact on market prices. Even if Michigan had no direct use for Line 5 (i.e. it was a total pass through from Wisconsin to Ontario), the loss of Line 5 would cause crude and propane supply shortages elsewhere. Those shortages would raise demand for crude and refined products used in Michigan, which drives up prices in Michigan and the region.
- Additionally, if for whatever reason Line 5 and the products it transports were suddenly unavailable, there would be consequences to our energy security, likely resulting in a reduction in our resiliency and our ability to withstand future energy supply disruptions or market volatility.



