



A Newsletter of the Michigan Basin Geological Society



March 2020

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www.mbgs.org

ANNOUNCEMENTS

MBGS MEETING – Tuesday, March 10th

March 10th, 2020: Michigan Basin Geologic Society meeting will be hosted at Michigan State University in the Natural Science Building, East Lansing, Michigan. Stacy Metz and Graham Crockford from TRC will present "Evaluation of the Vapor Intrusion Pathway at a Non-Residential Facility using VaporSafe[™] Continuous Air Monitoring results in a Sustainable Solution".

VOLUNTEERS NEEDED

MBGS needs member volunteers to assist in a booth on Earth Day, April 22nd, 2020 at Constitution Hall in Lansing. The MBGS booth at the State of Michigan Earth Day event will include hands-on activities for exploring porosity and permeability in rocks and the cycle. Also, some rocks and minerals samples will be available for the students to take home. If you are interested in volunteering, please contact any of the MBGS officers. More information about the event is available at: https://www.michigan.gov/egle/0.9429.7-135-3307_3580_66835---.00.html

OTHER NEWS

LED FIELD LENS

The Michigan Basin Geological Society is offering geological field hand lens and lanyards for purchase. The field hand lens is a large 21mm lens with a 20X magnification. A pair of white LEDs provides illumination for all those darkened close-up viewing of rocks, minerals and fossils. A case is provided for the field lens with a key to remove the batteries. Batteries are included. The green lanyard has MICHIGAN BASIN GEOLOGICAL SOCIETY printed on one side of the 1" wide webbing. This lanyard is designed with a breakaway buckle clip and detachable keychain for versatile use and comfortable wearing. MBGS is offering the Lanyard/LED Hand Lens and Case combo for \$15 each and the Lanyard alone for \$5 each if picked up at a meeting or field trip. If you request to have your purchase mailed, standard costs for mailing container and postage will apply.



Please contact Mark Wollensak at wollensak@att.net to order.

EDUCATONAL TOOLS

MBGS has a core display available for use by members that visually demonstrates permeability and porosity. There are informational posters available for use with the core display. The kit is a hands-on educational tool that can be used for many age groups. Contact Jennifer Trout at <u>jennifer.l.trout@wmich.edu</u> to reserve this core display kit for your educational event or class.



March MBGS Membership Meeting

When: Tuesday, March 10th, 2020, 7:00PM
 Where: Michigan State University in the Natural Science Building, Room 204, East Lansing, Michigan
 Speaker: Stacy Metz and Graham Crockford, TRC, Ann Arbor, Michigan
 Presentation: "Evaluation of the Vapor Intrusion Pathway at a Non-Residential Facility using VaporSafe[™] Continuous Air Monitoring results in a Sustainable Solution"

Background/Objectives. TRC has been assisting with site investigation and cleanup at a USEPA Region V RCRA Corrective Action Site. Corrective Action for the Site, as outlined in the Final Decision, is largely complete. However, new remediation goals were established for the Site in 2016 after USEPA published revised trichloroethene (TCE) toxicity values. Because of the new remediation goals, a passive sub-slab ventilation (SSV) system was installed and short-term indoor air monitoring was completed to demonstrate system effectiveness. Despite favorable indoor air sampling results, USEPA was hesitant lift the occupancy restrictions which would return the 225,000 square foot building to full industrial use. This position was justified by citing historic data variability and the possibility that there may be exceedences of the indoor air criteria for TCE between quarterly sampling events since recent risk assessment guidance raises concerns with short-term TCE exposures during pregnancy.

Approach/Activities. Due to tight clay soils beneath the majority of the building footprint, active mitigation throughout the 150,000 square foot restricted area would be very costly. However, continuing traditional 8-hr canister indoor air sampling on a quarterly basis, may not have ever fully addressed concerns with short-term data variability. Therefore, TRC recommended using the VaporSafe[™] Automated



Continuous Real-Time Vapor Intrusion Monitoring and Response System (VaporSafe[™]). VaporSafe[™] is equipped with a gas chromatograph (GC), which is deployed on-site to provide real-time indoor air results. VaporSafe[™] is also equipped to monitor air/vapor pressure measurements concurrent with air sampling. During the initial phase of the project, air samples were collected for direct injection into the GC to provide rapid response, real-time analysis to identify preferential pathways affect indoor air concentrations. Following this initial assessment, a multiplexed, automated system to collect continuous samples from twelve sample locations over a period of several days was set up. Differential outdoor/indoor/sub-slab pressure measurements were also collected over the same time period. Concentration and pressure data were then used as a basis for highly targeted building improvements. After building improvements were completed, the VaporSafe[™] system was deployed to document post-mitigation building conditions.

Results/Lesson Learned. TRC evaluated the data to better understand the variability of TCE in indoor air as well as the potential effect of preferential pathways and variable pressure on vapor intrusion. Data were used to identify encroachment locations and an indoor air source unrelated to historical operations (brake degreasing in an area of the plant where the current tenants are operating a garage). Additionally, TRC could document



how atmospheric pressure, wind speed, and site operations affected indoor air concentrations. These data have allowed TRC to recommend targeted, cost-effective modifications to the existing structure/SSV system to address those areas with lingering vapor intrusion concerns. Ultimately the mitigation and two one-week continuous air monitoring events cost approximately \$150,000, followed by an anticipated annual energy use of ~3,000 kW-hr. By contrast active mitigation throughout the entire restricted area likely would have a significantly higher capital cost with annual energy use in excess of 50,000 kW-hr, which constitutes a 94% reduction in energy use, while protecting human health.

Biography

Stacy Metz, PE, TRC, Project Manager/Environmental Engineer. smetz@trccompanies.com.

Stacy graduated from Alma College with a Bachelor of Science degree in Environmental Science in 2001. Following Alma College, Stacy worked as a wet chemist in an environmental testing laboratory before attending the University of Wisconsin-Madison where she obtained a Master of Engineering degree in Geological Engineering in 2007. Her graduate research was focused on the *in situ* treatment of arsenic contaminated groundwater. Stacy has worked as an environmental consultant at TRC since 2007, specializing in environmental characterization and remediation of commercial, landfill and industrial properties. Stacy coleads TRC's CORE vapor intrusion team. Her work includes environmental site assessments; development of project plans and specifications; project coordination; implementation of field investigation, monitoring, and remediation activities; risk assessment; report writing; and project permitting. Recently, much of Stacy's work has supported efforts to characterize and mitigate vapor intrusion concerns near historic industrial facilities where chlorinated solvents were released and at the associated downgradient residential and non-residential properties. These efforts include the calculation of site-specific cleanup levels, mitigation system design, and oversight of performance monitoring.

Graham Crockford, CPG, TRC, ECR Practice Lead. gcrockford@trccompanies.com.

Graham has over 30 years of experience in the fields of consulting, environmental engineering, geology, and hydrogeology. He currently serves as TRC's Office Practice Leader for the Michigan offices, and leads TRC's CORE vapor intrusion and sustainable remediation workgroups, and a member of TRC's PFAS CORE team. He also serves as a Principal Consultant/Program Manager for TRC's solid waste, utility, and manufacturing/industrial clients, and is a program manager for TRC's Coal Combustion Residual (CCR) program. He also has decades of contaminant investigation and remediation experienced focused recalcitrant solvent contamination, and metals. Graham also provides litigation support services including expert and fact witness. Graham has served on several technical committees providing advocacy and industry perspective during development of solid waste rules in response to RCRA Subtitle D. His education includes a B.S. in Geology from Grand Valley State University and M.S. coursework in geology/hydrogeology at Wayne State University.

MBGS Monthly Membership Meeting, March 10th, 2020 - TUESDAY

Michigan State University College of Natural Science Building, Room 204 288 Farm Lane, East Lansing, MI 48823, (517) 355-4470



Between 5pm & 6pm you can park in Lot 9 behind Giltner Hall and the Psychology Building (former Physics and Astronomy building) for free. Otherwise you can try your luck with the metered slots clustered around the Natural Science Building and the adjacent Student Services Bldg, no charge after 6. MSU Interactive Map: <u>https://maps.msu.edu/</u>

EVENTS

March 5th, 2020: Society of Petroleum Engineers - Michigan Section dinner meeting, Shahid Azizul Hag, speaking on "Reservoir Engineering While Drilling In Horizontal Wells". Alibi of Troy, 6700 Rochester Road Troy, MI 48085. Social Hour is 5-6 pm, dinner is from 6-7 pm, and presentation will follow dinner. Contact Zachary L Melcher <u>zachary.melcher@dteenergy.com</u> for additional information.

March 10th, 2020: Michigan Basin Geological Society membership meeting, Lansing, <u>www.mbgs.org</u>

April 8th, 2020: Michigan Basin Geological Society Annual BBQ meeting. Dr. Katherine "Kata" McCarville, professor of Geology and Paleontology, Upper Iowa University, will be presenting on the Grand Canyon, rafting the Colorado River, Lee's Ferry to Whitmore Wash". The meeting will be held at Western Michigan University, Michigan Geological Repository for Research and Education (MGRRE) Kalamazoo, <u>www.mbgs.org</u>

May 13 -14th, 2020: 66th Annual Institute on Lake Superior Geology, Mountain Iron, Minnesota, <u>http://lakesuperiorgeology.org/MtIron2020/index.html</u>

June 16-17th, 2020: AIPG Michigan Section Environmental Risk Management Workshop (10th Year Anniversary), Roscommon, Michigan at the Ralph A. MacMullen Conference Center, <u>http://mi.aipg.org/</u>

EGLE Calendar of Training and Workshops

https://www.michigan.gov/egle/0,9429,7-135-3308 3333---,00.html

ONLINE RESOURCES

- Michigan Geology Maps Available: https://www.michigan.gov/deq/0,4561,7-135-3304-116670---

 ,00.html
- Digital Geology Library Overview: <u>https://www.michigan.gov/documents/deq/GIMDL-Catalog-2010-</u> 01-20_307979_7.pdf
- GeoWebFace: <u>https://www.michigan.gov/deg/0,4561,7-135-3311_60700---,00.html</u>
- Digital Geology Library Mining Overview: <u>https://www.michigan.gov/documents/deq/GIMDL-Catalog-</u> 2013 06 22 mining 425595 7.pdf
- Michigan Geological Survey: <u>https://wmich.edu/geologysurvey</u>
- USGS Michigan Geological Map Data: <u>https://mrdata.usgs.gov/geology/state/state.php?state=MI</u>
- CMU, Clarke Historical Library, Michigan Geology: https://www.cmich.edu/library/clarke/ResearchResources/Michigan_Material_Statewide/Michigan_Oi <a href="https://www.cmich.edu/library/clarke/ResearchResources/Michigan_Material_Statewide/Michigan_Oi
 and Gas Industry/History of Michigan Oil and Gas/Pages/Michigan-Geology.aspx
- Wisconsin Geological and Natural History Survey has completed a data preservation and presentation project on their Lake Superior Legacy Collection. This collection contains the raw materials (notebooks, maps, samples, thin sections) of the Lake Superior Division of the USGS. The collection is available <u>here</u>

MICHIGAN BASIN GEOLOGICAL SOCIETY OFFICERS 2019-2020

PRESIDENT: JENNIFER TROUT, Staff Geologist

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Historical CD #1: Nine out-of-print publications from 1949 through 1965 and 1998, 2000, \$15

- The Stratigraphy of Manitoulin Island, Ontario, Canada, June 19-20, 1954
- The Devonian and Silurian Rocks of Parts of Ontario, Canada and Western New York, June 22-23, 1951
- The Traverse Group of the Northern Part of the Southern Peninsula of Michigan, June 16-17, 1949
- The Devonian Strata of the London-Sarnia Area, Southwestern Ontario, Compiled by Erwin C. Stumm, Lewis B. Kellum and Jean Davies Wright, June 9-10, 1956
- The Ordovician Rocks of the Escanaba-Stonington Area, Led by R. C. Hussey, June 2-3, 1950
- The Niagara Escarpment of Peninsular Ontario, Canada, June 18-19, 1955
- Lower Paleozoic and Pleistocene Stratigraphy Across Central Wisconsin, Compiled by C. E. Prouty, Led by L. M. Cline, J. L. Hough and R. F. Black, 1960
- Classic Silurian Reefs of the Chicago Area, by Donald G. Mikulic and Joanne Kluessendorf, June 27, 1998
- Geology of Central Ontario, Canada, 1965

Historical CD #2: Four out-of-print publications from 1947, 1959, 1983 and 1991, 2001, \$15

- Copper Country Field Trip, Michigan, June 20-22, 1947
- Geology of Mackinac Island and Lower and Middle Devonian, South of the Straits of Mackinac, June 12-14, 1959
- Tectonics, Structure and Karst in Northern Lower Michigan, August 1983
- Geology of the Pictured Rocks, Upper Peninsula, Michigan, July 11-13, 1991

Historical CD #3: Six out-of-print publications from 1948, 1952, 1990 - 1995, 2001, \$15

- Pleistocene and Early Paleozoic of the Eastern Part of the Northern Peninsula of Michigan, June 18-21, 1948
- Stratigraphy and Structure of the Devonian Rocks in Southeastern MI and Northwestern OH, June 20-21, 1952
- Lower Ordovician and Upper Cambrian of Wisconsin, May 10-12, 1990
- Guidebook to the Precambrian Geology and Metallogeny of the Central Upper Peninsula of Michigan September 12-13, 1991

Historical CD #4: Six out-of-print publications from 1957, 1958, 1961, 1967, 1968 and 1970, 2004, \$15

- Silurian Rocks of the Northern Peninsula of Michigan, 1957
- Cambrian Geology of Parts of Dickinson and Iron Counties, Michigan, June 1958
- Geologic Features of Parts of Houghton, Keweenaw, Baraga and Ontonagon Counties, Michigan, May 19-21, 1961
- Correlation Problems of the Cambrian and Ordovician Outcrops Areas, Northern Peninsula of Michigan 1967
- The Geology of Manitoulin Island, June 1968
- Devonian Strata of Alpena and Presque Isle Counties, Michigan 1970

Historical CD #5: Five out-of-print publications from 1971, 1989, 2001, and Oil & Gas Fields Vol. 1 & 2, 1969 & 1992, 2006, \$50

- Oil & Gas Fields Symposium, Volume 1, April 1969, 200 pp., maps, illus., second printing with updates
- Oil & Gas Fields Manual of the Michigan Basin, Volume 2, 1992, 520 pp., maps, illus.
- Glacial Geology of Southwestern Michigan, 1989, 53 pp. by A. Kehew, L. J. Schmaltz, and W. T. Straw
- Geology of the Lake Erie Islands and Adjacent Shores, 1971, 65pp., maps, illus. by Jane L. Forsyth
- Glacial Geology of Southwestern Michigan, Landforms of the Lake Michigan Lobe, Southwestern Michigan, 2001, AAPG Eastern Section Meeting Field Trip, 32 pp., maps, illus. by A Kehew and A. Kozlowski

Historical CD #6: Six out-of-print publications from 1946, 1953, 1963, 1966, 1978 & 1987 plus the Richfield Challenge, 1952 & Tom Knapp's MS Thesis, 2007 \$15.

- Guidebook for Ordovician Stratigraphy of the Cincinnati, Ohio and Richmond, Indiana Areas, June 12, 13, 1953 by W. H. Shideler and B. T. Sandefur
- Guidebook for Ontario Geological Excursion to Kettle Point Owen Sound- Waubaushene, June 21, 22, 23 1946 by W. A. Roliff, C.S. Evans and J.F. Caley
- Guidebook for the Stratigraphy of the Silurian Rocks in Western Ohio, May 31-June 2, 1963 by C. H. Summerson, Jane L. Forsyth, Karl V. Hoover and J. R. Ulteig
- Guidebook for Cambrian Stratigraphy in Western Wisconsin, May 21, 22, 1966 by Merideth E. Ostrom
- Geology of the Manitoulin Area, Special Papers #3, September 29, 30 and October 1, 1978 by J. T. Sanford
- and R. E. Mosher
- Middle Devonian Cratonic Carbonates and Shales in Southwestern Ontario, November 14, 1987 by Bruce Wilkinson
- The Richfield Challenge, A Review of the Richfield Developments in Michigan, 1952 by Gordon H. Hautan
- A Theory of Rogers City and Dundee Relationships in Central Michigan, Masters Thesis, 1947 by Tom Knapp

Historical CD #7: Field Guidebooks from 1962, 1969, 1977, 1980, 1985 & 1988, \$15

- Silurian Rocks of the Southern Lake Michigan Area, 1962, James H. Fisher, Chairman, MBGS Annual Field Conference
- Studies of the Precambrian of the Michigan Basin, by Harold B. Stonehouse, 1969
- The Geology of the Marquette District: a Field Guide By F. W. Cambray, 1977
- Ordovician and Silurian Geology of the N. Peninsula of Michigan, 1980, R.B. Votaw, 40 pp., illus., maps
- Special Paper #4: Ordovician and Silurian Rocks of the Michigan Basin and its Margins, 1985 K.R. Cercone and J.M. Budai (eds.), 96 pp., illus.
- Upper Keweenawan Rift-Fill Sequence, Mid-Continent Rift System, Michigan, 1988, P.A. Daniels and R.D. Elmore, M.S. Wollensak, ed., 150 pp., illus., maps

OTHER SPECIAL OFFERS

- Historical CD Set #1 7 (detailed above) for a special purchase price of \$95
- NE Lower Peninsula Geological Field Conf., 2004, T. Black, M. Wollensak, On CD \$10
- Stratigraphic Lexicon for Michigan, 2001, prepared by MBGS and published by DEQ, \$4
- Robert E. Mosher Geological Studies A lifetime of geological research on Silurian Rocks with John T. Sanford. The disks are organized chronologically and include field work in North America and Europe. 2007, 2 CDs \$35.

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