



# SUNKEN HAZARD

**Aging oil pipelines beneath the Straits of Mackinac  
an ever-present threat to the Great Lakes**

# SUNKEN HAZARD: AGING OIL PIPELINES BENEATH THE STRAITS OF MACKINAC AN EVER-PRESENT THREAT TO THE GREAT LAKES

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National Wildlife Federation

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## INTRODUCTION

# Scenic Waters Conceal A Major Oil Spill Hazard

**M**otorists who travel over the Mackinac Bridge in northern Michigan are treated to one of the most spectacular vistas in all the Great Lakes.

The five-mile-long bridge crosses a vast expanse of cobalt water that extends far to the east and west, well beyond the reach of the naked eye. The view is sublime, breathtaking.

From the bridge, which peaks at 199 feet above the Straits of Mackinac, sightseers have a bird's eye view of waters that mark the confluence of Lake Michigan and Lake Huron. What they cannot see from the bridge, or anywhere else, is a looming threat that could devastate the upper Great Lakes.

Just west of the Mackinac Bridge, below the water's surface, lie **two pipelines, called Line 5, that carry a total of 20 million gallons of crude oil and natural gas fluids each day** from Superior, Wisconsin to Sarnia, Ontario. The pipelines were placed in the Straits of Mackinac in 1953—the year President Dwight Eisenhower took office and one year before McDonald's opened its first burger joint.

If either of those pipelines leaked, the resulting oil slick would likely devastate some of the lakes' most bountiful fisheries, wildlife refuges, municipal drinking water supplies and one of the region's most popular tourist attractions: Mackinac Island. A significant rupture would cause an Exxon-Valdez scale oil spill spreading through Lakes Huron and Michigan, the heart of the largest freshwater seas in the world.

It's not an empty risk: the pipelines are owned and operated by Canadian-based Enbridge Energy and Line 5 is part of the Lakehead system—one of the largest networks of pipelines in the world. Enbridge Energy is the same firm responsible for the largest and most costly inland oil spill in American history. These interstate pipeline networks are regulated federally by the Pipeline and Hazardous Materials Safety Administration (PHMSA), which is a federal agency under the Department of Transportation that enforces pipeline safety rules and regulations.

An Enbridge pipeline that ruptured near Marshall, Michigan, in July 2010 dumped about one million gallons of tar sands oil into the Kalamazoo River system. Federal investigators were scathing in their critique, likening Enbridge to the "Keystone Kops" and determining that Enbridge could have prevented the disaster if the company had properly maintained the pipeline and fixed dozens of known defects.

The Enbridge pipelines that cross the Straits of Mackinac have never spilled oil into the conjoined waters of lake Michigan and Huron, according to government officials. But evidence is mounting that there is reason to be concerned.

The Line 5 pipeline that crosses the Straits has a history of problems, just like the company that owns it. Pipelines deteriorate as they age, according to engineering experts, and

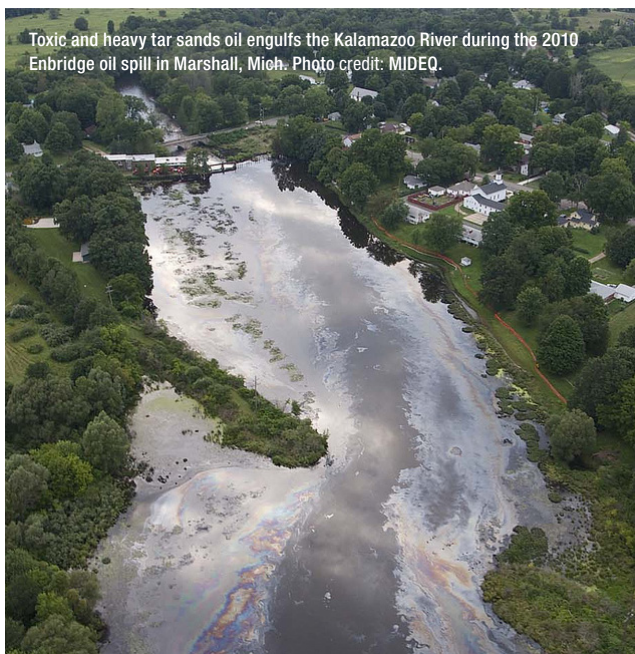
The lakes and their connecting channels contain more than 90% of the freshwater of the United States and 20% of the world's supply of fresh surface water.

Photo credit: Kathy Towler, NWF.

the Line 5 pipes at the Straits have been subjected to fierce underwater currents, intense external pressure and varying water temperatures for nearly 60 years.

Compounding the threat is the fact that the pipelines cross the world's largest source of surface freshwater, a sensitive ecosystem that cannot readily cope with large quantities of crude oil.

Additionally, Enbridge has set out to expand its Lakehead System—which includes Line 5—to carry more diluted bitumen and tar sands oil from western Canada. All of the lines within the Lakehead System transport Alberta tar sands-derived crude oil. Most concerning is the transportation of diluted raw tar sands oil or diluted bitumen (DilBit). Transportation of this product requires higher operating pressures, which in turn heats the line and could pose significantly higher risks of spills.<sup>1</sup>



In this report, National Wildlife Federation examines the history of the Enbridge pipelines that cross the Straits of Mackinac, Enbridge's environmental track record and what could happen if the pipes sprang a leak and pumped crude oil into the northernmost reaches of lakes Michigan and Huron.

This report is intended to point out the immediate need for proactive and consistent action to properly safeguard our Great Lakes from pipeline spills. History has proven that agencies and pipeline operators continue to favor a reactionary approach to pipeline oversight. Unless action is taken, an oil spill in the Straits of Mackinac isn't a question of if—it's a question of when.

We cannot allow Enbridge to play Russian roulette with the Straits of Mackinac. This report is a call for action to prevent Enbridge Energy's widening oil stain from reaching North America's freshwater seas.

## An Oil Spill in the Straits of Mackinac Would Cause Enormous Damage, Pose Many Challenges

The Straits of Mackinac in northern Michigan is a unique area of the Great Lakes, a four-mile-wide channel that funnels colossal amounts of water between Lakes Michigan and Huron.

Powerful storm-driven currents that cause water to oscillate back and forth between the two lakes can move water through the Straits at a rate of three feet or more per second. At times, the volume of water flowing beneath the Mackinac Bridge is 50 times greater than the average flow of the St. Clair River, one of the largest rivers in the Great Lakes basin.<sup>2</sup>

Those currents also make the Straits one of the worst places in the Great Lakes for an oil spill. There are few other places in the lakes where an oil spill could spread so quickly.

A spill from Enbridge Energy's underwater oil pipelines—which carry 20 million gallons of oil and natural gas fluids across the Straits every day—could contaminate nearby municipal drinking water intakes, devastate some of the Great Lakes best fisheries, poison wildlife and cast

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“An oil leak at the bottom of the Straits of Mackinac would raise as many questions about potential impacts to fish and other aquatic life as we had after the 2010 BP spill in the Gulf of Mexico, and we are still learning about impacts from that spill over two years later. With these pipelines on the bottom of the Straits, the combination of heavier oil, colder temperatures, and complex currents would cause extraordinary clean-up challenges.”

MICHAEL MURRAY, STAFF SCIENTIST,  
GREAT LAKES REGIONAL CENTER, NWF



This pipeline marker, near St. Ignace, Mich., is the only indication the public has to the presence of the Enbridge Line 5 pipeline that crosses the Straits of Mackinac. Photo credit: Jeff Alexander.

a pall over one of Michigan’s most popular tourist destinations: Mackinac Island.

The twin 20-inch oil pipelines that cross the Straits were installed in 1953, four years before the Mackinac Bridge opened. Those pipes have never been replaced and, for five decades, lay on the bottom of the Straits, unsupported. Enbridge installed several support structures under the pipelines in 2006 and again in 2010, following the company’s disastrous oil spill in the Kalamazoo River.

Enbridge officials have said that properly maintained pipelines can last indefinitely. But the company’s shoddy environmental track record tells a much different story.

**Enbridge had more than 800 spills in North America between 1999 and 2010, dumping nearly 6.8 million gallons of oil.<sup>3</sup>**

Several of those spills occurred on Line 5, the pipeline that carries crude oil from northern Wisconsin, to Sarnia, Ontario. Line 5 runs along the northern edge of Lake Michigan before crossing the Straits of Mackinac; it also crosses some of the region’s best trout streams, including the famed Au Sable River.

Enbridge claims the portion of Line 5 that crosses the Straits has never leaked, but the company has never made public the reports that document the condition of the pipes. The federal government doesn’t require oil companies to release pipeline inspection reports.

The risk of an oil spill in the Straits is ever-present and there is growing cause for concern. Consider:

- > The pipes that cross the Straits were installed nearly 60 years ago and pipelines corrode over time. Enbridge has never replaced the original pipelines.
- > Material, welds and equipment failures are the most common source of leaks from oil pipelines in the U.S.
- > Pipeline operators can switch between products transported in a line without warning or notice to the public, first responders or regulators. This is the case even when the product transported requires different operations. The transportation of DilBit requires higher operating pressures, which increase temperatures in a pipeline.
- > Swift and fluctuating currents could quickly flush any oil spilled at the Straits of Mackinac into Lake Michigan and Lake Huron.
- > Extreme conditions in the Straits, from ice in the winter and lake currents that occasionally flow in opposite directions at different depths, would make cleaning up oil in the Straits especially challenging.
- > DilBit, which represents a significant amount of material carried by the Lakehead system, can become heavier than water during a release and subsequent weathering. This makes conventional clean-up techniques largely ineffective and was the reason for massive damage to the Kalamazoo River during Enbridge’s 2010 spill.

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“The EPA staff that worked on this, that have responded to oil spills over many, many years, had never encountered a spill of this type of material, in this unprecedented volume, under these kinds of conditions.”

SUSAN HEDMAN, ADMINISTRATOR OF THE EPA’S REGION V OFFICE IN CHICAGO, DURING A 2012 NPR INTERVIEW<sup>4</sup>

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Cleaning up an oil spill is nowhere near as simple as shutting off the pipe and capturing the crude that escapes. When a pipeline ruptures, it’s impossible to immediately shut off the flow of oil.

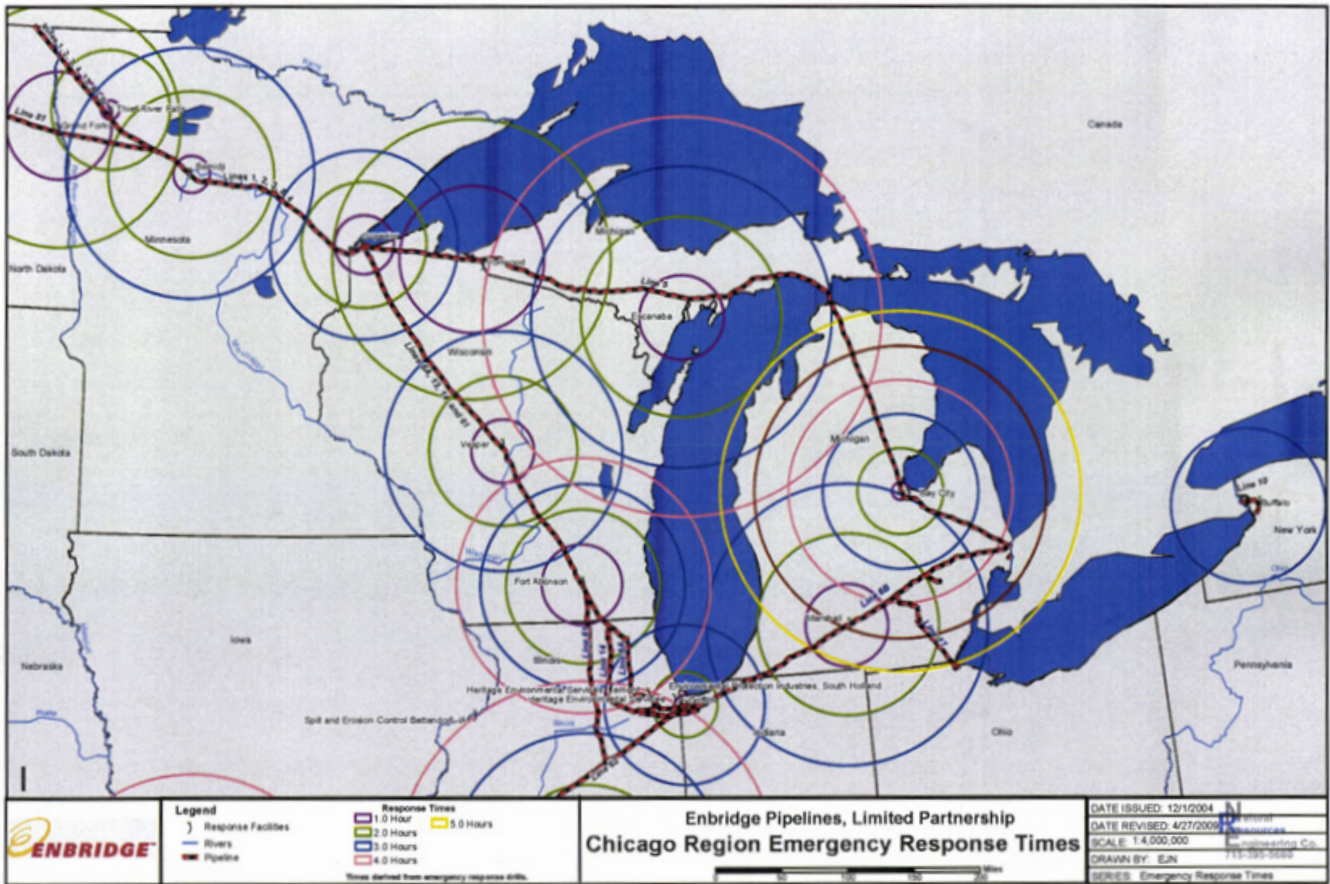


FIGURE 1: CHICAGO REGION EMERGENCY RESPONSE TIMES (Credit: PHMSA)

According to Enbridge Energy’s emergency response plans, it takes the company a minimum of eight minutes to shut down a ruptured pipeline and isolate the flow of oil from the leaking pipe. Enbridge has estimated that a “worst case” discharge for line 5, with the eight minute shut off, would be up to 1.5 million gallons of oil released. However, that is hardly worst case. Enbridge did not react to the Kalamazoo River spill for 17 hours despite warnings from their leak detection system, and instead had to be told about that release by a local utility.

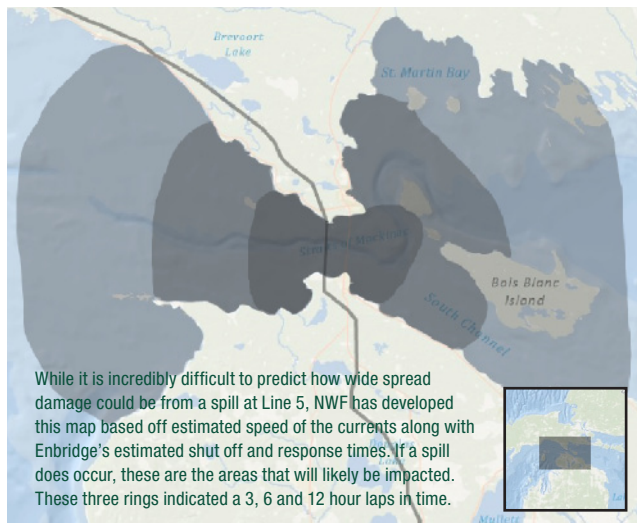
Because the flow of oil in the 30-inch diameter Line 5 is split into two, 20-inch diameter pipes in the Straits, a pipeline rupture there would theoretically leak less oil than elsewhere along the route. The flip side is that having two oil pipelines in the Straits doubles the risk of a spill.

Enbridge’s emergency response plans show it would take company crews around three hours to respond to a spill in the Straits of Mackinac (Figure 1). This delayed response will have devastating impacts when you consider the possible oil discharge during that amount of time.

According to the National Oceanic and Atmospheric Administration (NOAA), the estimated speed of currents at the Straits can reach 2 mph (3 feet per second) or more, depending on meteorological conditions. However, water current directions and speeds are constantly fluctuating, making spill flow predictions incredibly difficult. Even excluding many other factors, like ice complications during the winter months, below are some scenarios on how such a spill could impact our waters.

Based on Enbridge’s own calculations for a shut off, a worst case scenario oil slick moving east through the Straits could reach the shores of Mackinac City and Mackinac Island in the three hours it would take Enbridge to respond.

Within six hours, oil leaking from Enbridge’s Straits pipeline could reach Wilderness State Park, a biologically rich park on Lake Michigan that is home to a population of endangered piping plovers.



Twelve hours after a spill in the Straits pipeline, the resulting oil slick could spread to Cheboygan, Mich. And within a day of a spill, oil could be spreading toward the shores of Beaver Island and Charlevoix to the west, or Rogers City to the east.

An oil spill in the Straits would damage a bountiful whitefish fishery that is worked by Native American tribal fishermen and provides fish to scores of restaurants across the region. Spilled oil could also imperil bald eagles that live near the Straits and scores of migratory birds that pass through the area.

Looking at the geological formations located at the Straits also raises yet another concern when considering the damage you might see from a spill (Figure 2). Perpendicular to the bridge is an ancient submerged river channel or canyon traversing the lakebed of northern Lakes Michigan and Huron. Depths in this Canyon can reach 300 ft below the surface of the water, and its walls are steep in some areas. Because information on the current status of this pipeline is not available to the public, it is unknown how this pipeline navigates this feature, and what additional risks are associated.

With so many unknowns, it is safe to assume that the impacts of an oil spill in the Straits could dwarf the effects of Enbridge's July 2010 pipeline rupture, which spewed around 1 million gallons of oil into Michigan's Kalamazoo River system, and has a rising clean-up cost of more than \$800 million.

If Line 5 ruptured and gushed oil for 17 hours—as Enbridge's Line 6B did during the 2010 Kalamazoo River

spill—the resulting oil slick could spread up to 35 miles to the east and even west of the Mackinac Bridge, depending on lake currents at the time and the severity of the break. “A water spill is going to have much more of an impact and much more of a response than a large spill on land,” according to Melanie Barber, an environmental planning officer for the U.S. Pipeline and Hazardous Materials Safety Administration.<sup>5</sup>

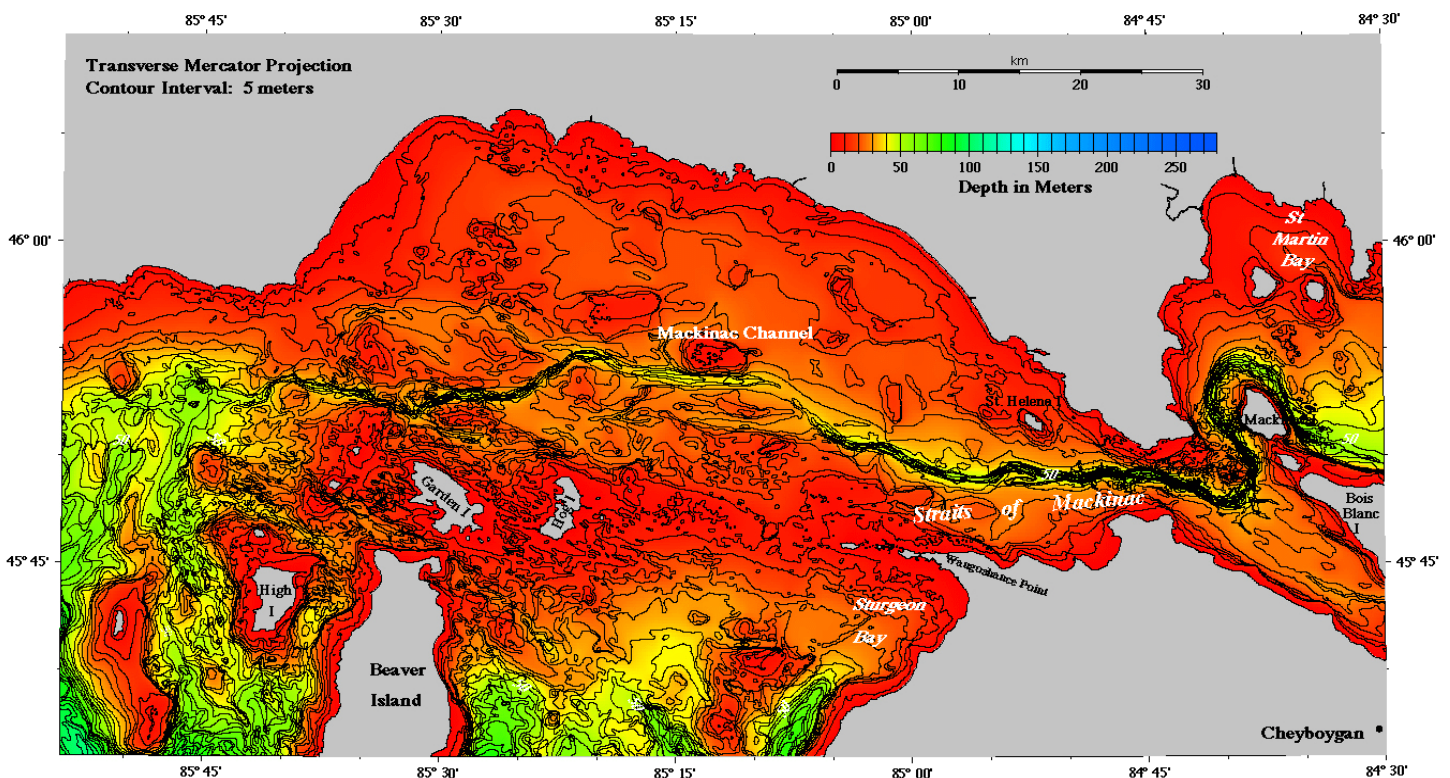
The 2010 Enbridge oil spill in the Kalamazoo River was caused by the company's failure to properly maintain its pipeline, according to the National Transportation Safety Board (NTSB). The spill was much worse than it should have been because it took Enbridge workers at the company's control center in Edmonton, Alberta 17 hours to shut down the gushing pipeline.

Enbridge officials who were supposed to know how to detect and respond to pipeline spills acted like “Keystone Kops,” according to the head of the NTSB panel that investigated the disaster. The NTSB probe found that Enbridge employees twice restarted the flow of oil in the ruptured pipeline, which dramatically increased the volume of thick tar sands oil from western Canada that poured into the Kalamazoo River.

Complacent Enbridge employees and a weak regulatory system were among the factors that allowed the pipeline rupture to mushroom into the nation's largest and most costly inland pipeline spill.

**In a 2011 *The Globe and Mail* interview, a prominent Alberta Canadian pipeline builder, who helped found the Alliance natural gas pipeline, issued an**

FIGURE 2: LAKE MICHIGAN BATHYMETRY (Credit: NOAA)



**ominous warning about Enbridge's pipelines. Glen Perry said the Kalamazoo River spill was "a harbinger of things to come. What we're learning is some of that old pipeline doesn't have a 100-year life, even though maybe they hoped it did. I don't know what the life is. But for sure these old lines are going to have to eventually get replaced. And I think what Enbridge is seeing is just the front end of that."**

The reason: The vast network of Enbridge pipelines that stretch from western Canada, through the Great Lakes basin and into Montreal, are old and many are showing signs of extreme wear and tear. Worse, scientists have known that the protective tape coatings placed around oil pipelines a half-century ago to prevent corrosion, are failing, and in some cases can even exacerbate an existing problem. This type of failure is called disbondment, where moisture becomes trapped between the surface of the pipe and the tape creating an environment that may be corrosive.

Enbridge's aging pipelines crossing the Straits of Mackinac—coupled with the company's history of spills, a weak regulatory system and the fragile nature of the Great Lakes ecosystem—are a recipe for economic and environmental disaster.

There is no margin for error when it comes to preventing oil spills in the Great Lakes. The lakes provide drinking water for 30 million people in the U.S. and Canada, support a \$7 billion fishery, a \$16 billion recreational boating economy and are the backbone of one of the world's largest regional economies.

An oil spill in the Great Lakes would also be a huge setback to the Great Lakes Restoration Initiative, the federal program that has already invested \$1 billion in cleaning up toxic hot spots, restoring near-shore health and creating new fish and wildlife habitat in the lakes.

A ruptured oil pipeline in the Straits of Mackinac, or in other coastal areas where Enbridge's oil pipelines are located, could cause unimaginable damage in the Great Lakes and cripple economies that depend on the lakes. Such an oil spill could be worse than the Exxon-Valdez disaster that has devastated Alaska's shoreline since the oil tanker foundered over two decades ago.

Unlike the oceans, the Great Lakes are a relatively confined ecosystem, meaning that they are ill equipped to digest or flush away oil.

Enbridge's oil spill in the Kalamazoo River contaminated 38 miles of the river and came within 80 miles of reaching Lake Michigan—and the submerged oil is still migrating downstream. A similar spill in the Straits of Mackinac could spread even further because storm-driven currents in the Straits are often faster and more variable than those in the Kalamazoo River.

Oil spills in freshwater ecosystems cause a myriad of short term and long-term effects. Beyond the immediate threat to fish and wildlife, oil spills can also affect the

spawning success of trout because the eggs of trout and other salmon species are "highly sensitive to oil toxins," according to the U.S. Fish and Wildlife Service.<sup>6</sup> Small amounts of oil can kill fish eggs and oil toxicant that linger in sediment and aquatic vegetation long after a spill is "cleaned up" can harm aquatic ecosystems for decades after a spill occurs.<sup>7</sup>

A large oil spill in the Straits of Mackinac could potentially spread across vast areas of Lake Michigan and Lake Huron. A far-reaching oil slick that spread into Lake Huron could also affect Georgian Bay, one of the most vibrant freshwater ecosystems on the planet.

Enbridge officials pledged to do a better job of preventing pipeline spills after the Kalamazoo River disaster. But the spills have continued with alarming regularity. For example, in July 2012, close to the two-year anniversary of the Kalamazoo River oil spill, an Enbridge pipeline ruptured in Wisconsin, spilling 50,000 gallons of crude oil on the ground. And just months before that, an Enbridge pipeline in Alberta, Canada spilled over 60,000 gallons of oil from one of its pumping stations. These are the latest in a series of alarming incidents involving a company whose actions could someday determine the fate of the upper Great Lakes.



Talmadge Creek, tributary to the Kalamazoo River, is overcome with toxic tar sands oil during the 2010 Enbridge oil spill on Line 6B. Photo credit: MIDEQ.



# Shoddy Maintenance, Numerous Spills

On a hot July night in 2010, a little known oil pipeline that crosses southern Michigan split open, pouring about one million gallons of heavy Alberta crude oil into the Kalamazoo River system. By the time the leak was stopped, the incident had become the largest inland oil spill on American soil.

The disaster was a wakeup call for Michigan residents, regulatory officials, lawmakers, conservationists and Enbridge Energy, the Canadian-based oil giant that owned and operated the pipeline. Horrific as it was, the Kalamazoo River oil spill was far from unprecedented.

Enbridge Energy's North American pipelines have logged more than 800 spills since 1999 and spilled nearly 7 million gallons of oil. Spills from pipelines in Enbridge's Lakehead System have polluted the environment, forced evacuations that disrupted communities and, in one incident, killed two workers.

In 1988, a corroded Lakehead pipeline ruptured in suburban Detroit, dumping 320,000 gallons of oil into the Clinton River. Firefighters set fire to the polluted river to remove the oil.<sup>13</sup>

Two years later, a pipeline rupture spilled 1.68 million gallons of oil near Grand Rapids, Minn. A resident of Grand Rapids reported the spill after smelling petroleum odors. It took an Enbridge subsidiary one hour after the spill was reported to shut down the pipeline. The company's sluggish response "caused a significant increase in

the size of the spill," according to the U.S. Coast Guard.<sup>14</sup>

In 1999, residents of the tiny northern Michigan community of Crystal Falls got a crash course in the dangers of having an Enbridge pipeline in their midst. A motorist driving on the west side of Crystal Falls on Nov. 2, 1999, smelled a strong petroleum odor. He reported the odor to local authorities and they notified Enbridge officials in Canada.

By the time Enbridge figured out where the pipeline had ruptured, and shut it down, the spill had dumped 226,000 gallons of crude and natural gas liquids into a marsh. The natural gas liquids vaporized, forming a potentially explosive cloud that forced dozens of nearby residents to evacuate. Enbridge officials ignited the vapor cloud to prevent it from spreading. That touched off a raging fire that burned for 36 hours and scorched eight acres of land.

Almost as remarkable as the inferno was the company's explanation of why the pipeline had leaked. Enbridge officials said the 30-inch oil pipeline was rubbing on a rock, which caused it to rupture.

The federal government has documented 80 spills on the Enbridge's Lakehead pipeline system since 2001. That network of pipelines carries oil from western Canada's tar sands region to refineries near Chicago, Detroit and in Sarnia, Ontario.<sup>15</sup>

## SIGNIFICANT INCIDENTS ON ENBRIDGE'S LAKEHEAD PIPELINE SYSTEM SINCE 2002

**July 4, 2002:** A pipeline in **Itasca County, Minnesota**, spilled 252,000 gallons of crude oil, causing \$5.6 million in property damage.

**January 18, 2005:** A pipeline in **Bay County, Michigan**, spilled 4,200 gallons of crude oil, causing \$45,750 in property damage.

**January 2010:** An Enbridge pipeline leaked 126,000 gallons of oil near **Neché, North Dakota**.

**July 25-26, 2010:** A ruptured pipeline near **Marshall, Michigan**, dumped about one million gallons of crude oil into Talmadge Creek and the Kalamazoo River.

**September 9, 2010:** A broken pipeline near **Chicago** spilled 250,000 gallons of oil, causing an unknown amount of property damage.

2002	2003	2005	2007	2010	2012
<p><b>February 27, 2003:</b> A pipeline in <b>Monroe County, Michigan</b>, near Toledo, spilled 5,460 gallons of crude oil, causing \$255,000 in property damage.</p> <p><b>October 13, 2003:</b> A pipeline in <b>Bay County, Michigan</b>, spilled 21,000 gallons of crude oil, causing \$120,000 in property damage.</p>		<p><b>January 1, 2007:</b> A pipeline leak in <b>Wisconsin</b> spilled 50,000 gallons of oil on a farm.</p> <p><b>February 2, 2007:</b> A pipeline leak in <b>Exeland, Wisconsin</b>, spilled 201,600 gallons of crude oil, causing \$4.5 million in damage.</p> <p><b>November 2007:</b> Oil and gas from a ruptured pipeline ignited near <b>Clearbook, Minnesota</b>, killing two workers. The federal government fined Enbridge \$2.4 million for failing to follow safety procedures while repairing the pipeline.</p>			<p><b>July 27, 2012:</b> A pipeline rupture near <b>Grand Marsh, Wisconsin</b>, spraying over 50,000 gallons of oil onto a farm — coating a nearby home, cattle and horses.</p>

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“Northern Michigan contains some of the most important, diverse, and pristine water resources on earth. The Line 5 pipeline also lies between Mullett Lake and Burt Lake, in the heart of the Inland Waterway. If there were ever a rupture or break in the pipeline, we would have a tsunami of a disaster. Existing rules need strengthening and rapid response plans need to be improved. We need to take steps to ensure protection for wildlife, natural resources and the people and communities that have invested deeply for decades to safeguard our long standing investment in our conservation heritage.”

**BRENDA ARCHAMBO, PRESIDENT, STURGEON FOR TOMORROW - BLACK LAKE CHAPTER**

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The U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) has initiated 28 enforcement actions against Enbridge over the past decade and the company has paid millions of dollars in fines.<sup>16</sup> But the company’s pipelines continue to leak, with astonishing regularity.

Some spills have occurred dangerously close to the Great Lakes. As noted earlier, the roughly one million gallons of oil that poisoned 38 miles of the Kalamazoo River came within 80 miles of reaching Lake Michigan. Two decades earlier, traces of oil from a much smaller pipeline spill did reach northern Lake Michigan.

In 1990, a pilot conducting a routine flyover of Enbridge’s Line 5 pipeline in Michigan’s Upper Peninsula

spotted oil on the ground near Brevort. The leaky pipe was just 900 feet from Lake Michigan—the length of three football fields. Enbridge shut down the pipeline and crews pumped 600 gallons of oil out of the ground. But some of that oil spread into the groundwater and seeped into Lake Michigan, according to a 1994 report by the Michigan Department of Natural Resources.

The state of Michigan didn’t require Enbridge to pump contaminated water out of the ground because the pollutant levels were below the state’s cleanup standards. Though relatively minor, that 1990 incident demonstrated that the Great Lakes aren’t immune to the threat of catastrophic pipeline spills.

Crews work to replace Line 6B after the Enbridge tar sands oil spill into the Kalamazoo River. Photo credit: EPA.



# Raising the Stakes: Enbridge Plan to Expand Lakehead Pipeline System Would Increase Spill Risk

Enbridge Energy recently announced plans to expand the Lakehead Pipeline system in an effort to pump even more tar sands oil through the Great Lakes region, including Line 5 crossing the Straits of Mackinac (Figure 3). That announcement came nearly a week after the National Wildlife Federation released a report warning that pipeline rules and regulations do not adequately protect the Great Lakes from spills.<sup>17</sup>

For some time now the Great Lakes states have been one of the lead transporters for DilBit tar sands oil. That issue came to light after the one million gallon Enbridge tar sands oil spill into the Kalamazoo River system.

The Kalamazoo River oil spill caused widespread environmental damage, health impacts, and baffled clean-up crews when officials discovered that the DilBit product sinks rather than floats. The spill is still being cleaned up and officials now say significant amounts of oil will remain in the river system due to complications of cleaning up DilBit. Yet state and federal agencies are showing little progress towards demanding increased pipeline safety from the company.

Despite this abysmal record, Enbridge is proposing to expand existing pipelines—but in a way that minimizes government and public review. Enbridge is proposing a series of smaller pipeline projects each as a stand-alone



**FIGURE 3**  
A map of Enbridge Energy liquid pipelines, including the Lakehead system. The 4,700-mile Lakehead System transports crude oil through Canada and the upper Midwestern US. The 1,900-mile US portion of the Lakehead System includes line 5 and line 6B. Credit: PHMSA.

project for a specific local purpose. But the company's plan—which it has publicly announced—is to link all the small changes to create system wide expansion that will allow the company to ship oil from the Alberta tar sand fields in western Canada all the way to Maine—much of it through the Straits of Mackinac's Line 5.<sup>18</sup>

Enbridge has started to lay the groundwork to expand Line 5 by 50,000 barrels of oil per day—or 1.8 million gallons. As part of that effort, Enbridge has conducted hydro testing to evaluate the condition of the pipeline, which has turned up recent failures on the line near Bay City, Mich.<sup>19</sup>

Simultaneously, the company is attempting to build an additional Line 6B through Indiana and Michigan, which will double the amount of oil currently running through that line.

As part of its pipeline expansion program, Enbridge noted in an application to the Michigan Public Service Commission that the company has also considered building an additional pipeline next to Line 5 if other expansion projects fail to move forward.

Stacked (made in Canada) pipeline near Mendon, Mich., which could be installed next to the old Line 6B and will increase the amount of tar sands product transported by double. Photo credit: Linda Shafe, Battle Creek, Mich.



Although Enbridge's massive pipeline expansion plans would enable the company to transport a quantity of tar sands oil similar to that in the proposed Keystone XL pipeline, Enbridge thus far has avoided major controversy by hiding the scale of its project. While federal law requires the U.S. Department of State to approve maintenance activities at border crossings on interstate pipelines, Enbridge was allowed to build a new pipeline, which crosses into Canada at Sarnia, Ontario, under an existing permit.<sup>20</sup> Because Enbridge has broken up the project into small components, it claims that it only needs to comply with existing permits or undergo state review.

Since that phase has been mostly completed, Enbridge has continued to put forth, piece-by-piece, projects labeled as "maintenance and rehabilitation." These projects in fact increase the amount of tar sands oil flowing through the Lakehead system, which could eventually increase some flow rates by almost triple the current rates.

The result is increased risk of disasters and more toxic pipeline spills. In addition, the pollution from refining tar sands oil is going to impact the region's health and ecosystems as Enbridge transports this more toxic oil to refineries throughout the Great Lakes region.

Soon, communities will be facing refinery permits requesting to release larger amount of pollutants like

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“Oil pipelines pose a significant threat to the Great Lakes. Pipeline operators, like Enbridge, with a history of shoddy maintenance and poor compliance must be held accountable, and not allowed to operate pipelines along, near, or under our Great Lakes until they can demonstrate that our waters are protected.”

**NICK SCHROECK, EXECUTIVE DIRECTOR,  
GREAT LAKES ENVIRONMENTAL LAW CENTER**

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mercury. BP Whiting, a refinery just outside of Chicago that is already refining this product, has requested on several occasions permits to release mercury levels 20 times higher than what is allowed under Great Lakes water quality standards.<sup>21</sup>

Once Enbridge's proposed and projected pipeline expansions are complete, the tar sands oil that is transported and refined in the Great Lakes states won't remain in the region. Much of that oil will be shipped further east and possibly through New England for export to other countries.<sup>22</sup>

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## Tar Sands Crude: Why It Matters for the Great Lakes



A Great Blue Heron coated in tar sands oil during Enbridge's Kalamazoo River oil spill. Photo credit: MIDEQ.

**F**or decades, the Midwest has been importing some forms of tar sands oil from Alberta, Canada. Tar sands oils differ from conventional crude in many ways. While conventional crude can be pumped from underground deposits, the tar sands produce bitumen, a heavy tar-like substance, which must be strip mined or extracted using steam injection. These mining practices have a major impact in Alberta. They:

- > Destroy enormous swaths of important boreal forest ecosystems;
- > Produce lake-sized reservoirs of toxic waste;
- > Release toxic chemicals into our air when it is refined;
- > Emit significantly more global warming pollutants than fuels made from conventional oil.

But they also have impacts in the Great Lakes. For many years the bitumen was upgraded and refined before

entering a pipeline system. But as tar sands production has increased in the last decade pipeline operators like Enbridge Energy have begun transporting diluted tar sands (DilBit) oil through pipelines to refineries in the Midwest.

Some producers create DilBit by adding a natural gas condensate and a secret blend of chemicals to the bitumen, which is too thick and heavy to move without dilution. DilBit is a highly acidic, heavy and potentially unstable blend of thick raw bitumen and volatile natural gas liquid condensate. It is high in heavy metals, sulfur, and contains significant quantities of sediment. To move, it requires higher pressures that heat the lines due to friction, leading to it aptly being compared to hot liquid sandpaper.

The major transmissions lines within the Great Lakes, including Line 5 and Line 6b, were constructed to transport lighter conventional crudes, not upgraded versions

of tar sands oil or Dilbit. Spills of DilBit are extremely difficult to clean up. When a release occurs, the diluents and bitumen separate, leaving behind extremely harmful light volatile organic compounds (VOC's) and thick, sticky and heavy bitumen material.

As discovered during the Kalamazoo River disaster in 2010, the bitumen was found to sink in the Kalamazoo river system as it mixed with the water, causing the oil to spread through the river system, undetected, for many months. It was also discovered that attempting to remove the submerged oil further devastates sensitive ecosystems, so experts are left choosing the lesser of two evils and in some cases have selected to leave oil in parts of the river for long term monitoring.

The VOC's given off during a release also pose health threats and some of the condensates used as diluents are highly explosive. They contain chemicals that harm the

## Key Reasons To Be Concerned About Enbridge Energy's Oil Pipeline in the Straits of Mackinac

**T**he physical setting alone is enough to cause concern: Two 20-inch pipelines near the bottom of the Straits carry up to 20 million gallons of crude oil and natural gas fluids across the four-mile wide channel each day. But that's just the beginning. Consider:

- > **The pipes are 59 years old; they were installed in 1953, the same year that President Dwight Eisenhower took office. These original pipelines have never been replaced.**
- > **Line 5 is vulnerable to material, weld and equipment failures, which PHMSA identifies as the most common causes of pipeline ruptures. As discovered in the Kalamazoo River disaster, some protective pipeline coatings and wraps that were supposed to prevent corrosion actually contributed to the problem.**
- > **The Line 5 pipeline that crosses the Straits is considered capable of transporting the raw form of tar sands oil (Dilbit) from western Canada. Dilbit oil requires different pipeline operating pressures and temperatures, which could increase spill risks. When a spill occurs, Dilbit is far more difficult to clean up than other types of crude oil.**
- > **Enbridge has publicly announced plans to increase the amount of oil pumped through Line 5 by 50,000 barrels per day, or 2.1 million gallons, to deliver even more tar sands-derived oil through the Great Lakes to new markets.<sup>17</sup>**
- > **Line 5 traverses very uneven terrain at the bottom of the Straits. The pipeline suspends over a 250-300 foot-deep, quarter-mile-wide, underwater canyon with steep walls. The tension on that section of the line is likely to be severe—but neither Enbridge nor the government will release any information about how that segment of the pipeline is supported.**
- > **Enbridge's pipelines had more than 800 spills in the U.S. and Canada between 1999 and 2010, leaking 6.8 million gallons of oil.<sup>8</sup>**
- > **Enbridge officials responding to the 2010 Kalamazoo River oil spill—the worst inland pipeline spill in the lower 48 states—behaved like “Keystone Kops,” according to a federal official who investigated the disaster.<sup>9</sup>**
- > **Some of Enbridge's worst oil spills were first reported by passing motorists, utility workers or nearby residents—not by employees at the company's control center in Edmonton.<sup>10</sup>**
- > **It would take at least three hours for Enbridge to dispatch cleanup crews to the Straits in the event of a spill. In that amount of time, oil could spread miles into Lake Michigan and Lake Huron.<sup>11</sup>**
- > **Currents in the Straits are often faster and more complex than those in the Kalamazoo River, where oil from Enbridge's ruptured pipeline spread 38 miles downstream.**
- > **The Pipeline and Hazardous Materials Safety Administration (PHMSA), the federal agency that regulates pipeline safety, is understaffed, weak and ineffective.<sup>12</sup>**



The 2010 Kalamazoo River tar sands oil spill, by Enbridge Energy, was the largest and most costly inland oil spill in U.S. history due to 17 hours passing before Enbridge reported the spill and inadequate response plans. Photo credit: MIDEQ.

central nervous system and are known carcinogens—like benzene. 300 people were immediately sickened by benzene exposure after the Kalamazoo spill.<sup>22</sup>

While much of the focus on fuels coming from the tar sands fields is on the threat of pipelines carrying diluted bitumen, DilBit is only one of three products that can come from the tar sands fields.

Tar Sands bitumen can also be made into upgraded bitumen or synthetic crude oil (SCO) and Synthetic Bitumen (Synbit). SCO is produced through an upgrading process that turns very heavy hydrocarbons into lighter fractions.<sup>23</sup>

Synbit is usually a combination of bitumen and SCO and the properties of the various synbit blends vary significantly. Blending the lighter SCO with the heavier bitumen to create Synbit creates a product that is sometimes described as conventional crude or even light sweet crude oil. Pipeline operators do not notify regulators, first responders or the public when product changes occur in a pipeline. Understanding the product running through a line when a release occurs is critical for any response.

While the refining process can indeed change the nature of the product moving through pipelines to something more similar to conventional crude oil, fuels

derived from tar sands are dramatically different from conventional crudes in their environmental impact.

Production of synthetic crude oil from tar sands is estimated to release *at least* three times the greenhouse gas emissions per barrel than conventional crude. In addition, the production of tar sands oil leaves behind enormous lakes of toxic waste (tailings ponds) and is resulting in the destruction of vast swaths of the Canadian boreal forest.<sup>24</sup> The presence of the lake size tailings ponds have killed thousands of waterfowl and is devastating for over 300 species of migratory birds.<sup>25</sup>

This destruction of critical boreal forest habitat has caused imbalances in wildlife populations. Most notable is the sharp decline in caribou herds due to expanding oil and gas development. The decline of caribou has caused an imbalance with their natural predators, like the wolf. Instead of the Canadian government focusing on ecological safeguards and prevention of population imbalances, they have resorted to wildlife control methods, including poisoning wolves and even shooting black bears.<sup>26</sup>

Nearby First Nation villages have also been exposed to the toxic aftermath of this industry, which has caused clusters of rare cancers within their communities.<sup>27</sup>

# Recommendations

**A**fter the Enbridge oil pipeline disaster in Marshall, Mich., it was apparent that pipeline safety, especially in the Great Lakes, needs to be a priority. Federal rules need to be strengthened and gaps closed, Great Lakes states need to step up and take a more proactive role in oversight and the agencies charged with pipeline monitoring need to be pressured to effectively apply the laws. Most importantly, overall transparency needs to improve, not only from the pipeline operators but also from the regulators charged with their oversight.

With pipeline expansion plans flooding the market, the Midwest and the Great Lakes basin are quickly becoming the anchor for tar sands transportation and refining. Most of these projects are happening before long term impacts are understood and before pipeline rules and regulations have adopted needed changes. Line 5 is no exception, with Enbridge publicly announcing plans to increase flow amounts by 50,000 barrels per day without any major pipeline safety improvements or pipeline replacements.

The National Wildlife Federation provides the following recommendations to ensure protection of our natural resources and improve pipeline oversight. NWF strongly supports increasing pipeline safety measures and opposes all oil pipeline expansions in the U.S. that would increase the market for the world's dirtiest form of crude oil.

## IMMEDIATE PIPELINE OPERATION AND MAINTENANCE

- > **Enbridge needs to develop additional response centers in both the Lower and Upper Peninsula of Michigan** to provide immediate response to any problems with lines located under the Straits of Mackinac. Enbridge's current response plans estimate that it would take 3 hours to respond to a spill from Escanaba and 5 hours from Bay City.
- > Short of decommissioning Line 5 entirely because of its age and location, **Enbridge should at least consider full replacement of this pipeline.** On the condition that Line 5 not carry dangerous tar sands oil, the old Line 5 should be completely removed and a new line put in its place that is no larger than the original lines, since there is no reason to increase the amount of oil flowing through the Great Lakes.
- > **All pipelines constructed during the time period when polyethylene tape wrap coating was used need to be evaluated and considered for replacement** due to the potential for disbondment. Disbondment occurs when the protective tape coating detaches from the surface of a pipeline creating a gap between the tape and the pipeline, which can trap moisture and encourage corrosion. Disbondment and external corrosion were the cause of the Line 6B Kalamazoo River spill. As demonstrated by the investigation into that spill, the tape coating used on pipeline constructed in the 50's

and 60's could actually encourage external corrosion. That same tape coating may be present on additional Enbridge pipelines, including Line 5. To date, the public has been denied any maintenance records divulging the current safety status of that pipeline.

## RECOMMENDATIONS FOR STATES WITHIN THE GREAT LAKES BASIN

- > **The state of Michigan and our federal agencies should deny all new interstate oil pipelines and expansion plans** within the Great Lakes basin due to environmental and economic sensitivities, especially concerning Line 5 of the Lakehead system.
- > **States should develop their own requirements for facility response plans and spill reporting.** State programs could be modeled after the ones developed in Washington and Alaska, which encourage public input on response plans and provide greater transparency. States should also consider requiring reporting of spills within a specified short period of time.
- > **The regulatory framework should consider the potential effects of oil pipelines on the Great Lakes Basin as a whole.** Pipelines are governed by multiple laws, with authority divided among different federal agencies and individual states. The Great Lakes Commission and the International Joint Commission could act as facilitators for a much-needed basin-wide perspective to improve pipeline regulation.

- > **Our federal agencies should require that Enbridge pay for a thorough health study of the Kalamazoo River release, focused on how a release of DilBit impacts wildlife and human health long term.** The Michigan Department of Community Health conducted a study on short term health impacts, called the *Acute Health Effects of the Enbridge Oil Spill*, which concluded that over 58% of the people surveyed had adverse health effects. According to that report: “Headache, nausea, and respiratory symptoms were the predominant symptoms reported by exposed individuals in all reporting systems. These symptoms are consistent with the published literature regarding potential health effects associated with acute exposure to crude oil.”
- > **All Great Lakes states need to consider strong renewable energy standards** similar to Iowa, which gets 21% of its energy from clean renewable sources. Michigan voters this November will consider a proposal for requiring 25% renewable energy by 2025. Although this standard applies to electricity generation and not transportation fuels, the technology, industry and innovation from renewable energy often translates into technologies that lower demand for fuels like tar sands products.
- > **Continue support for improved fuel efficiency standards.** In 2012, the Obama Administration finalized the first meaningful update to fuel efficiency standards in decades, the hallmark being the 54.5 miles per gallon fleet average by 2025. The series of standards will save American families more than \$1.7 trillion dollars in fuel costs, resulting in an average fuel savings of more than \$8,000 by 2025 over the lifetime of a vehicle. These programs represent the single largest reduction of American reliance on foreign oil, saving a total of 12 billion barrels of oil and reducing oil consumption by more than 2 million barrels a day by 2025 thus reducing U.S. need for importing diluted bitumen.

## NATIONAL RECOMMENDATIONS FOR PIPELINE SAFETY

- > In the wake of the Kalamazoo River spill, **any pipeline operator transporting DilBit should be required to develop alternative response plans**, taking into account the unique characteristics of the toxic heavy bitumen and the need for increased safeguards.
- > **No pipelines transporting tar sands derived crudes should be approved for construction or expansion until regulations protecting the public from the harms of diluted bitumen are promulgated and in place.** Such safety regulations should be informed by the results of an on-going study of the National Academy of Sciences. In 2012, Congress ordered PHMSA to conduct a study to determine if transportation of tar sands products poses unique corrosion risks beyond those occurring in conventional fuel lines. PHMSA has contracted that study out to the National Academy of Sciences and their conclusion is expected sometime in 2013.
- > **Pipeline information should be publicly available** consistent with national security interests. PHMSA should construe its obligation to promote awareness of the National Pipeline Mapping System with “other interested parties” as broadly as possible. This should reasonably include residents potentially impacted by pipeline spills. Expanding the availability of information could induce improved pipeline siting, operation, and response plans.
- > **States that have not been certified by PHMSA to regulate interstate pipelines and to participate in the oversight and inspection of interstate pipelines should obtain certification.** Certification would not only provide states with greater direct control over the safety of interstate pipelines, but also with greater access to pipeline safety information about interstate pipelines. Most, if not all, costs could be recovered through a combination of federal funds and cost recovery fees assessed to operators.

**LEARN MORE AND TAKE ACTION: [WWW.NWF.ORG/TARSANDS](http://WWW.NWF.ORG/TARSANDS)**

Pristine blue waters of Lakes Michigan and Huron. Photo credit: MDOT Photo/Video Unit.





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