

SB 159

BEFORE THE SENATE COMMITTEE ON
ENVIRONMENTAL RESOURCES

TESTIMONY OF
THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES
ON
SENATE BILL 159

May 10, 2001

The Department of Natural Resources is appearing today in support of SB 159.

Under current law, drilling through the beds of the Great Lakes for purposes of oil or gas exploration or production is explicitly prohibited. However, directional drilling beneath the bed of the Great Lakes is permissible provided the activity is conducted in accordance with all other applicable statutes. SB 159 would prohibit such activity but would allow limited development of oil or gas resources that may lie beneath one of the Great Lakes, provided that drilling does not extend below the lake. The Department supports this added protection.

A potential alternative or supplementary approach would be to establish a setback distance from the lake, within which no surface facilities associated with oil or gas exploration or production may be constructed. Environmental releases from oil and gas operations are generally associated with the surface facilities needed for the extraction, storage and transport of the resources and such facilities would be the same if the well were a vertical well drilled near the lake or if it were an inclined well drilled beneath the lake. Specifying an acceptable setback would help to minimize the potential for impacts to the Great Lakes from any oil and gas activities, not just those that involve drilling beneath the beds of the lakes.

The proposed legislation would make it very clear that drilling for oil and gas beneath the beds of the Great Lakes is prohibited. Protection of the Great Lakes has been and will continue to be a high priority of the Department. As such, if the Legislature proposes measures that will supplement existing controls, we will support those initiatives.

ROBERT L. COWLES

Wisconsin State Senator • 2nd Senate District

SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES
May 10, 2001
201 SE STATE CAPITOL
TESTIMONY ON SENATE BILL 159 BY SENATOR COWLES

I want to speak briefly on Senate Bill 159 relating to drilling for oil or gas in the Great Lakes.

It is vital that we protect the water quality of our Great Lakes. They provide ample recreational opportunities for boaters and fishermen. In addition the lakes provide drinking water for all the major metropolitan communities located on our Great Lakes and Bay of Green Bay.

- For several years geologists have hypothesized there might be oil deposits in the Lake Superior region. Oil oozing from the walls of copper mines in upper Michigan support this theory.
- In light of increased energy supply shortages across the nation, there has been a renewed interest in Great Lakes drilling. I have four news articles attached from the past two months which focus on Great Lakes drilling.
- Oil or gas that has been spilled in water can spread quite quickly and can be virtually impossible to contain. We all are familiar with oil spills that have caused harm to the environment.
- Under current law it is legal to drill for either oil or natural gas in the Great Lakes if the drilling originates from the shore and a written lease is obtained from the DNR.

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- I introduced Senate Bill 159 as a pre-emptive measure to protect our Great Lakes.
- The bill prohibits anyone from drilling beneath the beds of the Great Lakes to explore for or produce oil or gas. This ban also applies to bays and harbors adjacent to the Great Lakes.
- This measure will simply insure that our Lake Superior and Lake Michigan lakeshores and waters are not damaged by a potential oil or natural gas spill.

I can not believe that any cost benefit analysis ever completed would favor oil drilling in Lake Michigan over the safety of our drinking water and the vast tourism and recreational opportunities that the state receives from this resource. Sometimes it is necessary to draw a definitive line in the sand and not allow any potential damage to this precious resource. Why take a chance?

Please vote for Senate Bill 159.

Thank you.

Oil/Michigan governor may back drilling

■ From A-1

gas) supplies ... wouldn't outweigh the potential damage to the shoreline area," Voss said.

Michigan enacted a moratorium on new drilling in 1998. But the state Department of Natural Resources recently began discussion of lifting the ban amid calls for increasing domestic supplies of oil and natural gas.

Barrett said Michigan Gov. John Engler has indicated he might support lifting the ban. The proposed ban has been met with lukewarm response from U.S. House leaders, Barrett said.

Emily Green, Great Lakes director for the Sierra Club, said she

"Instead of reacting blindly and trying to drill every possible oil reserve, we really ought to be investigating increased conservation measures."

— Emily Green, Great Lakes director, Sierra Club

feared hype over soaring natural gas prices and energy blackouts in California could bolster belief in an energy crisis where none exists.

"All this is catering to the oil industry — trying to bump up their profits when it's really not necessary," Green said.

"Unfortunately, the crisis in California plays right into this, and it's causing a real reactionary

mode."

Barrett said he favors stepped-up exploration for oil and gas in the United States. But he called drilling in the Great Lakes a "short-term fix for a long-term problem."

Green said the nation ought to do more to develop alternative energy sources, such as solar power, and called for more emphasis on saving energy.

"Instead of reacting blindly and trying to drill every possible oil reserve, we really ought to be investigating increased conservation measures," she said.

Voss called the image of oil slicks on Lake Michigan "a nightmare."

"Until we see a complete shift in the way our state oversees the management of oil and gas, we feel a ban is entirely appropriate," he said.

Barrett noted that more than 35 million people get drinking water from the Great Lakes — including Green Bay residents.

"It's our lifeblood. You just don't want your lifeblood."

Please see OIL, A-2

"There's a cost associated with industrializing a shore, and the benefits of a slight increase in (oil and

ban. His group supports the executive director of the Michigan Land Use Institute, according to Hans Voss, about a dozen sites in Michigan. The technique is in use at Green Bay. But Barrett said during a news conference in Wisconsin now, Bar-

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"In essence, water is our water and oil don't mix," Barrett said. "Any grade school kid can tell you."

The Great Lakes could soon be threatened by onshore drilling unless steps are taken to prevent it, U.S. Rep. Tom Barrett said here Friday.

Bill would ban oil, gas drilling in Great Lakes

BY PETER REBHABN
PRESS-GAZETTE

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Great Lakes drilling

The fight to prevent new rigs from dotting shorelines intensifies

By Ruby L. Bailey
Knight Ridder Newspapers

WASHINGTON — Rep. Bart Stupak, D-Mich., fired off a memo to Energy Secretary Spencer Abraham last month, demanding to know whether

Abraham supports drilling for oil and gas under the Great Lakes.

Abraham's answer: So far, nothing. His office says he's fashioning a response; it won't say what it is.

But the silence isn't good

news for Stupak, the five-term congressman from Menominee, Mich., or other environmentalists who appear to be fighting a losing battle to prevent new rigs from dotting the shorelines of the Great Lakes.

As the nation braces for a

summer of rolling blackouts in Western states and spiking gas and heating oil prices across the Midwest, nearly any new energy supply looks tempting.

Abraham said in his

Please see DRILLING, Page A7

Drilling

Continued from Page A1

President Bush, already are pushing to drill for oil in Alaska's Arctic Natural Wildlife Refuge, although environmentalists and members of Congress have promised to wage a bitter fight to stop it. Stupak and others fear that the Great Lakes reserves will look equally attractive.

Stupak faces formidable opponents at home. The Michigan Department of Natural Resources has recommended that Gov. John Engler lift the leasing restrictions he imposed in 1997, which prohibited new drilling until a study was completed.

Engler supports the DNR's recommendation. He could approve lifting the ban as early as July, clearing the way for up to about 30 new wells to be drilled, mainly along Lakes Michigan and Huron. Michigan now has seven oil and gas wells in the Great Lakes.

Meanwhile, Canada already is drilling the parts of the Great Lakes it controls. Ohio's Department of Natural Resources is researching the possibility of drilling, at the request of state lawmakers. Wisconsin has a law on the books allowing drilling, although it isn't doing any. Environmental groups say

additional wells could pollute the lakes and dampen tourism — all without providing a significant amount of oil or gas.

But supporters of drilling, including the Michigan Department of Natural Resources, point out that the practice poses little environmental risk.

The leases could generate \$100 million in new revenue for the Michigan Natural Resources Trust fund, according to the DNR. The fund to date has received \$15 million from well leases. The money is used to purchase and maintain the state's parks.

"You've got this concern for energy needs," said Stupak, whose Upper Peninsula district contains more than 1,500 miles of shoreline bordering three of the five Great Lakes. "They envision getting \$100 million. Not only are they saying we'll go where we have them. They could go all over the state."

Last month, Stupak introduced legislation calling for a ban on additional directional drilling sites on the Great Lakes. In directional drilling, rigs sit on land, about 1,500 feet from the shore — as opposed to sitting in the water — and drill at an angle underwater to hit oil or gas pockets.

Michigan has allowed such drilling under the Great Lakes

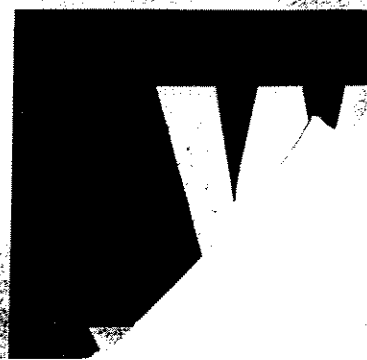
since 1945. Its gas wells produce 25 percent of the state's natural gas supply, according to the DNR. The DNR could not say how much oil.

Stupak and fellow Michigan Democrat, Sen. Debbie Stabenow, sent Bush a letter last week asking him to resist pressures to allow any new drilling in the Great Lakes.

But so far, he hasn't replied either.

Similar bills to ban directional drilling also were introduced last month in the Michigan House and Senate. State Sen. Gary Peters, D-Bloomfield Township, plans statewide hearings, starting at the end of April.

There have been no reported leaks of oil into the Great Lakes, according to the state's Department of Environmental Quality, which regulates the oil and gas industries in the state.



Lawmaker urges ban of onshore drilling on lakes

The potential return isn't worth the risk, congressman says

By Peter Rebhahn
For The Post-Crescent

GREEN BAY — The Great Lakes could soon be threatened by onshore drilling unless steps are taken to prevent it, U.S. Rep. Tom Barrett said here Friday.

"In essence water is our oil," Barrett said. "Any grade school kid can tell you water and oil don't mix."

Barrett, D-Milwaukee, is cosponsor of a bill introduced in the House of Representatives last week that would ban directional drilling in the Great Lakes.

Directional drilling allows companies to tap oil and gas reserves beneath lake beds by drilling from shore. Drilling from platforms in the Great Lakes is already banned.

No directional drilling into the Great Lakes takes place in Wisconsin now, Barrett said, but the technique is in use at about a dozen sites in Michigan, according to Hans Voss, executive director of the Michigan Land Use Institute. The group supports the ban.

"There's a cost associated with industrializing a shoreline, and the benefits of a slight increase in (oil and gas) supplies ... wouldn't outweigh the potential damage to the shoreline area," Voss said.

Michigan enacted a moratorium on new drilling in 1998. But the state's Department of Natural Resources recently began discussion of lifting the ban amid calls for increasing domestic

supplies of oil and natural gas.

Barrett said Michigan Gov. John Engler has indicated he might support lifting the ban. The proposed ban has met with lukewarm response from House leaders, Barrett said.

Emily Green, Great Lakes director for the Sierra Club, said she feared hype over soaring natural gas prices and energy blackouts in California could bolster belief in an energy crisis where none exists.

"All this is is catering to the oil industry - trying to bump up their profits when it's really not necessary," Green said. "Unfortunately, the crisis in California plays right into this, and it's causing a real reactionary mode."

Barrett said he favors stepped-up exploration for oil and gas in the United States. But he called drilling in the Great Lakes a "short-term fix for a long-term problem."

Green said the nation ought to do more to develop alternative energy sources, such as solar power, and called for more emphasis on saving energy.

"Instead of reacting blindly and trying to drill every possible oil reserve we really ought to be investigating increased conservation measures," she said.

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"Until we see a complete shift in the way our state oversees the management of oil and gas, we feel a ban is entirely appropriate," he said.

Barrett said more than 35 million people get drinking water from the Great Lakes - including Green Bay residents.

"It's our lifeblood," he said. "You just don't gamble if it's your lifeblood."

■ Peter Rebhahn writes for the Green Bay Press-Gazette.



Barrett

for what could turn out to be a relatively small amount of oil and gas. They say a drilling accident could foul drinking water supplies for millions and disrupt fishing, tourism and other industries.

"We don't need to be causing environmental damage to our Great Lakes for a short-term solution," said Tanya Cabala of the Lake Michigan Federation. "And really it will be the oil companies that will benefit from it; it won't be the people."

The debate over drilling in the Great Lakes is not new, but there are new pressures as Bush warns of an impending energy shortage.

Environmentalists and their friends in Congress strongly oppose the president's plan to drill in the Arctic National Wildlife Refuge in Alaska, so the Bush administration has been looking elsewhere. Protected lands in the Rocky Mountains are now under consideration.

Experts believe there are between 5.6 billion and 16 billion barrels of oil under the Alaskan refuge, and perhaps enough natural gas under the Rockies to supply the country for six years.

No one is sure how much is under the Great Lakes.

Since the first well was drilled under Lake Michigan in 1979, only 438,000 barrels of oil and 17.7 billion cubic feet of natural gas have been produced, a fraction of U.S. production each day.

Energy Secretary Spencer Abraham has not said whether he supports Great Lakes drilling, though he opposed it last year when he campaigned for the Senate in Michigan.

The Great Lakes states — New York, Pennsylvania, Ohio, Illinois, Michigan, Indiana, Wisconsin and Minnesota — do not allow drilling from rigs on the water, although Canada allows drilling on its side of Lake Ontario.

It is up to each state to decide whether to allow drilling to reach deposits under the lake from the shore. Michigan is the only state that allows it.

Great Lakes being eyed for oil, gas drilling

The Associated Press

WASHINGTON — As President Bush calls for more domestic oil and natural gas drilling, some people are looking to the Great Lakes, the nation's largest supply of freshwater, as a possible power source.

A small amount of oil and gas already is being extracted from seven sites along the Michigan shoreline. The eight Great Lakes states have kept energy companies from digging for more, but Michigan and Ohio officials now are discussing changing their policies.

"The fact is there is an energy shortage out there and the technology is out there," said Lynne Boyd of the Michigan Department of Natural Resources. "The time is now."

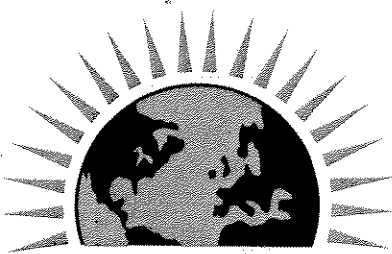
Environmentalists say the lakes should not be threatened for what could turn out to be a relatively small amount of oil and gas. They say a drilling accident could foul drinking water supplies for millions and disrupt fishing, tourism and other industries.

"We don't need to be causing environmental damage to our Great Lakes for a short-term solution," said Tanya Cabala of the Lake Michigan Federation. "And really it will be the oil companies that will benefit from it; it won't be the people."

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WISCONSIN'S ENVIRONMENTAL DECADE

TO: The Senate Committee on Environmental Resources

FROM: Rich Bogovich, climate change specialist

DATE: May 10, 2001

RE: Endorsing Senate Bill 159

Wisconsin's Environmental Decade acknowledges the wisdom of elected officials in the past who helped to enact the current ban on drilling for oil or gas in the waters of the Great Lakes and their bays and harbors, and we are pleased to testify in favor of Senator Cowles's bill to prohibit drilling under these bodies of water from the shore.

Oil

According to the U.S. Department of Energy's Energy Information Administration, in 1999 the U.S. *exported* about 339 million barrels of oil, more than *triple* the 104 million barrels per year that could be produced from the Arctic National Wildlife Refuge toward the end of this decade. Reinstating the federal exportation ban that was repealed in 1995 would have a much more significant and immediate effect on the supply of gasoline in the United States than would any drilling under the Great Lakes. However, even barring exports would have only a small effect on world oil prices, because the United States contains less than 3% of total proven world oil reserves and 10.4% of the world's undiscovered oil reserves, some of which may not actually be recoverable.

At least as promising as reinstating the export ban, and clearly advantageous to the environment, would be raising fuel efficiency standards for sport utility vehicles (SUVs) and light duty trucks to the standard passenger cars must average, which is currently 27.5 miles per gallon. U.S. Senators Dianne Feinstein (D-Calif.) and Olympia Snowe (R-Maine) announced on May 1st legislation to do precisely that, which would save one million barrels of oil a day and reduce oil imports by 10 percent, and as an added benefit prevent 240 million tons of carbon dioxide emissions from entering the atmosphere. Though the car companies are still resisting regulatory changes, Ford announced last summer that it would increase the fuel efficiency of its SUVs by 25% by the 2005 model year. General Motors reacted by pledging to exceed Ford's target. If all the automakers increased their gas mileage by 25% in five years, average fuel efficiency would increase to 30 mpg, more than what Feinstein and Snowe would require, and sooner.

Natural Gas

Wisconsin's Environmental Decade has endorsed natural gas power plants as part of the transition from fossil fuels to far more sustainable sources of energy, but that doesn't mean there is a need to drill under the Great Lakes for natural gas. According to the U.S.



Geological Survey, our country has sufficient reserves of natural gas to meet its needs for 45 years at current demand levels, or 34 years at future demand levels projected by DOE/EIA. In addition, DOE/EIA cost projections indicate that this past winter's natural gas prices will not be exceeded for at least ten years.

The price spike in natural gas this past winter does not mean there is a dire need to find new places to drill for it. Congressman Paul Ryan asked the Congressional Research Service to explain the cause or causes of the price spike, and on March 12 he released the resulting report to the public.

The memo to Ryan stated:

During the 1990s, the total supply of natural gas from U.S. production and imports grew steadily until 1996. Domestic production declined by about 5% between 1996 and 1999, and imports – chiefly from Canada – do not appear to have risen enough to completely make up the difference. Despite the slightly lower apparent supply and underlying demand that may well be growing, prices remained stable until 2000. ... By the second half of 2000, however, steadily growing gas demand by new gas-fired power plants began to consume the gas supply left over from the warm winter. Much of the supply that might have gone into storage for the current winter was burned. As winter 2000-2001 approached, power demand remained strong and prices began to rise sharply.

The memo also noted that a necessary adjustment is already underway: "Given that the amount of drilling in the last half of 2000 was twice that of the first half of 1999, much of the increased gas supply resulting from those efforts should be available on markets sometime during 2001."

In light of how popular natural gas had become among Wisconsin utilities in the 1990s, it is hard to imagine that so many utilities would have invested so much in that fuel if it will be in short supply indefinitely, as some sources are suggesting.

Therefore, despite efforts to create a crisis mentality regarding oil and natural gas, few proposals would be more difficult to justify than drilling for these fuels under the Great Lakes.



**Wisconsin
Manufacturers
& Commerce**

Wisconsin Manufacturers'
Association • 1911
Wisconsin Council
of Safety • 1923
Wisconsin State Chamber
of Commerce • 1929

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James A. Buchen
Vice President
Government Relations

James R. Morgan
Vice President
Education and Programs

Michael R. Shoys
Vice President
WMC Service Corp.

TO: Senate Environmental Resources Committee
FROM: Jeff Schoepke, Director, Environmental Policy
DATE: May 10, 2001
RE: Senate Bill 159

Thank you for the opportunity today to provide comments on Senate Bill 159.

WMC is a general business trade organization representing over 4600 businesses and organizations. WMC's interest in SB 159 is in its concerns about our national energy situation and the overall health of Wisconsin's business climate.

The Great Lakes are not only the most significant natural resource in our region, but also the most important economic resource. Commerce on the Great Lakes is critical to our economy, and is, in fact, one of the biggest reasons our heavy manufacturing base materialized at the turn of the century. Environmental health is critical to economic health, as a dirty lake is bad business for those who depend on the water to move goods and especially for the tourism and sporting industries. WMC and it's members are committed to sound environmental policy in regards to the Great Lakes not only as citizens of this state but also as a simple matter of good business.

WMC opposes Senate Bill 159, legislation which bans directional drilling under the Great Lakes. WMC is becoming increasingly concerned about Legislative attempts to prohibit legitimate industries and practices allowed elsewhere. A blanket prohibition sends a message to the business community unrelated to issues of oil and gas exploration. This message is also sent to others outside the oil and gas industry, to investors considering the overall business climate of our state. The message is science and engineering don't matter. The message is the Legislature does not trust it's DNR to make wise regulatory decisions, and is therefore prone to banning industrial practices.

Directional drilling is understandably controversial. Legislators and members of the public who are concerned about the practice are concerned out of a genuine interest in our water resources. However, such concern manifests itself in this bill as an unreasonable reaction to fear.

New technologies are being developed which allow directional exploration of more than five miles beneath the surface. This technology is being used safely in Alaska and other areas with no impact on the water resources and little disruption on the land. As technology gets increasingly better, geologists may be able to find oil

and gas reserves in areas never imagined prior, and will be able to do so in an environmentally sound manner. In light of the current national energy crisis, it would seem to be short-sighted to eliminate out of hand any new potential source of fossil fuel reserves.

At present, there are no major directional drilling projects occurring in Wisconsin. It may still be appropriate for the Legislature and the DNR to review its regulatory systems for such drilling projects. However, WMC believes proposals should be evaluated on merits and permitted or rejected accordingly, not dismissed without regulatory review.

WMC is willing to participate in, and would in fact recommend, discussions between industry, Legislators, the DNR, public interest groups and other parties to address issues, potential standards for future rules, and general policy in this area. Such a dialogue could result in an appropriate regulatory scheme without resorting to a ban on certain industries.

Again, thank you for the opportunity to provide comments on this legislation.

Vote Record

Senate - Committee on Environmental Resources

Date: 5-31-01

Bill Number: SB 159

Moved by: Sen. Cowles

Seconded by: Sen. Hansen

Motion: _____

<u>Committee Member</u>	<u>Aye</u>	<u>No</u>	<u>Absent</u>	<u>Not Voting</u>
Sen. Jim Baumgart, Chair	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sen. David Hansen	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sen. Robert Wirch <i>Passing</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sen. Robert Cowles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sen. Dale Schultz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Totals:	<u>5</u>	<u>0</u>	<u>0</u>	<u>0</u>

Motion Carried

Motion Failed

STATE OF MICHIGAN



JOHN ENGLER, Governor

MICHIGAN ENVIRONMENTAL SCIENCE BOARD

P.O. BOX 30026, LANSING, MICHIGAN 48909
Internet: <http://www.great-lakes.net/partners/mesb/mesb.html>
E-mail: mesb@state.mi.us

Evaluation of Directional Drilling under the Great Lakes
October 1997

On August 12, 1997, Governor John Engler requested that the Michigan Environmental Science Board (MESB) conduct an evaluation of the state's regulatory procedures pertaining to directional drilling under the Great Lakes. Specifically, the MESB was requested to address the following directives:

1. Evaluate the risk of directional drilling causing contamination of the waters (through releases of hydrocarbons through the subsurface directly to the lake bottom) and shorelines of the Great Lakes,
2. Evaluate the potential impacts of directionally drilled wells on competing uses of the Great Lakes waters and shoreline areas, and
3. Review existing and potential permit conditions for adequacy in protecting the shoreline environment from adverse impacts.

A Panel, composed of four MESB and two guest scientist members, was assigned to address the Governor's request (see Attachment 1). One meeting of the Panel was held on September 23, 1997. Each Panel member was requested to review the information provided verbally and in written form from the Michigan Departments of Environmental Quality and Natural Resources (DEQ and DNR), industry, environmental organizations and citizens and then assigned a specific directive for response. Presented below are the Panel's findings and conclusions.

Directive 1. Evaluate the risk of directional drilling causing contamination of the waters (through releases of hydrocarbons through the subsurface directly to the lake bottom) and shorelines of the Great Lakes.

There have been more than 2,000 oil and gas wells directionally drilled in Michigan since the 1970's. Horizontal drilling is a special form of directional drilling that has been used for about 200 wells since 1985. Conventional, vertical wells have the bottom hole location directly below the surface location. A unique property of directionally drilled wells is that the bottom hole location (subsurface termination of the well) is at some distance laterally away from the surface location. Consequently, directional drilling has the advantage of siting the surface drilling and production equipment at a distance away from the surface immediately above the target reservoir zone where conflicts may

exist with environmental or land use issues. Directional drilling may also reduce the number of surface locations because several wells can be drilled to different bottom hole targets from the same surface pad. Figure 1 shows a directional and horizontal well path.

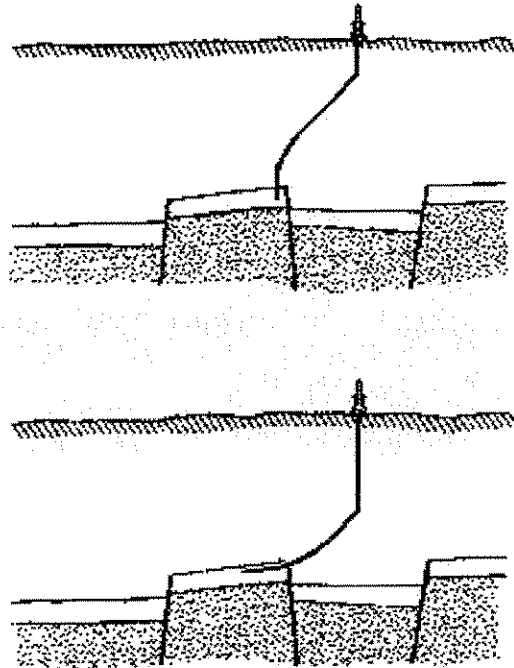


Figure 1. Directional (upper) and horizontal (lower) well paths.

The displacement of the bottom hole from the surface location may range from a few hundred feet to over ten thousand feet in the horizontal direction. Drilling and completing directional wells utilizes the same basic processes as a vertical well, except the drilling assembly is designed to track at an angle rather than to stay vertical. Casing requirements and borehole design are similar for both vertical and directional wells. Michigan's Oil and Gas Regulations (Parts 615 - 617, 1994 Public Act No. 451, as amended) and industry standards dictate the well design for all wells, including those directionally drilled.

Steel pipe casing is cemented into the borehole from the surface down to "... a minimum of 100 feet below the base of the glacial drift into competent bedrock and 100 feet below all fresh water strata ..." (P.A. 451, Part 615, R 324.408). Other zones in the well will also be cased to prevent hole collapse or unwanted fluid flow into or from subsurface formations. When oil or gas is produced from a reservoir formation at some depth in the subsurface, production tubing (another smaller diameter pipe) is placed in the hole to a depth at or near the bottom of the hole.

The installation of casing and production tubing creates integrity from the bottom of the hole to the surface. No fluids can escape into the surrounding formations with this

system in place. Figure 2 shows the well design for a horizontal well with several different diameter sections of casing throughout the well. When assessing the risk of fluid migration out of the borehole, the casing plan is one critical component for evaluation. An additional area of evaluation should focus on the geologic strata above the producing reservoir horizon. The existence of impermeable strata above the reservoir will provide additional protection from fluid migration toward the surface. In the case of drilling for Niagaran Reef reservoirs adjacent to Lake Michigan, there are thousands of feet of impermeable rock strata above the reef reservoir. Most Niagaran Reef reservoirs occur at greater than 4,000 feet depth in the area of Manistee County, Michigan. These reefs are overlain by more than 2,000 feet of impermeable strata comprised of shale, salt and anhydrite. In fact, the presence of some of these impermeable strata is the seal that has kept the oil and gas trapped in the reefs for over 300 million years. If any hydrocarbons could naturally leak through these layers, the reservoir would no longer contain any trapped oil or gas. Figure 3 shows a well with dual horizontal segments in a reservoir layer. Impermeable layers above and below encase the hydrocarbons. These fluids will move through the borehole only to the surface.

In directional wells, the surface location is at some lateral distance away from the bottom hole where the oil and gas are found. With proper well design and the geological subsurface layers that exist in Michigan, there is minimal to no risk of hydrocarbons reaching the surface to cause contamination in the area vertically above the bottom hole location of these directionally drilled wells. In Michigan, no subsurface fluids of any type have ever reached the surface through overlying formations directly above the bottom hole location of a directional well. The only path for fluids to the surface is through the well bore to the surface location.

Although the potential risk for contamination through releases of hydrocarbons is small at the well head, the risk is not zero and should be considered in siting the surface locations of these wells. It is possible to determine the area of potential risk around each well's surface location. The risk drops dramatically with the distance away from the well head. There is a finite distance away from the well head at which essentially no risk exists from that well. The currently existing directionally drilled wells with bottom hole locations under the Great Lakes have surface locations as close as 700 feet from the shoreline. Four of 12 are less than 1,000 feet from the shore, whereas the remaining eight are at distances greater than 1,000 feet from the shore.

The Panel concludes from review of available data, that there is little to no risk of contamination to the Great Lakes bottom or waters through releases directly above the bottom hole portion of directionally drilled wells into Niagaran Reef and deeper reservoirs. There is, however, a small risk of contamination at the well head. The of area away from the well head that is at risk can be estimated based on experience gained from existing contamination sites.

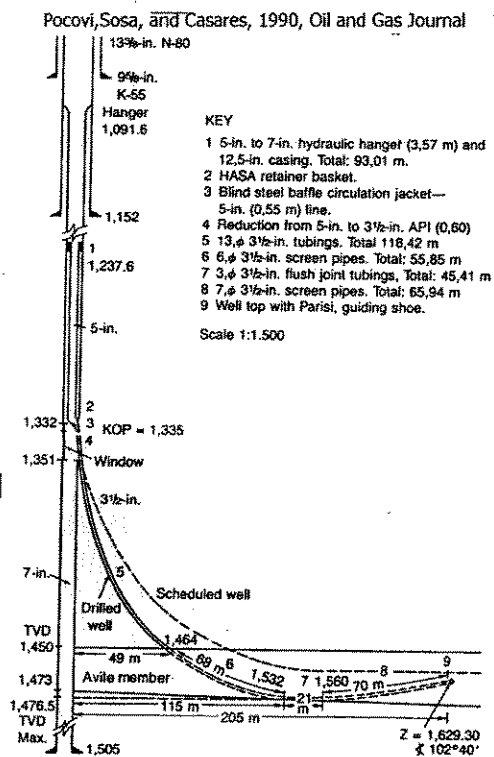
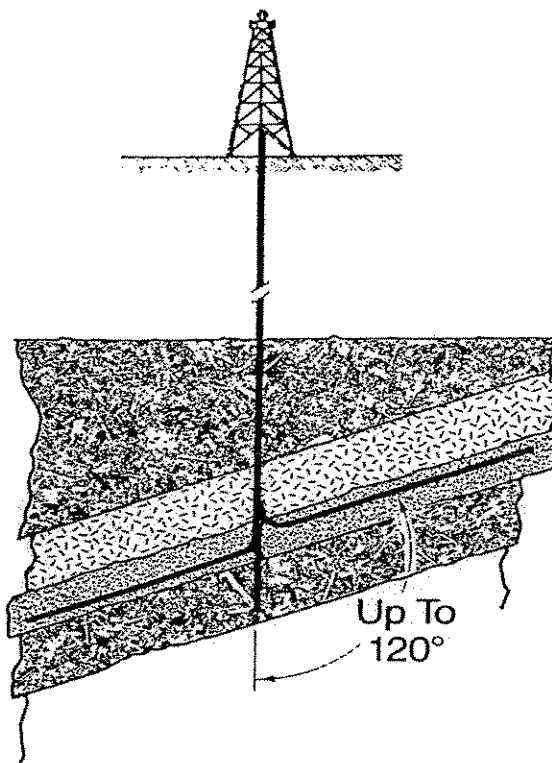


Figure 2. Design for a horizontal well with several diameter sections of casing throughout the well.



Montgomery, 1990, Petroleum Frontiers

Figure 3. Well with dual horizontal segments in a reservoir layer.

Directive 2. Evaluate the potential impacts of directionally drilled wells on competing uses of the Great Lakes waters and shoreline areas.

Given its response to Directive 1 above, the Panel finds that there exists a greater risk for potential impacts to the shoreline environments where the well head and its associated infrastructure are located than to the aquatic environment of the Great Lakes. Based on a review of over 100 base maps from the Michigan Resource Information System (MRIS) and other sources, and on documents delineating oil and gas developments, natural features, critical dunes, endangered species, soils, and land use associated with the Lake Michigan and Lake Huron shorelines, the Panel identified two areas of potential environmental concerns (ecological and social/aesthetic) that could have an impact on and, consequently be in conflict with, directional drilling on the Great Lakes' shoreline.

Ecological impacts may be derived from the physical location of the well and its associated equipment and distribution pipelines in critical or unique biological areas such as wetlands, sand dunes, etc., and the occurrence of some unforeseen accident which would degrade the environment. Such issues, depending on the specific location of the well or wells, could involve anything from a localized loss of land, reduced carrying capacities, reduced primary and secondary productivity, decreased densities of some and increased densities of other species of animals and plants to irreparable loss

of a given resource (e.g., loss of some unique species of animal or habitat type, or contamination of a potable ground water aquifer). With any directional (or for that fact, vertical) drilling proposal, impacts to ecological resources will occur. However, the Panel concludes that the ecological impacts can be minimized by identifying and prohibiting oil and gas development in areas where the ecological resources are either highly sensitive to perturbation or unique, use of the most advanced but proven technology and the employment of rigorous permit requirements to help ensure the reasonable protection of all resources in developable areas.

From the Panel's perspective, the social/aesthetic impacts involve the greatest potential for impact inconsistencies and incompatibilities of activities on adjacent properties. These social/aesthetic conflicts may result from the differences in expectations of "quality-of-life" parameters like noise, odors, congestion, vistas and undisturbed landscapes (natural but not unique or critical habitats), recreation and tourism between coastal residential, recreational and industrial land uses. The Panel views the social/aesthetic issue to be one primarily of coastal development and zoning irrespective of vertical or horizontal drilling. While technology and science can certainly help to lessen the impacts and even resolve several of the conflicts that may appear, most of these types of issues will require comprehensive environmental planning, communication between all stakeholders and compromise in order to be resolved.

Directive 3. Review existing and potential permit conditions for adequacy in protecting the shoreline environment from adverse impacts.

Regulation of directional drilling activities in Michigan is based on provisions contained in Michigan's Oil and Gas Regulations (Parts 615 - 617, 1994 Public Act 451, as amended) and its Administrative Rules, Natural Resources Commission (NRC) Policy 2306 of April 13, 1995 (Oil and Gas Leasing Policy - State-Owned Minerals) and the DNR Oil and Gas Lease. The Authority to lease state-owned minerals vests with the DNR. Regulatory functions of the oil and gas program vests with the DEQ. The various regulatory and policy provisions contain a variety of requirements which deal with technical aspects of the actual drilling operation and requirements designed to address the environmental concerns. Overall, the Panel finds that while the Oil and Gas Regulations and Administrative Rules, NRC Policy and the DNR lease provisions when taken together provide considerable protection to the Great Lakes' aquatic and shoreline environments, most of the environmental conflicts could be more readily resolved and the Great Lakes' aquatic and shoreline environments better protected if the lease agreement required an aggressive environmental impact assessment and stakeholder participation prior to the lease sale. Additional recommendations to enhance the level of protection are presented below.

A. Streamline Process. One of the problems encountered by the Panel in reviewing the various regulations, policy statements and lease provisions was the fact that it was confusing trying to discern what an applicant has to do first, get a lease or get a drilling permit, or get both simultaneously. Although not strictly a science or technical recommendation, the Panel strongly suggests that the process could be streamlined and better coordinated between the DEQ, DNR and NRC to make it more clear, remove some of the duplicative steps and/or requirements contained in both the lease and the

permit processes and add, where needed, steps not currently included in either of the processes. This, in turn, should assist applicants in preparing and the regulators in reviewing the application, and the public in better understanding of the process.

Related to the above issue are the requirements of the DEQ regulations and rules through its environmental impact assessment process and the DNR lease agreement through its requirement of a development plan to request similar and, in some instances duplicative, environmental information and/or analyses. The Panel suggests that the leasing process deal with environmental land use impacts and conflict analysis and that the oil and gas permit process focus more on the technological impacts of directional drilling to the environment. Applicants that cannot obtain a lease due to an inadequate or unacceptable environmental analysis should not proceed to the oil and gas permit process.

B. Sealability. One of the issues unique to directional drilling compared to vertical drilling is the potential for vertical leakage point of oils and gas from the recovery point to the overlying lakes. Successful isolation of escaped oil and gas fluids from the overlying lakes depends on the ability of the overlying geologic units to act as a barrier or seal. During the Panel meeting, the high degree to which the geologic units would act as a seal for active and proposed directionally drilled sites were discussed and demonstrated. The Panel recommends that such discussions on the ability of the geologic units to act as a seal be required by the DEQ in permits for directional drilling. Sources of information for demonstrating the "sealability" of the geological units might include knowledge of rock units on shore and of subsurface geology from off shore seismic data.

C. Coastal Zone Development Inventories The ecosystem characteristics of the coastal zone vary considerably among the Great Lakes. Lake Michigan is characterized predominantly by sand dunes. Setbacks running parallel to the shoreline can define the barrier dune and buffers for such concerns as noise and odor. This restricts development to a setback of around 1,500 feet. Unique and sensitive land area exclusions are then imposed on the remaining locations. Lake Huron, on the other hand, is characterized by meandering riverine flood plains and coastal wetlands. These can extend miles inland from the shoreline. Setbacks alone will not address the issues of environmental protections.

The Panel recommends that comprehensive coastal zone environmental inventories be compiled for both Lake Michigan and Lake Huron in order to clearly identify and evaluate, at a minimum, areas that are already impacted with oil and gas development, areas where leases could not be issued for future development (e.g., due to non-resolvable environmental constraints) and areas where directional drilling development leases could be allowed provided that such development could be documented as to cause only minimal and mitigable environmental impacts and conflicts to the shoreline. The existing DNR MRIS system supplemented with local land use plans could be used as a basis to identify the above areas. Given the great complexity of the Lake Huron and Lake Michigan shorelines and the need to afford the greatest environmental protection, such coastal zone evaluations should be considered a prerequisite before leasing of any of the Great Lakes' bottomlands.

D. Mandatory Use of Existing Infrastructure. The greatest ecological and social impacts of oil and gas developments are the required networks of transportation infrastructure. Pipelines, roads and transmission corridors can fractionate the landscape and can open virgin or undisturbed areas to intense recreation activities. Directional drilling allows greater flexibility in locating drill sites. Consequently, borehole locations can be selected to maximize the probability of using existing infrastructures and minimizing intrusions into such landscapes. Lease provisions currently require that the lessor route all pipelines from the well site to follow existing well roads or utility corridors; however, it does not prohibit, for instance, the development of new roads to the wells. In order to afford the greatest environmental protection, the Panel recommends that lease sales should specifically prohibit the construction of any new infrastructures and limit oil and gas development to areas where existing infrastructures (pipelines, transmission lines and roads) are already available to minimize intrusions into virgin or undisturbed areas and to prevent further intrusions into minimally disturbed areas.

E. Residuals. The coastal zones of the Great Lakes are generally characterized by permeable soils and high water tables. Materials such as brines, drilling muds or bulk fuels should not be stored for long periods of time or be disposed of on-site. What is stored for short periods of time should be thoroughly protected from reaching the underlying or adjacent environments. The current oil and gas regulations attempt to deal with brines and bulk fuels by requiring temporary, above ground and monitorable storage. This is not the case for drilling muds which may be stored and eventually buried in plastic-lined pits. The Panel concludes that the need to store any residue in ground is nonexistent given current technology and recommends that no residues should be stored above ground for any extended period of time without a thorough chemical analysis of the material being stored and a state-of-the-art, operable and monitorable leak detection system.

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