MICHIGAN OIL BASIN

2015

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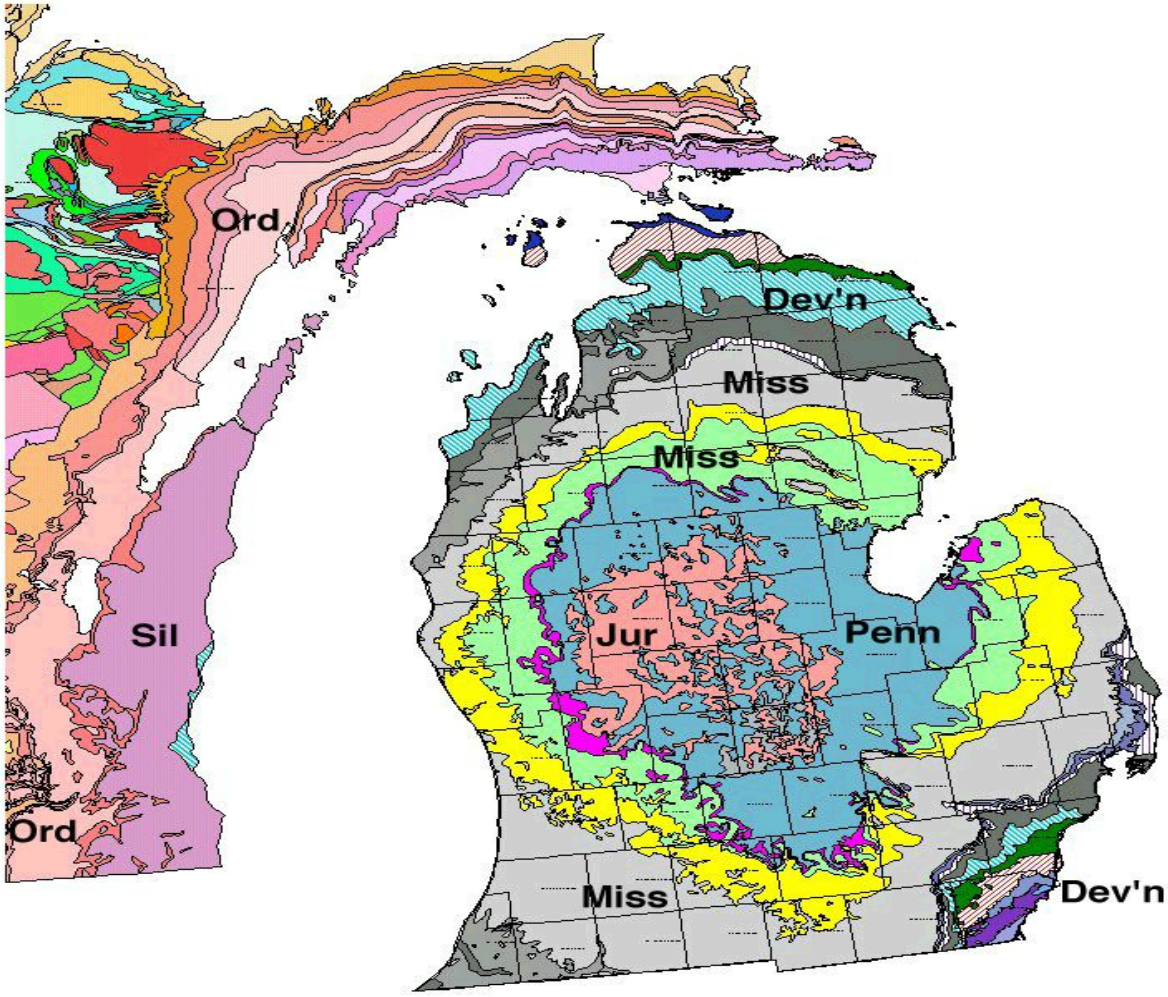
Location and history

- The **Michigan Basin** is a geologic basin centered on the Lower Peninsula of the US state of Michigan
- The first well was drilled in Michigan sometime around 1870 near Port Huron (if you are unfamiliar with Michigan geography it is about 60 miles north of Detroit) and it and a few others produced small amounts of oil.
- Michigan's oil and gas industry began in 1925 when oil in commercial quantities was drilled near Saginaw. Since then, more than a billion barrels of oil and 3 trillion cubic feet of gas have been produced in the state--all in the lower peninsula

Geologic History

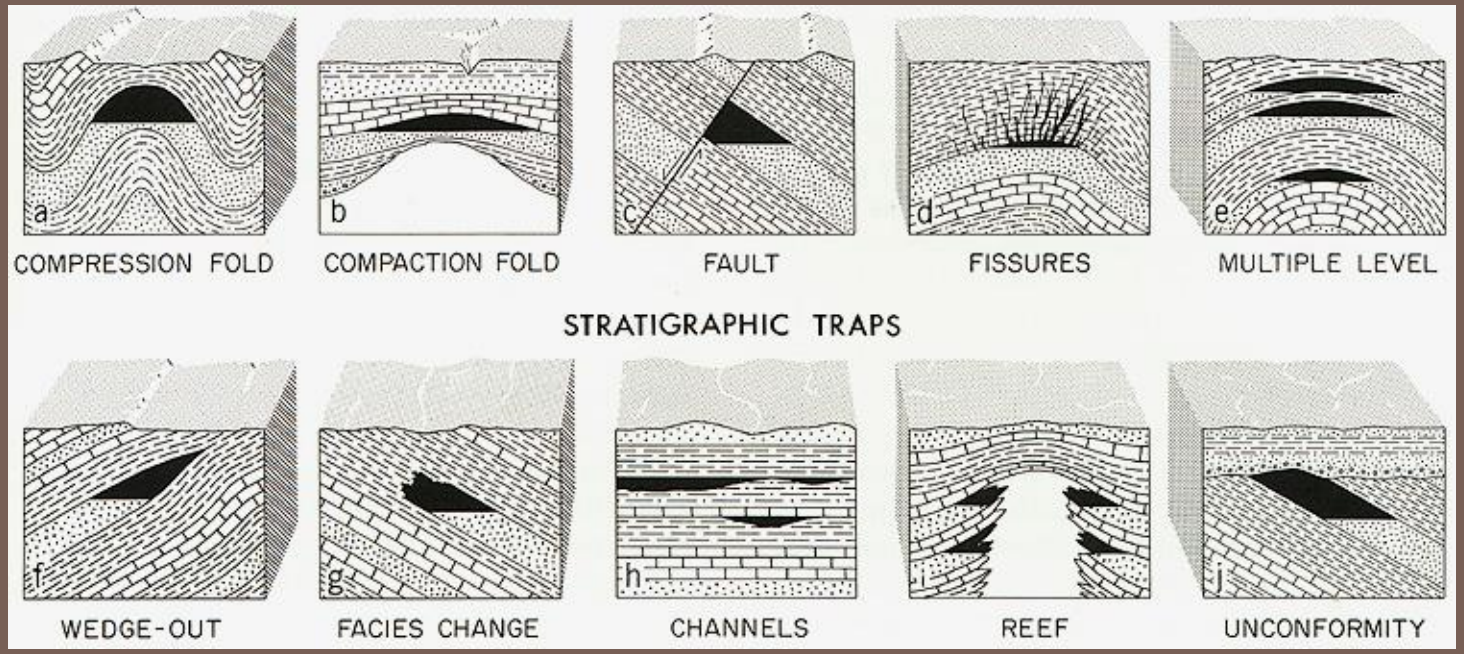
- The basin is composed of sedimentary rocks, the oldest which were deposited about 500 million years ago and the youngest about 150 million years ago. They are represented with sediments from the Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian and small amount of Jurassic sediments at the top of the basin. The basin is about 14,000 feet thick at its deepest point. There are several unconformities in the basin (time gaps in the rocks because of uplift or non-deposition) which include Early Ordovician, Early Devonian and the Late Mississippian.
- Cambrian and Ordovician rocks consist predominantly of sandstones and limestones (including the Utica Shale,Collingwood Shale, which is really a shaly limestone, and the Trenton Limestone/Dolomite) which cover most of the basin. The Silurian – Devonian consists of limestones, reef limestones, dolomites, halite and anhydrite. The Pennsylvanian and Mississippian strata fill in the center and the basin has a very thin strata of Jurassic at the top of the section and located in the center of the state. The basin seems to have subsided concurrently with basin filling which would help explain why the basin predominantly has shallow water marine sediments. The surface of Michigan is, of course, covered with glacial sediments, which give Michigan it's wonderful topography of moraines, drumlins, valleys, streams and of course the big lakes.

Geologic History



http://www.geo.mtu.edu/svl/geoscience/figures/digital%20geologic%20map%20of%20michigan.jpg

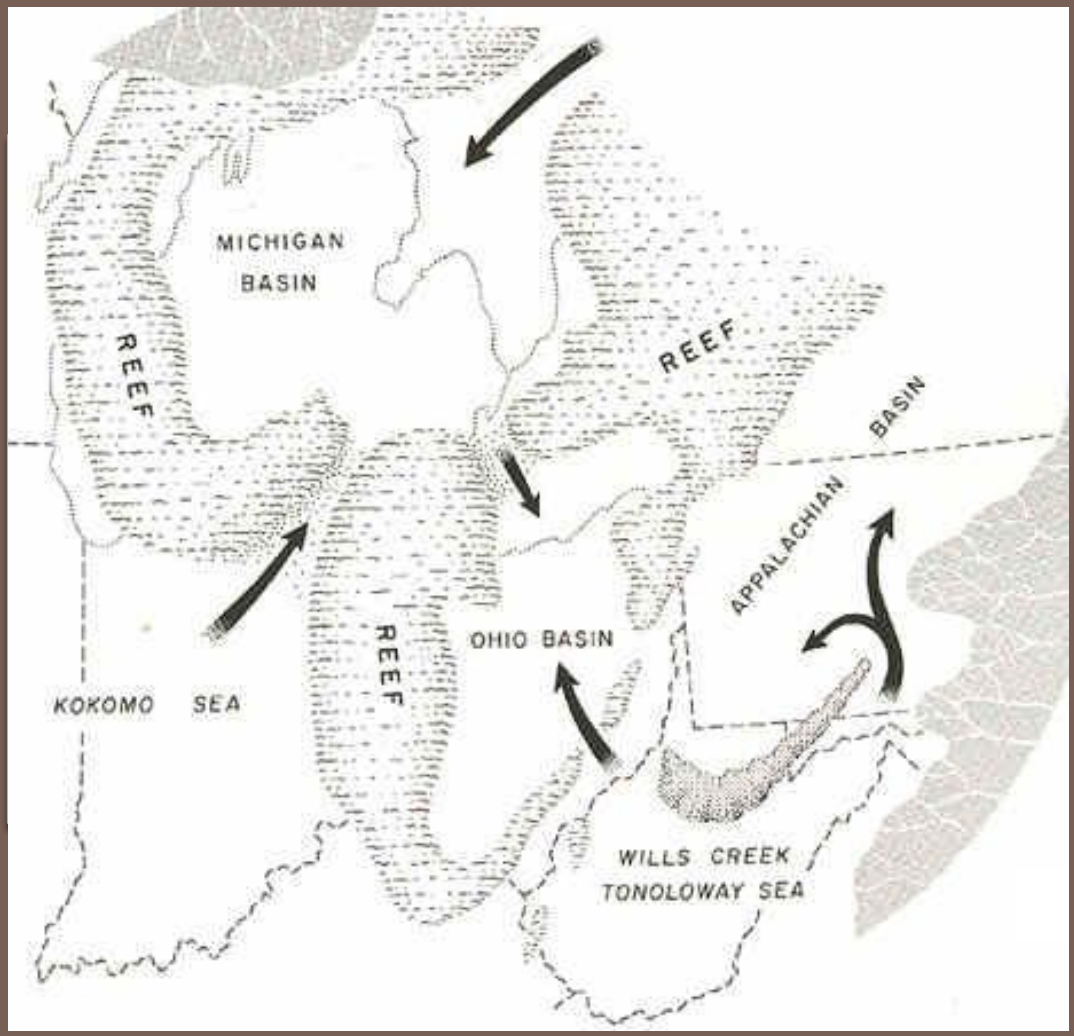
Formation (Migration)



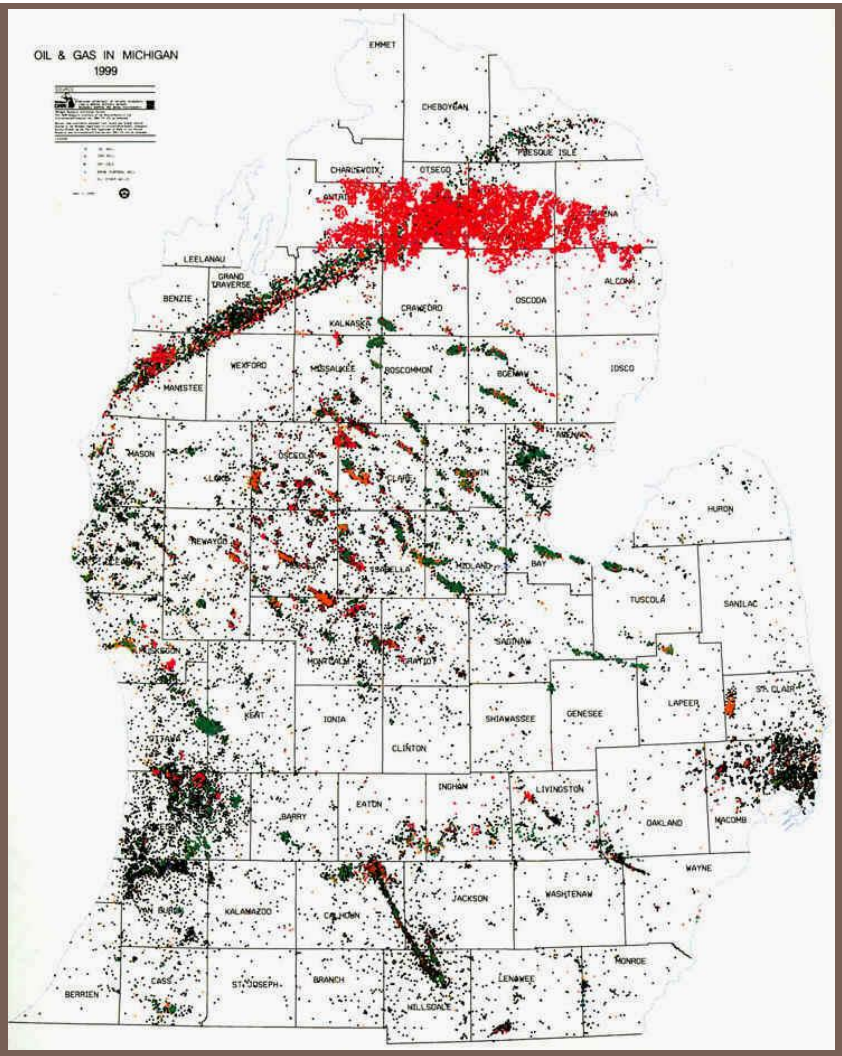
- The oil originates in source rock (shales) and will eventually migrate up into the reservoir rock (sandstone and limestones)
- Folds and faults create traps (zones in which the oil becomes trapped)

Pinnacle reefs

- During the early and middle Silurian, an extensive blanket of limestone was deposited from New York State west --- at least as far as Wisconsin.
- Earlier, during the Cambrian and Ordovician periods, one rather elongate basin extended from Missouri northeastward through Illinois and lower Michigan
- A series of coral reefs developed along the Kankakee Arch and in the shallow waters along the western and southern margins of the basin.



Oil and Gas in Michigan.



- **COLOR KEY: oil wells gas wells dry holes**

Major structures

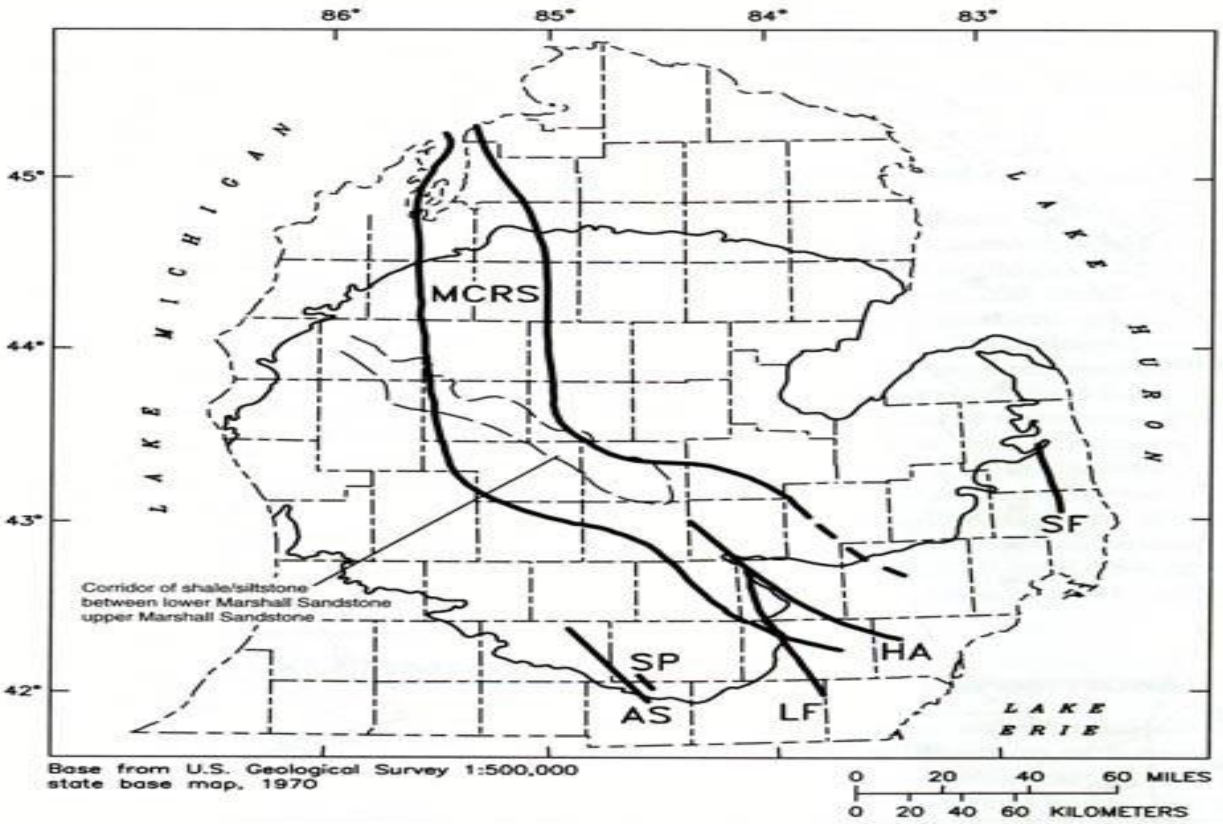
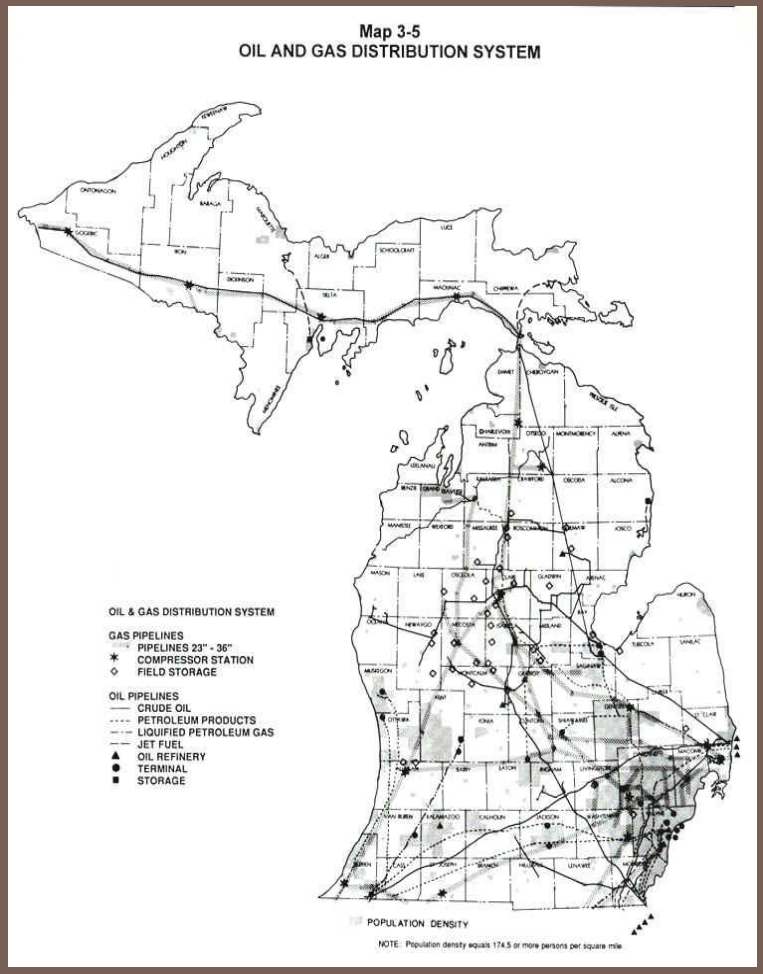
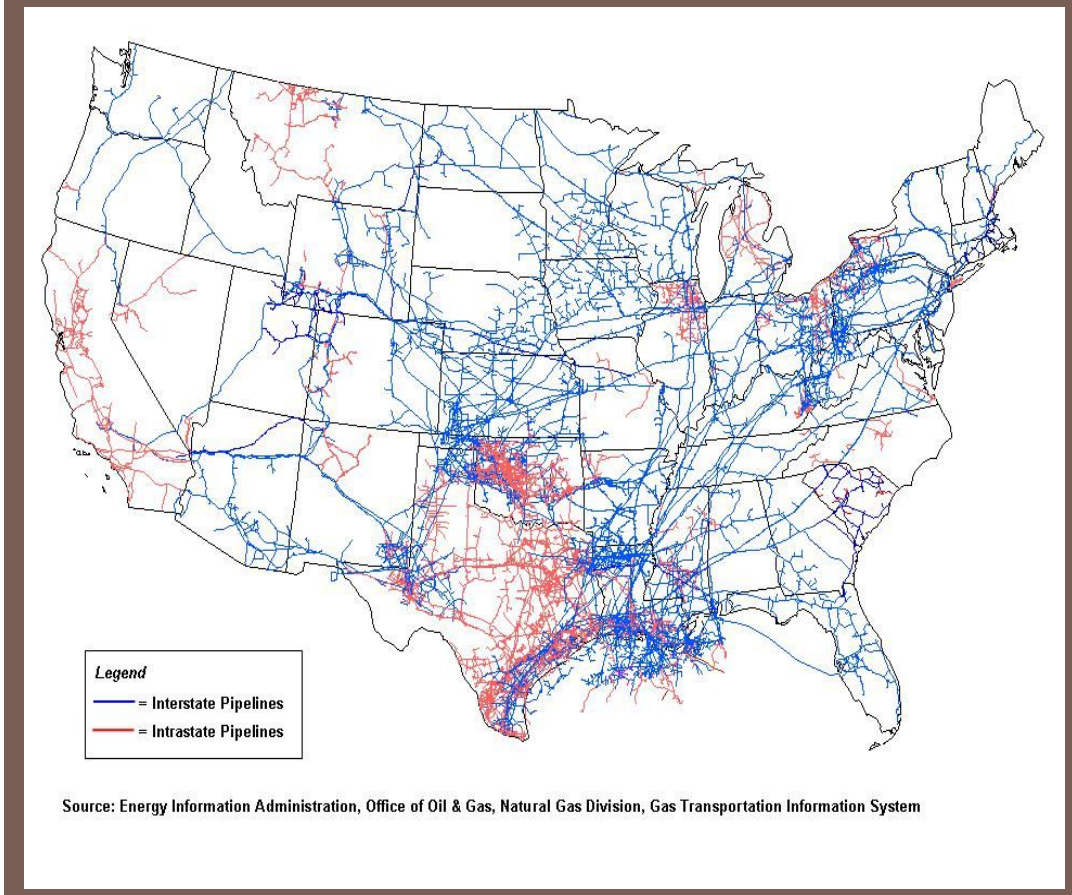


FIGURE 2.—Major structures of the Lower Peninsula of Michigan. (Modified from Budai and Wilson, 1991, and Fisher, 1981.)

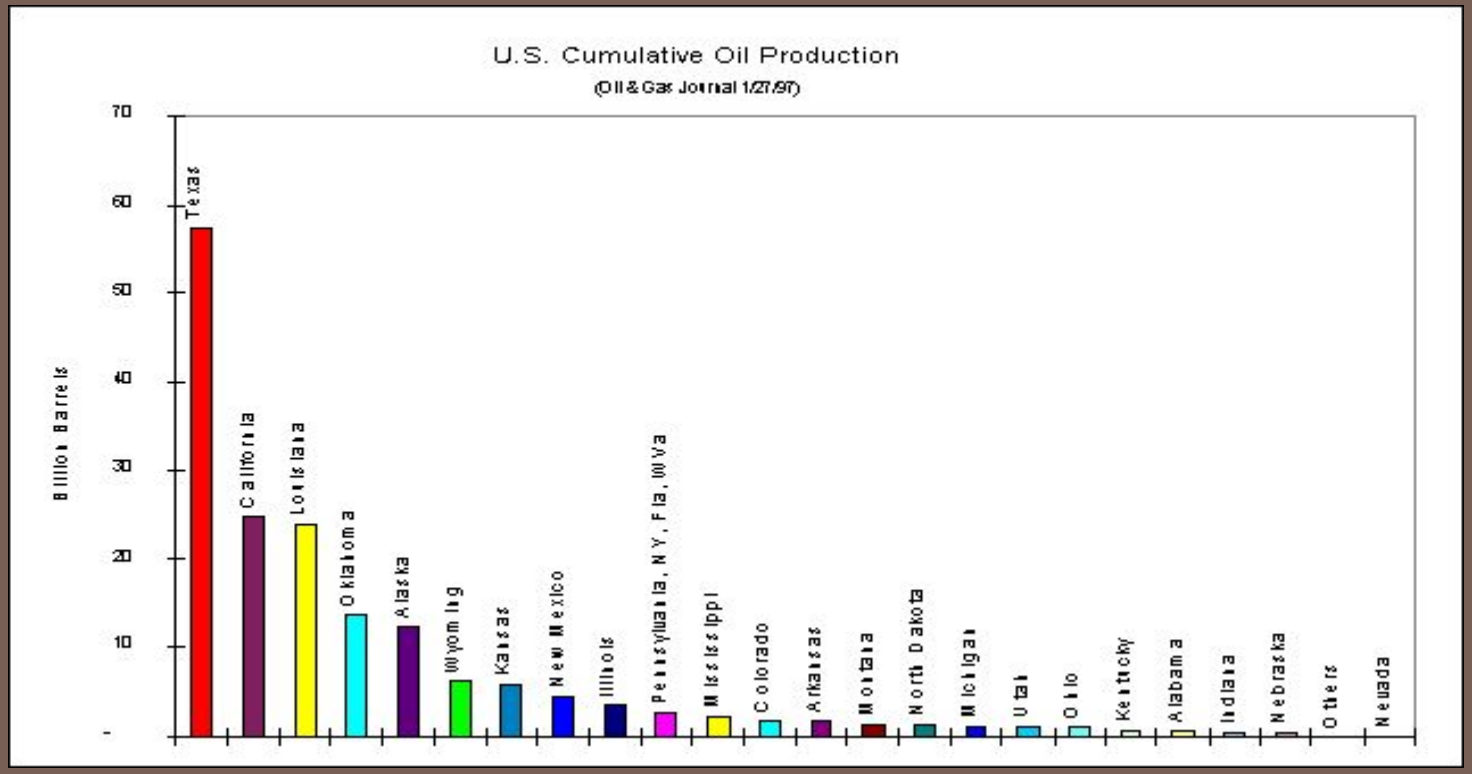
Gas Storage





Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System

Reserves



- Reserves represent quantities of crude oil estimated to be commercially recoverable with current technology

WHAT IS NEXT FOR MICHIGAN?

- With the use of 3D seismic there have 3 additional fields found in the Trenton in Southern Michigan some distance away from the Albion – Scipio field. The Napoleon field was discovered in 2008, the Saline field was discovered in 2009 and the Adrian field was discovered in 2010. Together the 3 fields have produced 8 million BO and 5 BCF of gas.

- There has been some success with the Collingwood and it may very well be the next boom. Canadian company, Encana recently transferred all of its Michigan Collingwood holdings, rumored to be in excess of 100,000 acres, to Marathon. Some say the reason Encana left is because they couldn't figure out the Collingwood, however, I suspect it has more to do with the $6 billion investment in the Permian basin and the focus to earn a return on that investment. The Michigan Department of Natural Resources has auctioned 120,000 acres (October 29th) in some of the prime Collingwood acreage in northern Michigan. Future drilling depends on gas prices and success in unlocking the secrets to efficiently producing the Collingwood but it certainly won't be because Michigan doesn't have the infrastructure, markets and the natural gas storage capacity in the summer so producers can produce maximum rates all year long.

Resources

- http://geo.msu.edu/extra/geogmich/oil&gas.htmlhttp://en.wikipedia.org/wiki/Peak_oil
- http://info.drillinginfo.com/