

An hourglass-shaped graphic with a globe inside. The top bulb is dark blue, and the bottom bulb is light blue. The globe is centered in the narrow neck of the hourglass. The text is centered within the hourglass.

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Drilling in the Great Lakes: Background and Issues

Pervaze A. Sheikh, Coordinator, Resources, Science, and Industry Division

November 11, 2008

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CRS Report for Congress

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November 11, 2008

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**Prepared for Members and
Committees of Congress**

Drilling in the Great Lakes: Background and Issues

Summary

Drilling for oil and gas in or under the Great Lakes has generated interest among Great Lakes stakeholders, states, and Congress. Some opposed to drilling are concerned about the potential environmental, economic, and public health consequences. They contend that drilling will raise the risks of oil spills, hazardous gas leaks, and pollution that may harm lakeside residents and the Great Lakes ecosystem. Proponents of oil and gas drilling contend that drilling will increase local and regional tax revenues and employment, increase domestic energy production, and not be an environmental problem because of new technologies that lower the risks of oil spills and other accidents.

Issuing federal or state permits for new drilling operations under the U.S. portions of the Great Lakes was banned in the Energy Policy Act of 2005 (P.L. 109-58, §386). Specifically, the provision enacts a permanent ban on the issuance of federal or state permits for new directional, slant, or offshore drilling in or under the Great Lakes. Congress had enacted a temporary ban on any new federal and state permits for drilling under the Great Lakes in 2001 (P.L. 107-66; Title V, §503) and extended it to 2007. This temporary ban was in addition to several state bans on drilling in or under the Great Lakes. In contrast to U.S. law, Canadian law permits *onshore* gas and oil drilling under the Great Lakes, and *offshore* gas drilling in the Great Lakes.

Some contend that the decision of whether to ban drilling is a state responsibility. The states have the authority to regulate the use of Great Lakes resources within their territory and have instituted a variety of approaches for dealing with oil and gas drilling. Yet Congress has broad authority to regulate both the navigable waters and oil and gas development. Some critics of federal action to prohibit drilling say that while Congress may have the authority to regulate or ban oil and gas drilling in or under the Great Lakes, such action might also constitute a “taking” of property for which just compensation would be required.

This report provides background information on historical and current drilling practices in the Great Lakes, and statistics on oil and natural gas production, where data are available. It describes state laws regarding drilling in the Great Lakes and analyzes the environmental, socioeconomic, and legal aspects of drilling in or under the Great Lakes.

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Drilling in the Great Lakes: Background and Issues

Introduction

The debate over how to regulate offshore oil and gas drilling in the United States has generated public and congressional interest. Much discussion has centered on existing and potential drilling operations along the Outer Continental Shelf. The debate has also reached specific regions within the United States, including the Great Lakes. The question of whether to allow oil and gas drilling under the Great Lakes has been contested within states bordering the Great Lakes and in Congress. Some opposed to drilling under the Great Lakes are concerned about the potential environmental, economic, and public health consequences of drilling. They contend that drilling will raise the risks of oil spills, hazardous gas leaks, and pollution that may harm lakeside residents and the Great Lakes ecosystem. Proponents of drilling contend that the risks of oil spills and other accidents are extremely low due to new technologies, that drilling would not be environmentally harmful, and that it would lead to the generation of revenues, additional employment, and expanded domestic energy supplies.

Obtaining permits for drilling under the Great Lakes has largely been banned by various state and federal laws. A Great Lakes-wide ban may have initially been driven by the signing of a “statement of principle against oil drilling in the Great Lakes” by eight Great Lakes governors in 1985.¹ All states viewed this non-binding agreement as prohibiting drilling for natural gas and oil in the lakes and, with the exception of Michigan, as prohibiting directional drilling.² Various states have enacted permanent or temporary bans against drilling.

The federal government became involved in banning drilling in the Great Lakes when the Congress enacted a temporary ban on the federal and state issuance of permits for drilling under the Great Lakes in 2001 (P.L. 107-66; Title V, §503), extended it in 2003³, and then again through 2007.⁴ Some also proposed a permanent ban against drilling in or under the Great Lakes. A permanent ban on issuing federal

¹ A “Statement of Principle Against Oil Drilling in the Great Lakes” was signed by the governors of Michigan, Wisconsin, Pennsylvania, Minnesota, Indiana, Ohio, Illinois, and New York and states, “We collectively state our opposition to oil drilling in the waters of the Great Lakes or their connecting channels.”

² Directional drilling is the process of drilling a slant or curved well to reach a target not directly beneath the drill site. Directional wells are often drilled to reach an oil or gas reservoir where drilling directly overhead cannot be done, such as beneath a shipping lane in the ocean.

³ Section 505 of the Consolidated Appropriations Resolution of 2003, P.L. 108-7.

⁴ Section 504 of the Consolidated Appropriations Act of 2005, P.L. 108-447.

or state permits for new directional, slant, or offshore drilling in or under the Great Lakes was included in the Energy Policy Act of 2005 (P.L. 109-58). Section 386 specifically states that “no federal or state permit or lease shall be issued for new oil and gas slant, directional, or offshore drilling in or under one or more of the Great Lakes.”⁵

The U.S. ban on drilling in the Great Lakes has generated controversy. Some contend that the decision of whether to drill in the Great Lakes should be made by each state bordering the lakes. They view a federal ban on drilling in the Great Lakes as a violation of states’ rights and suggest that a federal ban constitutes a “taking.”⁶ Some proponents of the ban contend that state laws are not uniform in permanently banning drilling in the lakes. Indeed, as described later in this report, some Great Lakes states have enacted permanent bans on providing new oil and gas drilling permits in state waters, other states have no bans, and some are considering permanent bans in pending legislation.

Offshore and directional drilling for gas under the Canadian Great Lakes is allowed by the Canadian government and by Ontario, the only province that borders the Great Lakes. Directional drilling for oil is allowed under the Canadian Great Lakes; however, offshore drilling for oil is prohibited. Canadian directional drilling operations are not known to have gone under U.S. waters of the Great Lakes.

This report provides background information on the history of drilling in the Great Lakes, current production statistics (where available) for U.S. and Canadian wells, and a summary of some environmental and economic issues related to drilling. A review of state laws regarding drilling in the Great Lakes and a discussion of state drilling laws and the implications of a federal ban on drilling also are given.

The Great Lakes Basin

The Great Lakes basin is shared by eight U.S. states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin) and two Canadian provinces (Ontario and Quebec). The basin is generally considered to be composed of the Great Lakes, connecting channels, tributaries, and groundwater that drain through the international section of the St. Lawrence River. (See **Figure 1**.) The Great Lakes watershed contains the largest volume of fresh surface water in the world and covers approximately 300,000 square miles. The Great Lakes themselves contain an estimated six quadrillion gallons of water. This constitutes nearly 90% of the surface freshwater supplies of the United States and 20% of the surface freshwater supplies of the world.⁷ The Great Lakes region plays a role in the daily lives of millions of people and the economies of two nations. The Great Lakes states

⁵ This law does not prohibit drilling under the Great Lakes if appropriate permits have already been obtained or possibly if permits for existing operations are submitted for renewal.

⁶ U.S. Constitution, Fifth Amendment (stating “nor shall private property be taken for public use, without just compensation”).

⁷ The Great Lakes Information Network, Great Lakes Commission, *Overview*, available at [http://www.great-lakes.net/lakes/#overview], accessed October 14, 2008.

and Canadian provinces are home to more than one-tenth of the population of the United States and one-quarter of the population of Canada. An estimated 40 million people rely on the Great Lakes Basin to provide jobs, drinking water, and recreation, among other things.⁸

Figure 1. The Great Lakes Basin



Physical Characteristics of the Ecosystem. Since the Great Lakes cover a wide area, physical characteristics such as topography, soils, and climate vary considerably. Characteristics of water flow also vary across the lakes. Water levels in the Great Lakes vary according to the season. These changes are based primarily on precipitation and runoff to the Lakes. Levels are low in the winter, when much of the precipitation is in the form of snow or ice, and high in the early summer, when runoff increases.⁹

The Great Lakes ecosystem has been altered substantially in the last two centuries. In the last several decades, agricultural, urban, and industrial development have degraded water quality in the Great Lakes, posing threats to wildlife

⁸ For example, nearly 11% of the total employment and 15% of the manufacturing employment for the United States and Canada are directly related to the Great Lakes basin. Further, the tourism and fishing industry in the Great Lakes are estimated to be worth about \$4 billion each, and navigation through the Great Lakes is responsible for over 180 million tons of shipping annually. The Great Lakes basin also contains nearly 25% of Canada's agricultural production and 7% of U.S. agricultural production. Environmental Protection Agency, *The Great Lakes: An Environmental Atlas and Resource Book* (Chicago, IL: 2002), 46 pp. Hereafter referred to as the *Great Lakes Atlas*.

⁹ *Great Lakes Atlas*.

populations, human health, and the Great Lakes ecosystem. Development has also led to changes in terrestrial and aquatic habitats, the introduction of non-native species, the contamination of sediments, and the listing of more than 50 threatened and endangered species.¹⁰ To counter this trend, the federal governments of the United States and Canada, as well as provincial and state governments in the Great Lakes basin, have implemented numerous restoration activities.

Oil and Gas Production in the Great Lakes

No offshore oil and gas drilling in the Great Lakes has occurred in U.S. waters. Several states have attempted to drill onshore for oil and gas under the Great Lakes, but operating wells exist only in Michigan.

Interest in modern oil and gas drilling in the Great Lakes is thought to have begun in the mid-1950s, although some cite that Lake Erie's first offshore gas well was drilled in 1913.¹¹ Oil development in the mid-1950s was encouraged in the state of Ohio. The Ohio General Assembly provided the policy framework to allow for the extraction of oil and gas from under Lake Erie, and leasing and production procedures were established by the Ohio Department of Natural Resources.¹² However, opposition to drilling in Lake Erie began in 1957 because of environmental concerns, and the program was abandoned by 1968.¹³ No offshore or onshore wells were drilled in Lake Erie in Ohio state waters afterwards, and several temporary bans were placed on all types of drilling under Lake Erie in Ohio, the latest one in 2003.¹⁴

In Pennsylvania, there has been no history of oil or gas production under Lake Erie; two onshore exploratory wells were drilled in 1957 but no commercial deposits were found. In Michigan, since 1979, 13 onshore wells under the Great Lakes have been drilled; six were reported dry, and seven are still in production (one oil well and six natural gas wells).¹⁵ Five producing wells are under Lake Michigan and two wells are under Lake Huron. All producers in Michigan are employing directional drilling technology, which originates on land and drills underneath the lakes. In Michigan, no onshore or offshore drilling can take place under the Great Lakes, except by those who obtained leases and commenced drilling prior to April 5, 2002. Prior to that date, state law authorized removal of oil and gas under the Great Lakes

¹⁰ The Great Lakes Regional Collaboration, *The Great Lakes Regional Collaboration Strategy* (Dec. 2005), at [<http://www.glrc.us/>].

¹¹ Kathy Shirley, "What's (Not) Happening Is Erie," *Explorer* (Sept. 2001).

¹² Larry Wickstrom, "A Fresh Look at Exploration and Production in Lake Erie," Petroleum Geology Group, Ohio Division of Geological Survey, Ohio Oil and Gas Association Winter Meeting, 2001. At [http://www.ohgeosoc.org/presentations/lake%20erie%20gas%20talk%20-%20ooga%202001_files/frame.htm]. Hereafter referred to as "Wickstrom."

¹³ *Ibid.*

¹⁴ Executive Order 2003-17T (July 14, 2003).

¹⁵ Communication from the Dept. of Environmental Quality, Geological Survey Division, State of Michigan, Lansing, MI, 2008.

if directional drilling was employed. Other Great Lakes states including Illinois, Indiana, Minnesota, New York, and Wisconsin have no history of significant oil and gas drilling under the Great Lakes.

In Canada, 2,200 wells have been drilled in Lake Erie, of which 550 are producing. Canada began modern commercial production of natural gas in Lake Erie in the 1960s. This came after decades of exploration activity that began as early as 1913. Offshore *gas* wells are permitted in the Canadian Great Lakes, but offshore *oil* wells are prohibited. If a gas well shows evidence of oil, it must be closed and plugged, according to Canadian regulations. Directional oil and gas drilling is allowed under the Canadian Great Lakes, and has been extensively done in Lake Erie. In Lake Erie, annual natural gas extraction rose to 15.2 billion cubic feet (bcf) in 1985 and has since declined to about 10 bcf in 2000.¹⁶ Oil production through directional drilling into Lake Erie has developed in Ontario. There are 100 wells to date at an average depth of 2,800ft and 2.2 miles horizontal offset (i.e., drill location to target reservoir).¹⁷

Table 1 provides statistics on U.S. oil and natural gas production in the Great Lakes, all of it in Michigan state waters. Oil and gas production under the Great Lakes in Michigan has been variable over the past few years. The average annual production of natural gas under the Great Lakes in Michigan from 2000 to 2008 has been approximately 1.3 billion cubic feet (bcf), whereas oil production ceased in 2005.¹⁸ This annual average represents approximately 0.005% of national production of natural gas.

Oil and Gas Resources¹⁹

Modern-day estimates of oil and gas resources under U.S. portions of the Great Lakes have been created by the U.S. Geological Survey for 2005. The quantity of undiscovered, technically recoverable oil and gas resources for the U.S. portions of the Great Lakes includes a mean value of 312 million barrels of oil, a mean value of 5.2 trillion cubic feet of natural gas, and a mean value of 122 million barrels of natural gas liquids.²⁰ The range of these estimated values is high and is tabulated according to the percent chance of an amount recovered. (See **Table 2.**)

¹⁶ Wickstrom.

¹⁷ J. L. Coleman and C. S. Swezey, *A Review of Oil and Gas Resources Underlying and Adjacent to the U.S. Portions of the Great Lakes*, U.S. Geological Survey, Powerpoint presentation, August 2008.

¹⁸ Statistics are taken from the U.S. Energy Information Administration, "Production of Natural Gas and Use in Michigan," at [http://www.eia.doe.gov/emeu/states/_states.html].

¹⁹ Resources have a different meaning than *reserves*. Reserves are quantities of a resource claimed to be recoverable under current economic and technological conditions. Resources are quantities estimated to be potentially recoverable from undiscovered accumulations. Prospective resources have both an associated chance of discovery and a chance of development.

²⁰ J. L. Coleman et al., *Undiscovered Oil and Gas Resources Underlying the U.S. Portions of the Great Lakes, 2005*, U.S. Geological Survey, Fact Sheet 2006-3049.

Table 1. Production of Oil and Natural Gas in the U.S. Great Lakes (All Wells in Michigan)

Year	Oil (barrels)	Condensate Production (barrels)	Natural Gas Liquids (barrels)	Natural Gas Sold (thousand cubic feet)
Cumulative through 1999	9,717	380,882	22,294	15,630,452
2000	493	16,194	9,324	1,849,171
2001	2,331	12,770	7,054	1,848,584
2002	1,117	8,485	5,496	1,589,130
2003	967	5,124	2,379	1,374,546
2004	515	3,580	1,710	889,543
2005	0	2,978	2,221	916,342
2006	0	2,803	5,175	1,086,458
2007	0	2,654	4,418	979,790

Source: Michigan Dept. of Environment Quality, Office of Geological Survey, 2008.

Table 2. Great Lakes Oil and Gas Estimated Undiscovered Resources

Resource	Mean Value	F95	F50	F5
Oil	312 million barrels of oil	87.0 million barrels of oil	271.0 million barrels of oil	675.8 million barrels of oil
Natural Gas	5.2 trillion cubic feet of natural gas	2.2 trillion cubic feet of natural gas	4.8 trillion cubic feet of natural gas	9.5 trillion cubic feet of natural gas
Natural Gas Liquids	122 million barrels of natural gas liquids	39.7 million barrels of natural gas liquids	106.9 million barrels of natural gas liquids	254.6 million barrels of natural gas liquids

Note: F95 represents a 95% chance of at least recovering the amount given; F50, a 50% chance, and F5, a 5% chance. Mean is calculated using all estimates for the range of fractals.

Source: J. L. Coleman et al., *Undiscovered Oil and Gas Resources Underlying the U.S. Portions of the Great Lakes, 2005*, U.S. Geological Survey, Fact Sheet 2006-3049.

The USGS report on estimated resources also broke down estimates by lake and states within the Great Lakes. (See **Tables 3 and 4.**) Lake Huron and Lake Michigan have the greatest amount of estimated oil resources, whereas Lake Erie has the largest amount of estimated natural gas resources. In Canada, the Ontario Ministry of Natural Resources estimates that about 195 million barrels of oil and 1.1 tcf of gas remain under Canada's portion of Lake Erie.²¹ Estimates for oil and gas resources under the Canadian portions of other lakes were not available.

Table 3. Summary of Estimated Undiscovered Mean Values of Great Lakes Oil and Gas Resource Allocations by Lake (Areas Under U.S. Portions of Great Lakes)

Lake	Oil (million barrels)	Gas (trillion cubic feet)	Natural Gas Liquids (million barrels)
Lake Erie	46.1	3.0	40.7
Lake Huron	141.0	0.8	42.5
Lake Michigan	124.6	1.3	37.4
Lake Ontario	0.0	0.1	1.1
Lake Superior	Not assessed quantitatively		

Source: J. L. Coleman et al., *Undiscovered Oil and Gas Resources Underlying the U.S. Portions of the Great Lakes, 2005*, U.S. Geological Survey, Fact Sheet 2006-3049.

Table 4. Summary of Estimated Undiscovered Mean Values of Great Lakes Oil and Gas Resource Allocations by State (Areas Under U.S. Portions of Great Lakes)

State	Oil (million barrels)	Gas (trillion cubic feet)	Natural Gas Liquids (million barrels)
Illinois	0.7	0.003	0.14
Indiana	0.8	0.003	0.14
Michigan	282.5	2.2	83.3
Minnesota	Not assessed quantitatively		
New York	0.0	0.6	6.5
Ohio	25.7	1.9	24.7
Pennsylvania	0.0	0.5	6.6
Wisconsin	1.9	0.008	0.3

Source: J. L. Coleman et al., *Undiscovered Oil and Gas Resources Underlying the U.S. Portions of the Great Lakes, 2005*, U.S. Geological Survey, Fact Sheet 2006-3049.

²¹ See [http://www.mnr.gov.on.ca/en/Business/OGSR/2ColumnSubPage/STEL02_167105.html].

A breakdown of oil and gas estimated resources by Great Lakes state reveals that Michigan has the greatest amount of estimated oil resources under the Great Lakes. Indeed, some have reported that if a ban against drilling under the Great Lakes in Michigan did not exist, 20 to 30 new wells could be drilled in Michigan.²² Natural gas estimated resources are highest for Michigan and Ohio, with a majority of the estimated resources in Lake Erie.

Potential Consequences of Drilling

There are several potential consequences associated with oil and gas drilling in or near large waterbodies such as the Great Lakes. Possible negative effects include oil spills, discharge of contaminated drilling fluids, and effects of the “footprint” of the drilling infrastructure.²³ Possible positive effects include increased revenues for the region and state, increased employment, and greater domestic energy production. Under §503 of the Energy and Water Appropriations Act (EWA) of 2002 (P.L. 107-66), the U.S. Army Corps of Engineers was directed to conduct a study of the potential environmental effects of oil and gas drilling activity in the Great Lakes. This report was completed in 2005 and contains a detailed discussion of the potential environmental effects of drilling under the Great Lakes.²⁴

This section will provide an overview of some of the potential consequences of drilling under the Great Lakes and provide data, where available, on unintended oil and gas releases into the Great Lakes.

Economic Consequences

Drilling under the Great Lakes can have both benefits and costs for local, regional, and state economies. Exploration for oil and gas deposits may yield economic benefits, such as jobs and revenue for the owner. If deposits are not found and drilling is not fully implemented, these benefits may be short-term. If deposits are significant, and drilling commences and expands, local and state governments would also benefit from revenues generated from permits, leases, and taxes on the quantity of oil and gas sold. In some Great Lakes states, revenues from oil and gas leases potentially benefit the environment. For example, in Michigan, some revenues from leasing rights to drill under the Great Lakes would go to the Michigan Department of Natural Resources Trust to purchase and protect environmentally

²² Harold Fitch, “Forum on Directional Drilling Under the Great Lakes: The Basics of Directional Drilling,” *Michigan State University Law Review* (Nov. 6, 2001), p. 207.

²³ A footprint is generally considered to be the range of physical features and infrastructure involved in a drilling operation. There is no set definition of what constitutes a drilling operation footprint, and therefore it could vary between operations. The drilling footprint may result in lower tourism and recreation in the area surrounding the operation.

²⁴ U.S. Army Corps of Engineers, *Known and Potential Environmental Effects of Potential Oil and Gas Drilling Activity in the Great Lakes* (Chicago, IL: Nov. 2005), 244p. Hereafter referred to as the “Corps study.”

sensitive areas.²⁵ Depending on their scope and number, drilling operations would also generate employment. According to the U.S. Bureau of Labor Statistics, there was a national average of 5.7 jobs generated per \$1.0 million of sales by oil and gas producers in 2002.²⁶

Potential economic costs from drilling under the Great Lakes may stem from drilling infrastructure and oil and gas releases. The presence of infrastructure may lower tourism and recreational opportunities, harm the Great Lakes ecosystem, affect scenic vistas, and lower property values.²⁷ If spills occur in areas near or within the lakes, economic costs could come from clean-up, lower water quality and environmental mitigation, lost recreational and tourism opportunities, and reduced development.

Environmental Consequences

The potential environmental consequences of oil and gas drilling have been the primary driver in opposition to oil and gas drilling under the Great Lakes. During the process of drilling, environmental problems can occur through leaks, spills, and blowouts, among other things. A leak or spill can occur from a pipeline rupture, containment failure, or from a drilling mud pit. A blowout occurs when a drill reaches a formation with unusually high pressure, and results in the explosive discharge of the well's contents. Spills and leaks can also occur during transport. In addition, drilling wastes or byproducts — such as drilling muds or cuttings, drilling fluids, and produced waters²⁸ — can potentially harm the environment if released into streams or onto vegetation.

This section identifies potential effects related to oil spills and operational releases. In addition, this section discusses directional drilling, an activity that could have environmental consequences.

Potential Ecosystem Effects. Depending on timing and location, a relatively minor oil spill can cause significant harm to individual organisms and entire populations.²⁹ Oil spills can cause impacts over a range of time scales, from days to years, or even decades for certain spills. These are described below.

²⁵ Constitution of Michigan, Article 9, §35.

²⁶ Bureau of Labor Statistics estimates are based on 2002 labor productivity. At [<http://www.bls.gov/emp/empind4.htm>].

²⁷ Bryan Clark and Tony Dutzik, *Dirty Drilling, The Threat of Oil and Gas Drilling in Michigan's Great Lakes* (Ann Arbor, MI: PIRGIM Education Fund, Feb. 2002). Hereafter referred to as *Dirty Drilling*.

²⁸ Drill cuttings are particles of crushed rock produced by the action of the drill bit as it penetrates the geologic formation. Drilling fluids are mixtures of natural clays and/or polymers, weighting agents and other materials suspended in a water or oil-based material. Water encountered during the drilling process is termed *produced water*. Produced waters can contain organic hydrocarbons, phenols, and organic acids, among other things.

²⁹ National Research Council (NRC), *Oil in the Sea III: Inputs, Fates, and Effects* (2003), National Academies of Science (hereafter “NRC report”), p. 4.

Acute Impacts. Depending on the toxicity and concentration of an oil spill, acute exposure to oil spills can kill various organisms and cause the following debilitating effects:³⁰

- reduced reproduction,
- altered development,
- impaired feeding mechanisms, and
- weakened immunity against disease.

These potential acute effects to individual organisms and marine ecosystems have been confirmed by laboratory studies and well-studied spills, such as the *Exxon Valdez*.³¹

Birds, marine mammals, bottom-dwelling and intertidal species, and organisms in their developmental stages — e.g., fish eggs and larvae — are particularly vulnerable to oil spills.³² Wildlife are affected by direct exposure to floating oil, polluted waters, contaminated prey, or depleted food resources.³³

Chronic Impacts. Impacts to fish and wildlife and their habitat can also occur through chronic, low-level exposure from persistent contaminants in the ecosystem. Chronic exposure typically occurs from continuous oil releases — leaking pipelines, non-point sources (e.g., urban runoff), and production discharges, such as drilling fluids and produced waters. Some have expressed concern over the long-term effects of buried drilling wastes and injected production water on ecosystems. Drilling wastes are generally buried onshore and in some cases produced water is injected in drill holes for storage. Both substances contain a variety of toxic chemicals that could be hazardous to the ecosystem.³⁴

Although spills are normally associated with acute impacts, some oil spills have also demonstrated chronic exposure and effects.³⁵ There is increasing evidence that chronic, low-level exposures to oil contaminants can significantly affect the survival and reproductive success of marine birds and mammals.³⁶ However, because of the complexity of factors, including a longer time period and presence of other pollutants, determining the precise effects on species and ecosystems due to chronic

³⁰ These “sub-lethal” effects can occur at concentrations that are several orders of magnitude lower than concentrations that cause death. NRC report, p. 127.

³¹ NRC report, p. 120.

³² NRC report, Chapter 5; also multiple conversations with National Oceanic and Atmospheric Administration (NOAA) personnel (2008).

³³ J. M. Capuzzo, “Biological Effects of Petroleum Hydrocarbons: Assessments from Experimental Results,” *Long-Term Environmental Effects of Offshore Oil and Gas Development*, D. F. Boesch and N. N. Rabalais, eds. (London: Elsevier Applied Science, 1987), pp. 343-410.

³⁴ Corps study.

³⁵ NRC report, p. 121.

³⁶ NRC report, p. 134.

oil exposure in a particular locale is difficult for scientists. As a result, studies involving chronic effects are often met with debate and some controversy.

Other Ecosystem Impacts. Discharge of oil can also lead to changes in coastline and aquatic habitat. In aquatic habitats, spills or toxic discharges may degrade water quality, lower dissolved oxygen, contaminate sediments, and alter aquatic vegetation.³⁷ Water flow influences the potential impact of spills. In areas where there is a high flow of water (e.g., rivers), impacts will be less (but potentially more widespread) than in areas where water flow is minimal, such as in wetlands. In low-flow areas, spills can persist longer and damage vegetation and other organisms that use these habitats.³⁸ In the Great Lakes, water flow is variable and therefore spills can have different impacts. For instance, water that enters Lake Superior takes approximately 182 years to be completely replaced. This could be considered a low-flow area compared to Lake Erie and Lake Ontario, which take approximately three and six years, respectively, to replace water. Toxins from spills in the Great Lakes can settle into sediments and persist for many years.

Directional Drilling. The type of drilling operation is a factor when assessing its potential environmental consequences. For example, in Michigan, there has been a debate over the potential environmental effects of directional drilling. Directional drilling is considered to have less potential hazard than offshore drilling due primarily to its location onshore.³⁹ (See **Figure 2.**)

Directional drilling beneath the Great Lakes in Michigan, for example, targets the Niagaran Reefs formation, which is four to five thousand feet below ground. There is an impermeable geologic barrier between the hydrocarbon deposits and the lake.⁴⁰ According to an evaluation of the potential environmental impacts of directional drilling, there is little risk of contaminating the Great Lakes through spills at the reservoir and well. However, the study states that there is a potential risk associated with leaks at the wellhead, which would be located onshore.⁴¹ This study also recommended that directional drilling under the Great Lakes be done at least 1,500 feet from the shoreline, and prohibited in sensitive natural areas.

Directional drilling would likely mitigate the risk of spills into the Great Lakes. However, it is uncertain how much of the fossil fuel resources can be extracted with current directional drilling technology.

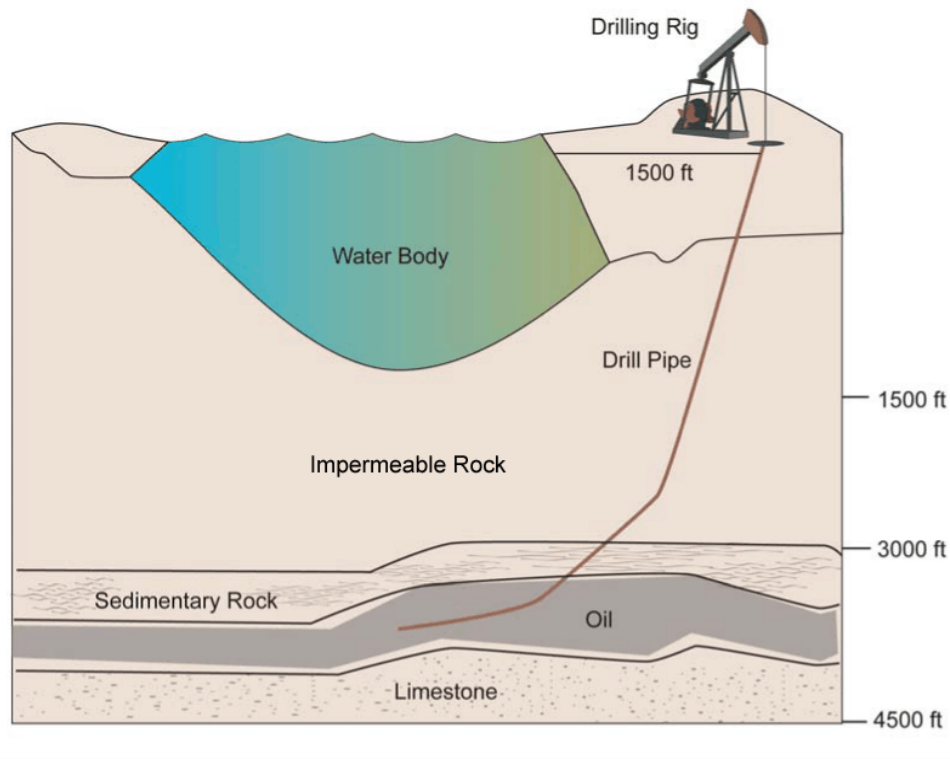
³⁷ D. F. Boesch and N. N. Rabalais, eds., *Long-Term Environmental Effects of Offshore Oil and Gas Development* (London: Elsevier Applied Science, 1987), 708 pp.

³⁸ U.S. Environmental Protection Agency, *Sensitivity of Freshwater Habitats* (Washington, DC: Office of Emergency Management, Oil Program, 2004), at [<http://www.epa.gov/oilspill/freshwat.htm>].

³⁹ Harold Fitch, "Forum on Directional Drilling Under the Great Lakes: The Basics of Directional Drilling," *Michigan State University Law Review* (Nov. 6, 2001), p. 207.

⁴⁰ *Ibid.*

⁴¹ Michigan Environmental Science Board, *Evaluation of Directional Drilling Under the Great Lakes* (Lansing, MI: Oct. 1997).

Figure 2. Diagram of Directional Drilling

Source: Created by CRS.

Oil Spills in the Great Lakes

The potential for oil spills in the Great Lakes would increase, if policymakers decided to allow offshore oil exploration and production operations in the region. As discussed above, relatively minimal drilling has occurred in U.S. oil and gas resources under the Great Lakes. According to insurance statistics, there were no oil or gas spills associated with the 13 onshore wells that directionally drilled under the Great Lakes before the ban was imposed in 2005.⁴²

Canada has been actively drilling, particularly in Lake Erie, since the 1920s.⁴³ According to a source cited in the Corps study, there has been one reported oil spill directly attributed to a drilling operation in the Canadian Great Lakes since 1959 and no reported oil releases from subsurface formations into overlying waters.⁴⁴ Compared to spill rates from oil extraction and production operations in U.S.

⁴² Michael LaFaive, *Great Lakes Drilling: Environmental Threat or Phantom Menace?* (Midland, MI: Mar. 2002).

⁴³ *Dirty Drilling*.

⁴⁴ The Corps Study cites a draft report from the Pennsylvania Department of Natural Resources (Borawski, T., Jr., *Draft Report Concerning Possible Oil & Gas Resources beneath Lake Erie* (2005)).

waters,⁴⁵ the Canadian spill figures are noteworthy. However, as mentioned above, Canada only allows directional drilling, thus making a spill into the Great Lakes more unlikely than offshore well locations.

Offshore oil exploration and production in the Great Lakes would increase the risk of oil spills in the region. The risk of oil well blowouts is relatively low.⁴⁶ A major blowout has not occurred in U.S. waters in decades, which industry advocates attribute to advancements in drilling technology.⁴⁷ Advances in drilling technology have led to decreases in spills and releases, and lower footprints for drilling rigs, according to some industry advocates. Three-dimensional seismic imaging technology,⁴⁸ for example, allows explorers to identify areas where commercial quantities of oil and gas may have accumulated. This technology provides a greater rate of success in finding oil and gas deposits and therefore could reduce the number of exploratory wells used to tap deposits.⁴⁹ In some drilling operations, slimhole drilling is employed. Slimhole drilling is defined as drilling the smallest hole size to meet production objectives in the most cost-effective manner. This method decreases waste volumes and takes up as much as 75% less surface area than traditional wells.⁵⁰ Other innovations include modular rigs which lower the footprint of drilling, as well as pipeline sensors that monitor for pipeline corrosion or wall defects.⁵¹

Regardless of these advancements, offshore drilling would yield some level of risk from an oil well blowout. In addition, offshore oil production in the Great Lakes would necessitate increased oil transportation. Increased oil transportation — pipelines and tank vessels — would increase the potential for oil spills in the region. Directional drilling would likely mitigate the risk of spills into the Great Lakes. However, it is uncertain how much of the fossil fuel resources can be extracted with current directional drilling technology.

⁴⁵ See Minerals Management Service (MMS) spill database, at [<http://www.mms.gov/incidents/IncidentStatisticsSummaries.htm>].

⁴⁶ Oil well blowouts from offshore oil extraction operations have historically been a source of major oil spills. The largest unintended oil spill in world history — the IXTOC I, estimated at 140 million gallons — was due to an oil well blowout in Mexican Gulf Coast waters in 1979. A 1969 well blowout off the coast of Santa Barbara released approximately 4 million gallons into the environment and has been credited with catalyzing some of the landmark environmental legislation of the 1970s.

⁴⁷ For information regarding this technology, see American Petroleum Institute's website at [<http://www.api.org/ehs/performance/explore/index.cfm>].

⁴⁸ This technology bounces acoustic or electrical vibrations off underground surfaces, generating data that produce multidimensional representations of those surfaces. These images can be analyzed to find the best location for drilling.

⁴⁹ American Petroleum Institute, at [<http://www.api.org/ehs/water/directional-drill.cfm>].

⁵⁰ *Ibid.*

⁵¹ *Ibid.*

Legal Issues Associated with Drilling in the Great Lakes

Congress has the authority to regulate the use of the Great Lakes, including the development of oil and gas, under the Commerce Clause of the Constitution. The repercussions of congressional action, however, depend to some extent upon the characterization of the regulated resource. If the body of water constituting the Great Lakes and its underlying resources are state-owned, some forms of federal regulation could amount to a taking. If these resources are federal property, a taking would not occur.

State Control

Eight states border the Great Lakes: Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New York, and Wisconsin. It appears that, in accordance with federal law, these states own those Great Lakes' beds and resources within their respective boundaries. Longstanding Supreme Court precedent indicates that individual states hold title to the submerged lands beneath the waters within their boundaries that were *navigable* at the time the state entered the Union.⁵² The determination as to whether a given body constitutes *navigable waters* is made by application of a test developed under federal law. That test states that waters are *navigable* when they are “used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water.”⁵³ That the Great Lakes would satisfy this test appears certain.⁵⁴ Thus, under the common law approach, states would hold title to some U.S. portions of the Great Lakes.

This approach is confirmed by the federal Submerged Lands Act (SLA).⁵⁵ The SLA declares that states are vested with title to both the lands beneath the navigable waters within their boundaries and to the natural resources within those lands and waters.⁵⁶ The act makes clear that a state's boundaries include its boundaries in the

⁵² *Shively v. Bowlby*, 152 U.S. 1, 14-16 (1894); *Martin v. Lessee of Waddell*, 41 U.S. (16 Pet.) 367, 410 (1842). In general, U.S. courts have recognized that the original thirteen states acquired title to the submerged lands under the navigable waters and their underlying resources when the American Revolution took place and the states achieved sovereignty. Under the *equal footing doctrine*, states entering the Union subsequent to the Revolution obtained similar title to the navigable waters and submerged lands within their boundaries. *Pollard v. Hagan*, 44 U.S. (3 How.) 212 (1845).

⁵³ *The Daniel Ball*, 77 U.S. (10 Wall.) 557, 563 (1870); *United States v. Utah*, 283 U.S. 64, 76 (1931); see also *State v. Venice of America Land Co.*, 125 N.W. 770 (Mich. 1910); *People v. Babcock*, 196 N.W.2d 489 (Mich. Ct. App. 1972).

⁵⁴ See *Utah v. United States*, 403 U.S. 9 (1971).

⁵⁵ 43 U.S.C. §§ 1301 et seq.

⁵⁶ *Id.* § 1311(a).

Great Lakes as they existed at the time the state became a member of the Union.⁵⁷ Thus, under both common law and the SLA, a state may claim ownership of Great Lakes oil and gas to the extent its boundaries encompass a portion of the Great Lakes bed containing such minerals.

Finally, while the courts do not appear to have directly addressed ownership of the Great Lakes as to each contiguous state, the U.S. Supreme Court has ruled that the state of Illinois is entitled to the portions of Lake Michigan within its boundaries.⁵⁸ As the other Great Lakes states contain portions of the Great Lakes within their respective boundaries⁵⁹ and as they are empowered to “manage, administer, lease, develop, and use” these submerged lands under the SLA, it would appear that each Great Lakes state has title to the Great Lakes oil and gas resources within its boundaries and the authority to regulate their development, assuming that other federal law does not limit state authority.⁶⁰ As stated above, the recently enacted Energy Policy Act of 2005 does contain a provision limiting state authority to authorize oil and gas drilling, potentially implicating the Takings Clause of the Fifth Amendment.

Existing State Regulation

Prior to the enactment of federal laws banning permits for Great Lakes drilling, states could claim significant authority over oil and gas-related activities in the Great Lakes. States chose to exercise this authority in a variety of manners. State laws that are inconsistent with the federal ban now in effect are preempted by federal law; however, to the extent that it does not conflict with federal law, state regulation may still remain viable.⁶¹ Further, if the existing federal ban is repealed, state regulation would again become applicable. Each state’s existing laws are briefly summarized below.

Illinois statutes indicate that its portion of the bed of Lake Michigan is under the jurisdiction of the Department of Natural Resources.⁶² Under state law, structures may be permitted within the waters of the state, and the Department of Natural

⁵⁷ Id. § 1301(b).

⁵⁸ *Illinois Central R. Co. v. State of Illinois*, 146 U.S. 387 (1892).

⁵⁹ See 3 Stat. 289, § 2 (Apr. 19, 1816) (Indiana); 5 Stat. 144 (Jan. 26, 1837) (Michigan admission act and Ohio northern boundary); 11 Stat. 166 (Feb. 26, 1857) (Minnesota); 2 Stat. 173 (Apr. 30, 1802) (Ohio); 71 P. Cons. Stat. § 1861 (Pennsylvania); N.Y. State Law § 5 (New York); 9 Stat. 56 (Aug. 6, 1846) (Wisconsin).

⁶⁰ Id. § 1311(a).

⁶¹ See *National Fuel Gas Supply v. Public Service Commission*, 894 F.2d 571, 576-79 (2d Cir. 1990). The preemption doctrine is based upon the Supremacy Clause of the Constitution and can occur in several different manners. Federal law will trump state law when (1) Congress explicitly intends preemption; (2) there is actual conflict between state and federal law; (3) compliance with both state and federal law is impossible; (4) a barrier to state regulation is implicit in federal law; (5) federal regulation is so pervasive as to “occupy the field” entirely; or (6) state law frustrates the purposes of federal regulation.

⁶² 615 Ill. Comp. Stat. 5/24.

Resources may also enter into an agreement with the permit holder to authorize oil and gas development.⁶³ Further, Illinois's process for leasing state-owned lands for mineral development would not appear to exclude lake bottoms from its application, although where the state owns 100% of the mineral interest, no leasing may occur on:

(1) lands where threatened or endangered species occur, as determined pursuant to the federal Endangered Species Act or the Illinois Endangered Species Protection Act, (2) Illinois Natural Area Inventory sites, (3) nature preserves dedicated under the Illinois Natural Areas Preservation Act, (4) lands containing a wild and scenic river as designated under the Wild and Scenic River Area Act, (5) lands registered under the Register of Land and Water Reserves under Part 4010 of Title 17 of the Illinois Administrative Code, and (6) lands on which federal or State laws or regulations prohibit the surface extraction or production facility activity.⁶⁴

Indiana law does not expressly address drilling in the Great Lakes, although it would appear that the Indiana Department of Natural Resources has the authority to permit and lease the beds of lakes for oil and gas development.⁶⁵

Michigan law vests the Department of Natural Resources with responsibility for leasing all state owned mineral resources. Recent changes to state law prohibit future leasing of Great Lakes oil and gas. Further, no drilling can take place, except by those who obtained leases and commenced drilling prior to April 5, 2002.⁶⁶ Prior to that date, state law authorized removal of oil and gas under the Great Lakes if drilling operations originated from locations above and inland of the ordinary high water mark and were performed pursuant to a lease.⁶⁷

Minnesota does not appear to have an express ban on Great Lakes oil and gas drilling. Its laws authorize issuing leases for minerals and petroleum on state lands, including the beds of any waters belonging to the state.⁶⁸

Ohio law stipulates that its director of natural resources, with the approval of the director of environmental protection, the attorney general, and the governor, "may issue permits and make leases to parties making application for permission to take and remove sand, gravel, stone, and other minerals or substances from and under the bed of Lake Erie, as he determines to be best for the state."⁶⁹ The governor of the

⁶³ 615 Ill. Comp. Stat. 5/18, 5/18b.

⁶⁴ 5 Ill. Comp. Stat. 615/2 (internal citations omitted); see also id. 615/1.

⁶⁵ See Ind. Code §§ 14-38-1-6, 14-38-1-11, 14-38-1-12, 14-38-1-24.

⁶⁶ Mich. Comp. Laws §§ 324.33938, 324.32503.

⁶⁷ Id. (amended 2002).

⁶⁸ Minn. Stat. § 93.25.

⁶⁹ Ohio Rev. Code Ann. § 1505.07.

state has issued an executive order banning oil and gas drilling, although it could be altered or repealed by a subsequent executive order at any time.⁷⁰

Pennsylvania law allows for drilling in the Great Lakes at the discretion of the Department of Conservation and Natural Resources. The law empowers the Department to “make and execute contracts or leases ... for the mining or removal of ... oil and gas beneath those waters of Lake Erie owned by the Commonwealth ... whenever it shall appear to the satisfaction of the department that it would be for the best interests of this Commonwealth to make such disposition of those minerals ...”⁷¹

New York statutes specifically prohibit issuing either oil or gas leases in the lands under the waters of Lake Ontario or along its shoreline. Similarly, oil leases are prohibited for the lands under the waters of Lake Erie, although gas leases are not prohibited.⁷²

Under **Wisconsin** law, oil and gas drilling operations are prohibited if they extend beneath the beds of the Great Lakes or bays or harbors that are adjacent to the Great Lakes. State law previously authorized directional drilling under certain circumstances, but the law’s amendment would appear to indicate that such authority has been removed.⁷³

Legal Implications of a Federal Drilling Ban

As described above, absent federal law to the contrary, states have the authority to regulate the use of Great Lakes resources within their territory and have instituted a variety of approaches for dealing with oil and gas drilling within their respective boundaries. Still, the federal government does have certain authorities at its disposal to regulate the use of Great Lakes resources as well, which it has exercised by banning new leases and permits related to Great Lakes oil and gas development. Congress has broad authority under the Commerce Clause of the Constitution to regulate both the navigable waters and oil and gas development.⁷⁴ While Congress likely possesses the authority to regulate or ban oil and gas drilling in or under the Great Lakes, such action might also constitute a “taking” of private property for which just compensation would be required.⁷⁵ The legal analysis a court would likely undertake in determining whether a taking has occurred is described below.

A preliminary issue is whether the federal ban on oil and gas leasing or permitting would be covered by federal navigational servitude. As stated in the SLA, a state’s title to the navigable waters is subject to the navigational servitude, meaning

⁷⁰ Executive Order 2003-17T (July 14, 2003).

⁷¹ 71 Pa. Cons Stat. § 1340.302; see also 58 Pa. Cons Stat. § 601.205.

⁷² N.Y. Envir. Conser. §§ 23-1101, 23-0305.

⁷³ Wis. Stat. § 295.33.

⁷⁴ U.S. Const. art. I, § 8, cl. 3; *Gibbons v. Ogden*, 22 U.S. (9 Wheat.) 1, 22 (1824).

⁷⁵ U.S. Const. amend. V (stating “nor shall private property be taken for public use, without just compensation”).

that the property interest held by the state is subject to a dominant federal right to act in the interests of navigation.⁷⁶ Thus, under its Commerce Clause authority, when Congress regulates waters for their navigability, a property right is not taken within the meaning of the Fifth Amendment, and no compensation is due.⁷⁷ The exact limits of the navigational servitude and whether the regulation or banning of drilling in or under the Great Lakes is sufficiently related to navigability are unclear. The U.S. Court of Appeals for the Fifth Circuit has held that when regulating the navigable waters, the navigational servitude applies despite a regulatory purpose that is unrelated to navigation.⁷⁸ Under this broad interpretation, the current ban on oil and gas leasing or permitting in or under the Great Lakes may not constitute a taking. However, the Court of Appeals for the Federal Circuit, as well as the Supreme Court, has held that the navigational servitude applies only when the government has “bona fide navigational grounds ...” for its regulation.⁷⁹ It is arguable that a drilling ban could be based on navigational grounds. For example, the Army Corps of Engineers has claimed that it has regulatory authority over both directional and vertical drilling in the navigable waters under the Rivers and Harbors Act, which authorizes the Corps to permit obstructions to navigability.⁸⁰ As the case law varies among the courts that have examined the issue and as it is not immediately clear whether a ban on drilling would fall under the navigational servitude, it is unclear whether this doctrine would prevent a taking from occurring.

Assuming the navigational servitude would not preclude a Fifth Amendment taking, additional analysis becomes necessary.⁸¹ A taking can occur in a variety of manners and a ban on leasing or permitting, and thus potential drilling, like other forms of government regulation, could arguably constitute a taking. Generally, for a court to find a regulatory taking, the regulation must result in a sufficient

⁷⁶ *United States v. Oregon*, 295 U.S. 1, 14 (1935).

⁷⁷ *Kaiser Aetna v. United States*, 444 U.S. 164 (1979); *Scranton v. Wheeler*, 179 U.S. 141 (1900).

⁷⁸ *Zabel v. Tabb*, 430 F.2d 199, 214-15 (5th Cir. 1970).

⁷⁹ *Palm Beach Isles Assocs. v. United States*, 208 F.3d 1374, 1386 (Fed. Cir. 2000).

⁸⁰ See Rivers and Harbors Act, 33 U.S.C. § 403; 33 C.F.R. § 322.3 (a) (1997). “For purposes of a section 10 permit, a tunnel or other structure or work under or over a navigable water of the United States is considered to have an impact on the navigable capacity of the waterbody.”

⁸¹ Two threshold matters must exist before a successful taking claim can be established: The action alleged to constitute a taking must be authorized by Congress and must be for a public use. Both of these conditions would likely be satisfied in the case of a congressional ban on Great Lakes drilling. In general, the public use requirement has been deemed a relatively low hurdle, and will likely be met if the government action is “in the public interest.” See, for example, *Kelo v. City of New London*, 125 S.Ct. 2655 (2005). The public use requirement is rarely an issue when takings are performed by the federal government. Along these lines it seems likely that multiple justifications for banning Great Lakes drilling would satisfy the test, such as the encouragement of more efficient oil and gas production or the prevention of environmental harm.

impairment of property interests.⁸² The extent and nature of regulation necessary to establish a taking under these circumstances is, however, debatable.⁸³ As stated in the Supreme Court's *Penn Central* decision, these determinations are generally to be made on a case-by-case basis focused on analysis of several particularly significant factors, namely the nature of the government action, the economic impact of that action, and the "extent to which the regulation has interfered with distinct investment-backed expectations"⁸⁴ In addition, it would appear that, generally, the economic impact and interference with investment-backed expectations must be severe for regulation to constitute a taking.⁸⁵

Takings analysis in this particular context is complicated by the numerous entities with existing property rights in Great Lakes oil and gas resources: the current leaseholders, who may or may not be presently engaged in drilling; and the states themselves. A person who acquired a lease prior to the enactment of the federal ban has obtained a right, as expressed in the lease, that is considered property for Fifth Amendment purposes.⁸⁶ Assuming that the navigational servitude does not preclude a taking, a *total ban on drilling*, which would effectively render an oil and gas lease valueless, might constitute a taking as, in general, the more narrow the property right held, the easier it is to prove that a taking has occurred.

However, the federal ban currently in place does not appear to affect leases or permits issued prior to the enactment of the 2005 Energy Policy Act. Thus, leaseholders with permits in place that are now or might soon begin operating would not appear to have been subjected to a taking of any property interest. Still, it is arguable that permit renewal might now be banned by federal law.⁸⁷ Further, permits necessary for oil and gas development would likely not be issued to current leaseholders who had not obtained permits prior to the ban. In these situations, the leaseholders may be able to successfully argue that their property interests, as expressed in the lease, have been rendered valueless and thus been subjected to a taking. Whether this is the case, however, would depend on the facts specific to each of the leases.

⁸² *Penn Central Transp. Co. v. City of New York*, 438 U.S. 104 (1978); *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922); *Nollan v. California Coastal Comm'n*, 483 U.S. 825, 834 (1987).

⁸³ See *Penn Central Transp. Co. v. City of New York*, 438 U.S. 104 (1978).

⁸⁴ *Id.* at 124.

⁸⁵ See, e.g., *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 126 (1985); *R.W. Docks & Slips v. State*, 628 N.W.2d 781 (Wis. 2001); *Mayhew v. Town of Sunnyvale*, 964 S.W.2d 922, 935 (Tex. 1998).

⁸⁶ See, e.g., *Union Oil Co. of California v. Morton*, 512 F.2d 743, 747 (9th Cir. 1975); *Sun Oil Co. v. United States*, 572 F.2d 786 (Ct. Cl. 1978); *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922).

⁸⁷ In Michigan, for example, oil and gas drilling permits are valid for two years if they were obtained after 1995, and if no drilling occurs. If drilling occurs, the permits remain valid until the well is sealed.

Whether the current federal ban on lease or permit issuance constitutes a taking of the state's property right appears more complex.⁸⁸ The states are seen to hold title to portions of the Great Lakes, the lakebed, and the minerals underlying the lakebed. It is also arguable that the federal ban on future leasing effectively renders any oil and gas accumulations valueless, unless oil and gas can be extracted by a non-lease arrangement (e.g., contracting). Thus, if a court were to define the relevant property interest for purposes of a takings analysis as the oil and gas estate alone, it might conclude that a taking would occur by virtue of a leasing ban. However, this analysis may be complicated by the application of the whole parcel rule. The whole parcel rule, as explained by the Supreme Court in *Penn Central*, states that “taking jurisprudence does not divide a single parcel into discrete segments and attempt to determine whether rights in a particular segment have been entirely abrogated.”⁸⁹ Thus, in that case, regulation affecting only a portion of the plaintiff's property, leaving the rest unaffected, did not constitute a taking.⁹⁰ It is thus arguable that a ‘taking’ of the mineral interest does not result in a Fifth Amendment taking because the whole parcel, the totality of a state's rights in the Great Lakes, remains otherwise unaffected. While the whole parcel rule is backed by considerable precedent, courts have been willing to sever certain property interests for takings analysis purposes, and among those interests is the subsurface mineral estate.⁹¹ Most recently, in *Tahoe-Sierra Preservation Council*, the U.S. Supreme Court has indicated that it rejects conceptual severance of property rights, although this case did not address severance of the mineral estate.⁹² Thus it remains unclear whether a taking of state property would be found as a result of the current oil and gas leasing ban.

Finally, there is another possible argument for concluding that any ban on leasing, permitting, or drilling in or under the Great Lakes is not a taking, based on the Supreme Court's holding in *Lucas v. South Carolina Coastal Commission*.⁹³ Under *Lucas*, a taking does not occur, even if the total value of property is eradicated by government regulation, if the regulation could have been imposed under the background principles of property and nuisance law existing when the property was

⁸⁸ The Supreme Court has held that the reference to private property in the Fifth Amendment equally applies to land owned by state and local public entities. See *United States v. 50 Acres of Land*, 469 U.S. 24, 31 (1984); *Block v. North Dakota ex rel. Board of Univ. and School Lands*, 461 U.S. 273, 291 (1983); *United States v. Carmack*, 329 U.S. 230, 242 (1946).

⁸⁹ *Penn Central*, 438 U.S. at 130.

⁹⁰ *Id.* at 137.

⁹¹ For discussion of this, see Rebecca Nowak-Doubek, “A Victory for Property Rights: How State Courts have Interpreted and Applied the Decision from *Tahoe-Sierra Preservation Council, Inc. v. Regional Planning Agency*,” 36 *Univ. Of Toledo Law Review*, 405, 414 (2005).

⁹² *Tahoe-Sierra Pres. Council, Inc. v. Tahoe Reg'l Planning Agency*, 535 U.S. 302, 326-27 (2002).

⁹³ *Lucas*, 505 U.S. at 1031.

acquired.⁹⁴ It is arguable that drilling in or under the Great Lakes could result in pollution or damage that could be regulated as a nuisance under common law. Several Great Lakes states have addressed the issue, albeit in different contexts from the present scenario, as to whether oil and gas drilling constitutes a nuisance. These cases would seem to indicate that oil and gas drilling is not a nuisance per se, but that the right circumstances could result in a finding that drilling constitutes a nuisance.⁹⁵ Thus, it may follow that the ban on leasing or permitting activities could constitute regulation of a nuisance and that no taking has occurred; however, whether a nuisance would exist in this case would appear to depend on the specific issues a drilling ban is intended to address.

Conclusion

Oil and gas drilling under the Great Lakes is opposed by many who contend that the potential environmental risks associated with drilling do not justify the potential economic gain. Proponents of drilling, however, contend that risks associated with drilling are not high due to advances in drilling technology and safety, and that drilling would provide jobs and income for the states where it is done. Congress has weighed in on these issues and enacted a permanent ban on the issuance of new federal or state leases or permits for oil and gas drilling in or under the Great Lakes. This ban would only affect drilling in U.S.-controlled waters of the Great Lakes and would not affect Canadian production.

⁹⁴ *Id.* at 1027-28.

⁹⁵ *Marrs v. City of Oxford*, 32 F.2d 134 (8th Cir. 1929); *Miller Bros. v. Department of Natural Resources*, 513 N.W.2d 217 (Mich. Ct. App. 1994); *Smith v. Bellows*, 20 Pa. D. 383 (Pa. Com. Pl. 1910); *Cline v. Kirkbride*, 2 Ohio C.C. 527 (Ohio Cir. Ct. 1901).