



MAY 1, 2014



SENATE
NATURAL RESOURCES, ENVIRONMENT & GREAT LAKES

MICHIGAN GEOLOGICAL SURVEY
SECURING THE FUTURE OF MICHIGAN

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MICHIGAN GEOLOGICAL SURVEY

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MICHIGAN GEOLOGICAL SURVEY



- × Legislation signed on October 11, 2011 assigns the responsibility for the Michigan Geological Survey (MGS) to Western Michigan University, Geosciences Department. (An applied research University).
- × “MGS is the geological and environmental resource to the State of Michigan”
 - × There was no State funding assigned to this transfer to Western Michigan University (WMU).
 - × **WMU has been providing interim funds to initiate & continue the functions of the Survey.**

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MGS – WMU SURVEY SYNERGIES



History of WMU survey synergies

- × WMU and the Geosciences department has been doing applied geological studies and programs for 50 years. State of the art geologic and hydrogeologic programs and studies were initiated and remain active today (See Strengths handouts).
 - + 1964 - Initial Geology degree
 - + Since 1964 WMU has graduated over 1600 Geosciences (Geology and Hydrogeology) and Earth Sciences professionals.
 - + Since 1989 – 400 are Hydrogeologists
 - + The MGS Resource Centers capture the synergies at WMU to service the Client.

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MEETINGS AND PRESENTATIONS



2013 MGS Review*

Presentations to and meetings with Stakeholders

- + In 2013, over 30 meetings and formal presentations
 - × State & Federal legislators, Michigan departments, Associations, Development authorities, Civic organizations, Universities, oil and gas, and mineral and mining companies, general public – outreach, etc.
 - * (*MGS Annual Report).

NOTE: 1/1 to 3/31/2014 – 18 Meetings, presentations and events to discuss MGS.

× What geologic issues were identified?

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MGS – IMMEDIATE NEEDS – “GO TO”



× Geologic issues identified were:

- × Status of groundwater resources in critical areas,
- × Future, long term groundwater resource requirements,
- × Agricultural growth, rural economic development,
- × Employment growth and resulting impacts associated with any State resource,
- × Resource development – MGRRE i.e. water, oil and gas, potash, metals and building materials
- × Natural resource educational information (Outreach) for students and the general public.

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MGRRE* – SUBSURFACE GEOLOGY



- WMU-MGS APPLIED RESEARCH
- Industry and academic research for over 30 years
- *Michigan Geological Repository for Research and Education (MGRRE) established in 1983

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MGRRE CORE/DATA REPOSITORY



- × Data from Oil and Gas, Mineral, Geotechnical, Environmental tests, Research and Water Wells,
- × Over 500,000 feet of Core (95 + miles).
- × Over 20,000 wells with sample sets,
- × Tens of Thousands of well reports, logs and sample analyses in data bases, scanned/digital,
- × 2000 +Community water wells



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MGRRE -SUBSURFACE GEOLOGY



- × MGS/WMU & MTU partnership
- × Industry and academic research for over 30 years
- × 27,000 sq ft (1/2+ acre)

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MGRRE ⇔ ECONOMIC DEVELOPMENT



ROI - Industry & Academic Milestones

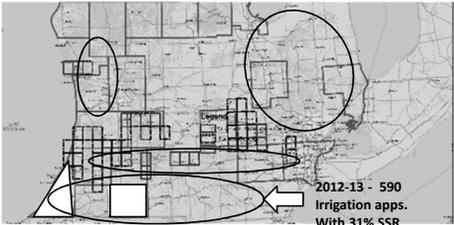
- × MTU-WMU partnership - DOE grant for the application of horizontal drilling technology to develop oil in **1995**.
- × USGS data compilation of oil basins, MGRRE core led to Trenton Black River - rediscovery in **2006**.
- × DOE - CO2 Sequestration program for 9+ years - **2005**.
- × Collingwood, Utica and A-1 Carbonate studies - \$180 M lease sale, the largest in Michigan history, which also led to new exploration in **2010**.
- × Re-discovery of a potash resource, Mecosta - Osceola Counties (\$65B) - **2013**.
- × EOR with CO2 - Core samples lead to program testing and successful tax legislation - **2005 to 2014**.
- × Many Geoscience graduates = highest paid positions

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MICHIGAN HAS A GROUNDWATER PROBLEM!



County areas - surficial geology mapped in detail (Blue)
Quadrangles - mapped in detail with limited subsurface geology (Black) subsurface (Red)
Critical water resource - areas identified are (Red outline) - Southern Michigan water withdrawal.
 7/2012 to 7/2013 total 1024 - Water Withdrawal Assessment tool (WWAT) Irrigation applications for High Capacity (HC) wells >70 gpm.



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MICHIGAN'S GROUNDWATER RESOURCES



Michigan's Groundwater

- × **What should Michigan be doing ?**
 - + The glacial geology (90% of LP groundwater) is very complex and has been overly simplified in groundwater studies and programs.
 - + This has been confirmed in areas of completed detailed subsurface geologic mapping.

Must have a comprehensive geologic data base that incorporates data from geologists/environmental companies, oil and gas companies, state remediation programs, city wells, MDOT, any borings that penetrate the glacial material.

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COMPARISON WITH ADJOINING STATES



- × **What are the adjoining states that have glacial sediments and associated groundwater doing to manage ground water?**
 - + Minnesota, Wisconsin, Indiana, Illinois, Ohio, Pennsylvania, New York are **not using** the WWAT screening tool.
 - × All these states have been mapping the groundwater geology for 30 to 50 years.
 - × Some are committed to comprehensive 3- D Geologic mapping.
 - × The adjoining states are using factual geologic data to model.
 - × If you ask about water withdrawals, in many cases, it is not a complicated response for a data sufficient model.
- × **Michigan water initiatives require geologic mapping of critical areas.**

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ACTION PLAN FOR NATURAL RESOURCE ASSESSMENTS

LONG TERM – State and Federal Funded public domain information:

1. Selective airborne or ground geophysical surveys to expedite the mapping and delineation of water and natural resources.
2. Acquire LiDAR coverage of critical areas of the state, joint funding by MDOT, DNR, DEQ, MEDC, Fed- USGS, etc, currently a USGS process for 8 years.
3. Initiate 3-D geologic mapping program in priority areas.

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IMPROVE THE DATA BASE FOR LOCAL & STATEWIDE AQUIFER DELINEATION

- ✘ Wellogic enhancements are first and immediate.
- ✘ All high capacity (HC) wells should have a **geologic** sample description log submitted in Wellogic and samples and this descriptive log submitted to MGS.
- ✘ All high capacity (HC) wells should have a gamma ray log of the entire hole, submitted with WWAT Application and to MGS with samples.
- ✘ All community (HC) wells will follow the same protocols.

This data acquisition process should be supported by state funding.

NEED TO CHANGE DATA ACQUISITION PROCESS FOR GROUNDWATER.

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IMPROVE THE DATA BASE FOR LOCAL & STATEWIDE AQUIFER DELINEATION, CONTINUED

OIL FIELD DATA

- ✘ Oil wells should be included in this data submittal.
 - + All oil wells should have samples through glacial material from collar to bedrock or where drilling is initiated.
 - + Bagged samples are submitted to MGS/MGRRE.
 - ✘ **NOTE: Suggest representative bedrock samples should also be submitted.**
 - + Gamma log of the glacial zone and submitted to MGS.

- ✘ Any oil drilling water wells that are needed will follow the process outlined above, if WWAT (HC), then those submittals to DEQ.

State funded program for gamma log and sample storage.

- ✘ Proposal - Voluntary submittal, to MGS/MGRRE, of shallow (less than 1000 feet) geophysical data to assist in delineation of aquitards and aquifers (e.g. Passive and 3-D seismic, etc.).
 - + Test program - filter the data to remain confidential, if possible.

NEED TO CHANGE DATA ACQUISITION PROCESS FOR GROUNDWATER.

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**IMPROVE THE DATA BASE FOR LOCAL & STATEWIDE
AQUIFER DELINEATION. CONTINUED**

- ✘ **CONTAMINATED SITES:**
 - + Follow the same protocol and data submittal to Wellogic.
 - + Samples & Gamma ray log only clean holes to MGS.
 - ✘ **MDOT drilling programs:**
 - + Emphasize importance of glacial geology.
 - + Collect glacial materials.
 - + Gamma ray log drill hole if bedrock is more than 25 feet below ground surface. Could be potential aquifer.
 - + All core and drill cuttings and any logs sent to MGS / MGRRE. (Currently MDOT is providing core to MGRRE, a mutual exchange of information - WMU Thesis study ongoing)
 - ✘ **Mineral exploration data when open filed.**
- NEED TO CHANGE DATA ACQUISITION PROCESS FOR GROUNDWATER.**

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MICHIGAN – MUST INVEST IN THE FUTURE



Funding now to Secure an ROI on Michigan's Resources

- ✘ **RESOURCE DATA STORAGE AND REPOSITORIES**
 - + MGRRE AND MTU COLLABORATION DATA RESOURCES
- ✘ **MGS STAFF POSITIONS**
- ✘ **STRATEGIC / PRIORITY WATER RESOURCE MAPPING ISSUES**
 - + GEOLOGIC MAPPING TO UNDERSTAND WATER USE IN STRATEGIC AREAS
- ✘ **FUTURE MINERAL POTENTIAL**
 - + SAMPLING AND MAPPING
 - + AIRBORNE GEOPHYSICAL SURVEYS (UP and LP).
- ✘ **DEVELOPMENT AREAS**
 - + RESOURCE and NATURAL HAZARD ASSESSMENTS

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MICHIGAN GEOLOGICAL SURVEY



**Thank you
“Secure the future of Michigan”.**

Questions?

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