

LEELANAU CLEAN WATER

AND

REGION 9 OF MICHIGAN LAKE AND STREAM ASSOCIATIONS

Invite You To

A FOUR PART SEMINAR: WATER ISSUES FOR ALL OF US

June 19th, THURSDAY

9:30 AM-2:30 PM in the lower level Community Meeting Room

**LEELANAU COUNTY GOVERNMENT CENTER
8527 E. GOVERNMENT CENTER DRIVE
SUTTONS BAY, MI 49682
1-866-256-9711**

- **9:30 ZEQUANOX, A BIOLOGICAL CONTROL OF ZEBRA AND QUAGGA MUSSELS FOR YOUR LAKE**

**Heath Phillips, Director, Inland Lake Applications for Zequanox ,
Marrone Bio-Innovations**

- **10:45 A SHORELINE SURVEY: WHY AND HOW, AND WHAT TO DO WITH IT**

Rob Karner, Glen Lake-Crystal River Watershed Biologist

11:45 Box Lunch from Glen Arbor Deli on the Balcony!

- **12:30 ENACTING TOWNSHIP ORDINANCES TO PROTECT COMMUNITIES FROM THE IMPACTS OF FRACKING**

Jim Olson, Environmental Attorney, Founder and President of FLOW

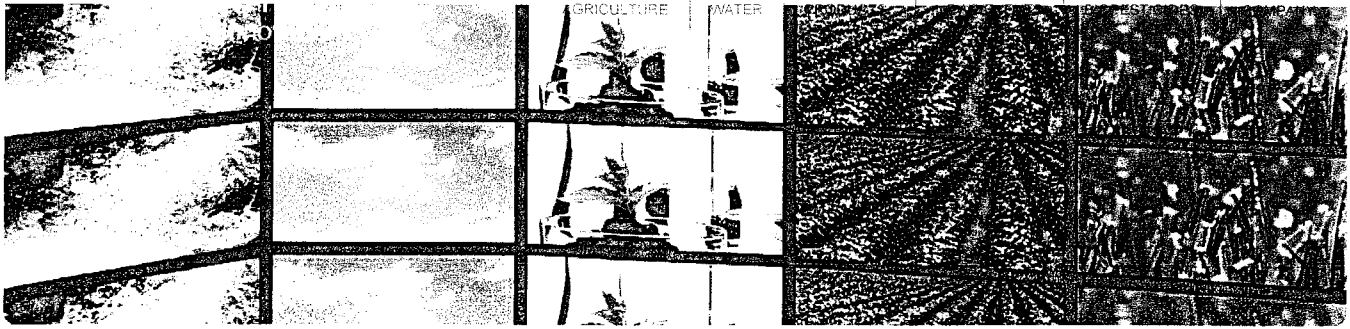
- **1:30 A BASELINE STUDY OF YOUR HOUSEHOLD AND GROUND WATER BEFORE HYDRAULIC FRACTURING OCCURS IN YOUR WATERSHED**

**Sarah Litch, Leelanau Clean Water and Glen Lake Association Water Quality
Committee**

**To Register and to reserve a lunch call Kristin Smith at the Government Center
1-231-256-9812**

Seminar is FREE & OPEN TO THE PUBLIC

Box Lunch is \$10.00 PAYABLE AT THE SEMINAR



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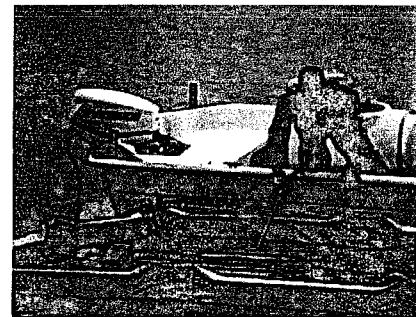
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Marrone Bio Innovations' Zequanox Demonstrates Control of Zebra Mussels in Illinois Lake

December 12, 2012

Study at Deep Quarry Lake showed more than 97 percent mortality of invasive mussels after applying Zequanox within barrier systems at three separate locations

Marrone Bio Innovations, Inc. (MBI) a leading provider of natural pest management products for water and agriculture applications, announced today that Zequanox[®] was highly effective at controlling invasive zebra mussels in Deep Quarry Lake located in DuPage County, Illinois. Zequanox, the industry's only environmentally compatible molluscicide, was applied within barrier systems in three locations throughout the lake. Results showed that treated sites experienced an average mussel mortality of 97.1 percent compared with 11.2 percent mortality in the control (i.e., untreated) sites.



Application of Zequanox into barrier. Photo credit: Kevin Irons, IDNR

In the study, funded in part through a grant from the Illinois Department of Natural Resources, three sets of paired treatment and control sites were set up within the lake to evaluate the effectiveness of Zequanox. Zequanox was so effective at controlling the invasive mussels that the study concluded after just one month. The study also showed that the application of Zequanox had no impact on water quality and no adult or juvenile fish mortality was observed 24 hours after product application.

"Zequanox has proven to be a powerful tool for controlling invasive mussels in 'in-pipe' applications such as cooling water systems. This study shows the product can be equally as effective in open waters," said MBI Director of Water Technologies Sarahann M. Rackl, Ph.D., P.E. "This successful study represents MBI's next step in our commercialization efforts for Zequanox in natural water bodies, and we're excited about expanding into this new market, where there are currently no other environmentally compatible treatment options."

Zebra mussels were first discovered in Deep Quarry Lake in 2009 and have since developed a well-established population within the lake. Because of their ability to reproduce quickly and in large numbers, invasive mussels can rapidly take over water systems they invade, outcompeting native species for food and space. Invasive mussels also clog boat engine intake systems, causing the motors to overheat, and coat boat hulls, resulting in costly damage to paints and coatings. In addition, their thin, sharp shells cause painful cuts and wounds, and when the shells of deceased mussels wash ashore, they can ruin recreational beach areas. Currently, there are no commercially viable alternatives for treating invasive mussels in open water bodies without harming other species.

"We are very pleased with the outcome of this study. The mortality rates as a result of Zequanox applications were impressive and the use of anchored barriers proved to be an excellent method to isolate and treat mussels within specific areas of the lake," said John "Ole" Oldenburg, director, Office of Natural Resources, Forest Preserve District of DuPage County.

The study was implemented in partnership with the Illinois Department of Natural Resources, Southern Illinois University (SIU), Forest Preserve District of DuPage County, PLM Lake and Land Management (PLM) and Marrone Bio Innovations.

Oldenburg added, "We are also very appreciative of MBI for providing the product that allowed us to conduct the study, and want to recognize the talented team of individuals from SIU, MBI and our Natural Resource staff from the District for

their great field work in conducting this very important evaluation. We look forward to having an environmentally friendly tool for controlling invasive mussels, which cause significant ecological and economic damage to the areas they infest."

Additional open water testing with Zequanox was performed earlier this year by the US Geological Service in collaboration with scientists from New York State Museum at Lake Carlos, Minnesota and Lake Shawano, Wisconsin. Further testing will be conducted in early 2013. EPA approval for using Zequanox in natural water systems is currently in process.

About Marrone Bio Innovations

Marrone Bio Innovations, Inc. (MBI) is a leading global provider of natural products for pest management (biopesticides) and plant health. Used in agriculture and water applications, MBI's environmentally responsible products control weeds, plant diseases and pests while managing pest resistance and promoting the health of natural ecosystems. Through its proprietary discovery and development platform and strategically in-licensed technologies, MBI has developed a pipeline of advanced and early-stage products for the significant agricultural and water treatment markets. MBI is addressing the water market with Zequanox[®], a groundbreaking solution for controlling invasive aquatic mussels in fresh waterways and is developing solutions for the control of algae and aquatic weeds. MBI's award-winning products for the agricultural market include the biofungicide Regalia[®] and the broad-spectrum bioinsecticide Granrovo[®]. MBI has three-dozen patents pending in the United States and globally.

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This entry was posted in [Latest News](#), [Press Releases](#), [Zequanox News](#). [Bookmark the permalink](#)



The Watershed Center- Shoreline Greenbelt Survey

Lake: Glen Lake Date: Month _____ Day _____ Year 2008

Location Info:

Township: ___ Glen Arbor ___ Kasson
 ___ Empire

Parcel Address/ Id Number: _____ Parcel Owner: _____

GPS Reading: N45.05. _____ W085.20. _____

Picture Numbers: _____

Shoreline: ___ Natural ___ Landscaped Waterfront Footage: _____ feet

Development: ___ Developed ___ Undeveloped

House Description: Stories: 1 1.5 2 3 _____ Across road from lake
_____ Color _____ Trim _____ Roof _____ Shutters _____

Access to Shoreline: ___ Stairway ___ Ramp

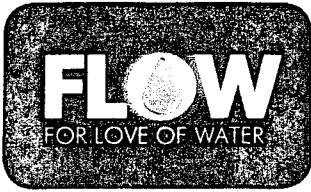
Structures on Shoreline:

___ Deck ___ Patio ___ Gazebo ___ Other
___ Boathouse ___ Pumphouse ___ Water Intake ___ Water Drain

Erosion and Buffer Info:

Note: Surveying should be done from the Ordinary High Water Mark.

1. Greenbelt Length: ___ None ___ <10% ___ 10-25% ___ 25-75% ___ >75%
2. Greenbelt Average Depth: ___ None ___ <10' ___ 10-40' ___ >40'
3. Vertical Structure: ___ All ___ Ground Cover ___ Understory ___ Overstory
4. Turf: ___ (0%) ___ <10% ___ 10-25% ___ 25-75% ___ >75%
5. Density: ___ Sparse ___ Medium ___ Dense
6. Species Diversity: ___ Uniform ___ Several Species ___ Many Species
7. Erosion: ___ None ___ Minor ___ Severe
8. Erosion Control Structures: ___ Sea Wall ___ Riprap ___ Biotechnical ___ Other
9. Emergent Vegetation: ___ Present ___ Absent



ADVANCING PUBLIC TRUST SOLUTIONS
TO SAVE THE GREAT LAKES

ENACTING TOWNSHIP ORDINANCES TO PROTECT COMMUNITIES FROM THE IMPACTS OF FRACKING

WHO REGULATES?

Oil and natural gas interests developing deep shale plays nationwide are exempt from key federal and state environmental laws. At the local level in Michigan, the oil and gas industry also has secured exemptions such that local townships and counties are prohibited from enacting ordinances that regulate the location, drilling, completion, operation or abandonment of oil and gas wells.

EMPOWERING COMMUNITIES: OUR LOCAL GOVERNMENT ORDINANCE PROGRAM

Early on, recognizing the exemption of deep shale horizontal natural gas drilling from key federal and state laws and regulations, FLOW (“For Love of Water”)—a Great Lakes policy and education center—saw an urgent need to develop legal strategies for local governments in Michigan to safeguard their communities against the unprecedented, water-and chemical-intensive, and cumulative impacts of fracking.

FLOW’s **Local Government Ordinance Program** offers a pioneering approach that empowers local governments and their citizens with critical information to assess the associated risks and land-use and water impacts of fracking. Our program is unique to Michigan because it enables communities to chart their own future, strengthen their existing local regulations, and preserve their rural and agricultural character. This is one of several key strategies necessary to build a coalition of citizens and leaders to protect Michigan’s predominantly rural and agricultural landscape and its 4.6 million acres of state public lands.

FLOW provides direct technical planning assistance to Michigan townships interested in crafting ordinances to regulate the ancillary industrial processes of fracking. In a two-part workshop series, our program:

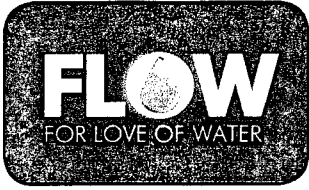
- *engages* and educates local government official and residents about the risks and impacts of fracking and specific legal strategies for communities to consider;
- *identifies* community priorities and related oil and gas activities to regulate (e.g., water withdrawals, chemical disclosure, roads/truck traffic impacts, pipelines, etc.); and
- *recommends* optimal strategies for integrating and amending the community’s existing master plans, zoning and police power ordinances, and franchise agreements in a **protective ordinance package**.

The local planning commission and township board then use the protective ordinance package as the foundation for drafting and adopting substantive ordinances protecting water, air, and land from fracking impacts and preserving their community.

This year, FLOW partnered with Cannon Township (Kent County) and Gun Plain Charter Township (Allegan County) to develop two separate protective ordinance packages. To learn more about this program, visit our website at flowforwater.org/fracking.

“Our goal was to educate our people and identify specific things we can do to alleviate the potential impacts and risks of fracking.”

– Supervisor, Mike VanDenBerg, Gun Plain Charter Township, Allegan County



ADVANCING PUBLIC TRUST SOLUTIONS
TO SAVE THE GREAT LAKES

LEGAL STRATEGIES AND TOOLS TO EMPOWER LOCAL COMMUNITIES AGAINST POTENTIAL RISKS AND IMPACTS FROM UNCONVENTIONAL HORIZONTAL FRACKING

The Great Lakes deserve great laws; the public trust is a key legal principle that empowers citizens and governments to protect our waters as a commons, owned and shared by the public for the use and enjoyment of all. FLOW (“For Love of Water”) has been working since 2011 to advance public trust solutions to address the systemic threats facing the Great Lakes. One recent threat to our waters has centered on the extraction process of deep oil and natural gas formations within the Great Lakes Basin.

HYDRAULIC FRACTURING, OR “FRACKING,” IN MI
High volume hydraulic fracturing, “HVHF” or fracking for short, is an unconventional method of extracting natural gas from deep shale rock formations.

Spanning across Michigan’s Lower Peninsula, the Collingwood/Utica deep shale, and A-1 Carbonate oil and gas formations are notably different than the Antrim shale formation developed in the late 1980s/early 1990s. Here are some key differences:

- **Depth:** The Collingwood/Utica/A-1 Carbonate geologic formation ranges from 5,000 to 10,000 feet deep, compared to the relatively shallow Antrim deposit, which is 600 to 2,000 feet deep.
- **Horizontal Drilling:** The Collingwood/Utica/A-1 Carbonate require unconventional horizontal drilling and fracking to capture the trapped natural gas as opposed to the Antrim’s vertical and slant drilling to tap isolated “reservoirs” of oil or gas.
- **Water Use:** Deeper geologic formations can require up to 30 million gallons of water and chemical/sand mixtures or more than 1,000 times more than used in a vertical or typical shallow Antrim well (30,000 gallons of water per well). Unlike normal water use where water returns to the watershed, “frack” water is permanently removed from the water cycle – remaining partially in the fracked formation with some 30 % flowback discharged into deep injection waste wells.

POTENTIAL RISKS AND IMPACTS OF FRACKING

A review of literature on fracking and its associated risks reveals several concerns: massive water withdrawals; surface and groundwater contamination; surface spills and leaks; wastewater management; land use impacts; truck traffic and burden on infrastructure; lack of public disclosure; air pollution; and noise.

OUR LOCAL GOVERNMENT ORDINANCE PROGRAM

Since 2010, Michigan has experienced a flurry of fracking activity on both private and state leased lands. Early on, FLOW recognized a growing and urgent need to develop sound legal strategies and policies for local governments to safeguard their communities against the unprecedented, large, and cumulative impacts of fracking. FLOW’s Local Government Ordinance Program intends to empower citizens and local governments with existing legal strategies and tools and address the industrial-scale impacts of fracking.

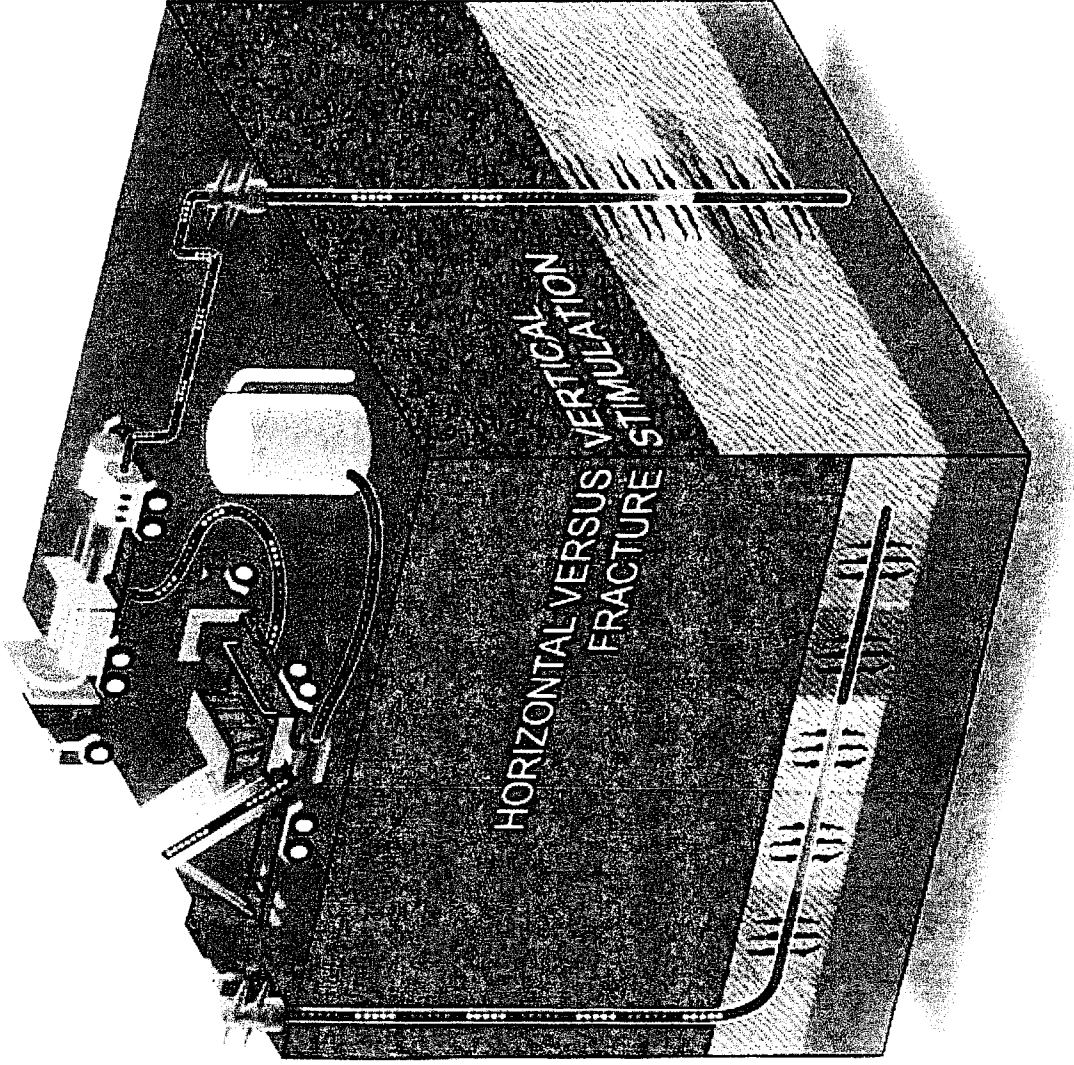
LEGAL OVERVIEW: WHO IS IN CHARGE?

Citizens and communities located in Michigan’s oil and natural gas-rich basin have good reason to be concerned about the risks fracking poses to state waters and other natural resources.

- The natural gas and oil industry is largely exempt from key federal environmental laws, including the Safe Drinking Water Act and Clean Water Act.
- States thus are primarily responsible for regulating fracking activities. Yet, this industry is largely exempt from key water statutes like Michigan’s codification of the Great Lakes Compact, which regulates surface and ground waters.
- Under Michigan’s Great Lakes Compact statute, local governments are expressly prohibited from enacting an ordinance that regulates a large quantity withdrawal (> 100,000 gallons per day).
- Under Michigan’s Zoning Enabling Act, local governments also are prohibited from enacting or enforcing an ordinance that regulates permit issues related to the location, drilling, operation, completion, or abandonment of oil and gas wells.

Hydraulic Fracturing

New Horizontal process vs. older Vertical process





P.O. Box 245 • Glen Arbor, MI 49636 • www.glenlakeassociation.com

The purpose of this project is to: Establish a baseline of water quality in the Glen Lake-Crystal River Watershed, should Hydraulic Fracturing occur within our watershed.

I understand that I will receive a report from SOS Analytical of the results of my water quality testing and that the cost of the testing is covered under a grant to Glen Arbor Township with supporting funds from the Glen Lake Association and Leelanau Clean Water.

I am willing to share these results in a data base established by the Water Quality Committee of the Glen Lake Association, assigning my test results an anonymous code number.

Signed: _____

Robert F. Karner

Date: _____

8/22/13



Rick Snyder, Governor
Dan Wyant, Director

Oil & Gas Pre-Drill Water Well Testing

Michigan Department of Environmental Quality Office of Oil, Gas, and Minerals

The Michigan Department of Environmental Quality, Office of Oil, Gas, and Minerals (OOGM) implements thorough and effective regulations covering all aspects of oil and gas development, including prevention and monitoring of spills and potential water contamination. However, some homeowners wish to conduct independent testing of their water source prior to oil and gas drilling activities. In response to questions on this issue, the OOGM has developed the following lists of parameters useful to establish a water quality baseline. It is important to note that when testing private well water, conditions that affect water quality may already exist and warrant the attention of homeowners. These conditions might occur irrespective of any nearby oil and gas development.

Nationally, several tiered approaches to pre-drill water quality sampling exist. The following are two tiered options, the tier that a homeowner selects may depend on their budget and the level of background data the homeowner desires.

Tier 1 - General Oil and Gas Pre-Drill Screening

The following parameters are a basic suite of analyses that provides a background for water quality as it relates to oil and gas activity:

- Benzene, Toluene, Ethylbenzene, and Xylene (BTEX)
- Total Dissolved Solids (TDS)
- Chloride
- Methane

Tier 2 – More Comprehensive Pre-Drill Screening

Although potentially expensive, a more comprehensive water quality analysis can be obtained by testing for the following parameters:

- | | | |
|-------------------------------------|--|-------------------|
| • Alkalinity | • Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) | • Total Strontium |
| • Oil & Grease | • Dissolved Methane | • Total Calcium |
| • pH | • Dissolved Ethane | • Total Iron |
| • Specific Conductance | • Dissolved Propane | • Total Magnesium |
| • Total Dissolved Solids (TDS) | • Nitrate as N | • Total Manganese |
| • Total Suspended Solids (TSS) | • Total Chromium | • Total Potassium |
| • Chloride | • Total Arsenic | • Total Sodium |
| • Sulfate | • Total Barium | • E. Coli |
| • Total Hardness | • Total Lead | • Total Coliform |
| • Surfactants (MBAS/foaming agents) | • Total Selenium | • Turbidity |

It should be noted that water well sampling provides water quality data for a single point in time. Water quality results can vary considerably because of many factors, including: seasonally fluctuating static water levels, water well construction, use of the water supply, sampling technique, weather and atmospheric conditions. **It is recommended** that homeowners who wish to perform pre-drill sampling work with a professional environmental consultant and certified laboratory in order to: understand these natural variations in water quality; choose an appropriate sample suite of parameters; and to ensure the quality of the data obtained from pre-drill sampling and analysis.

Finding a Laboratory

Local health departments are the main regulatory agency with respect to residential wells. They are required to maintain a list of environmental contaminants within their jurisdiction. Follow this link for contact information of local county health departments: <http://www.michigan.gov/mdch/0,1607,7-132--96747--,00.html>

The Laboratory Certification Program operates under the authorization of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), and the United States Environmental Protection Agency (USEPA) to certify laboratories for the analysis of drinking water. All laboratories testing Michigan drinking water samples for regulatory and compliance monitoring must be certified by this program. The Laboratory Certification Program certifies laboratories to ensure that proper methods and quality control are used in the testing of drinking water samples. The link below will direct users to lists of certified laboratories: http://michigan.gov/deq/0,4561,7-135-3307_4131_4156-36940--,00.html

Department of Environmental Quality
Office of Oil, Gas, and Minerals
P.O. Box 30256, Lansing, Michigan 48909-7756

Baseline Water Testing

Tests highlighted in green are "highly recommended" by at least one of these agencies: NYS Water Research Institute, NY Department of Environmental Conservation, PA Department of Environmental Protection, Penn State University, National Groundwater Association, Center for Rural Pennsylvania and OH Department of Natural Resources.

TEST	LABORATORY		
	DEQ	SOS	Brighton
PH	\$13	\$8	\$15
Alkalinity	\$16	\$10	\$15
Total Dissolved Solids		\$10	\$20
Chloride	*\$18	\$13	\$30
Total Suspended Solids		\$10	\$20
Turbidity		\$8	\$30
Hardness (by Ca,Mg)	*	\$20	\$40
Conductivity	\$12	\$8	\$15
Methane	**\$90	\$95	\$85
Chemical Oxygen Demand		\$20	\$40
MBAS (Detergents)		\$54	\$50
Drinking Water Metals:			
Arsenic (As)	(\$18)		
Barium (Ba)	\$18		
As, Ba, Ca, Fe, Mg ***		\$90	\$70
Iron, Lead, Manganese, Zinc	\$28		
Calcium, Magnesium, Sodium	\$18		
Strontium	\$18		\$30
Drinking Water VOCs	\$100	\$95	\$110
Potassium (Ck)	\$13		
Radioactivity			
Gross Alpha & Beta		\$55	
Formaldehyde ****			\$85
TOTAL	\$236	\$496	\$655

LEGEND:

Blank space means laboratory does not conduct the test

Parentheses () around the price means the DEQ gave a price but did not include it in their baseline panel

*DEQ includes hardness in combined test for Chloride, which includes Fluoride, Nitrate, Nitrite, Sulfate, Sodium and Iron

**DEQ includes Ethane and Ethylene in its Methane test

***Arsenic, Barium, Calcium, Iron, Magnesium

**** Formaldehyde test is recommended as a result of information received from Dr. Yuri Gorby, University of Southern California (request email)

May use multiple laboratories for price advantage

It is important to specify cold pack shipping when contacting the collection agent. Due to sample viability, testing should take place on a Monday or Tuesday.

Payment: Check(s) made payable to the testing lab(s) (State of Michigan for the DEQ) must be furnished at time sample is collected. Collection fees and payment for shipping must be paid to collection agent.

Quotes received from three certified laboratories in Michigan:

Drinking Water Laboratory
Michigan Department of Environmental Quality
3350 North M.L. King Blvd., P.O. Box 30270
Lansing, MI 48909
(517) 335-8184

Brighton Analytical LLC
2105 Pless Drive
Brighton, MI 48114
(810) 229-7575

NOTE: Brighton requires same day or overnight shipping

SOS Analytical
4125 Cedar Run Road
Suite B
Traverse City, MI 49684

Collection agents for 3rd party qualified sampling:

--Have ready the list of desired tests and laboratory you intend to use before calling. If selection of tests is changed after order, the collection agent may charge you an additional fee. --

A & B Webb Enterprises, Inc.
dba R. Webb & Son Well Drilling
3120 M-65
Hale, MI 48739
(989) 728-4011

Quote: \$75 plus shipping for DEQ only. \$150 plus shipping when using all three laboratories.

District Health Department No. 2
(989) 343-1803
Quote: \$82 per hour

SOS Analytical
Quote: \$65 per hour for travel and collection time, plus \$1 per mile for mileage

Brighton Analytical
Quote: \$415 flat fee (includes travel), plus \$25 per hour for sample collection time