ON THE ROCKS

A Newsletter of the Michigan Basin Geological Society

2018-2019 Edition 7 www.mbgs.org *March 2019*

ANNOUNCEMENTS

MBGS MEETING

MBGS Membership Meeting, March 13th, 2019: Michigan Basin Geologic Society meeting will be hosted at Michigan State University in the Natural Science Building, East Lansing, Michigan. Katelyn Kring, Michigan Tech graduate student will present "Slope stability analysis of an open pit mine using geostatistical simulations and limit equilibrium method ". Katelyn was a past recipient of the MBGS Student Scholarship. Information is included in the newsletter.

VOLUNTEERS NEEDED

MBGS volunteers needed for Earth Day, April 24th, 2019 Constitution Hall Lansing. Again, MBGS will have a booth at the State of Michigan Earth Day event. https://www.michigan.gov/deq/0,4561,7-135-3307_3580_66835---,00.html
If you are interested in volunteering, please contact any of the MBGS officers.

MBGS FIELD EXCURSION

SPRING 2020 - GEOLOGICAL EXCURSION BY RAFT ON THE COLORADO RIVER THROUGH THE GRAND CANYON LEE'S FERRY TO WHITMORE WASH (PAGE, ARIZONA) – THREE SEATS ONLY REMAINING

A 7-day Grand Canyon rafting trip through Hatch includes: 188 miles of rafting from Lee's Ferry to Whitmore Wash, pre-trip stay at Cliff Dwellers Lodge, helicopter ride & return flight to Las Vegas or Marble Canyon, and meals, beverages, camping gear and dry bags provided by Hatch while on the river. Contact Mark Wollensak at wollensak@voyager.net to get more information or reserve your spot on this trip.

OTHER NEWS

LED FIELD LENS AND MBGS LANYARD AVAILABLE

The Michigan Basin Geological Society is offering geological field hand lens and lanyards. 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@voyager.net to order.

CORE DISPLAY EDUCATIONAL TOOL AVAILABLE TO MEMBERS

MBGS has a core display available for use that visually demonstrates permeability/porosity. There are posters available for use with the core display. Contact Jennifer Trout at jennifer.l.trout@wmich.edu to reserve this great educational tool.

March MBGS Membership Meeting

"Slope stability analysis of an open pit mine using geostatistical simulations and limit equilibrium method"

presented by

Katelyn Kring, Michigan Tech Graduate Student

When: March 13th, 2019. Executive committee meeting at 5:00 PM at Claddagh Irish Pub, Eastwood Towne Center, (members welcome), membership meeting and presentation at 7:00 PM

Where: Michigan State University, College of Natural Science Building, Room 204, 288 Farm Lane, East Lansing, MI 48823, (517) 355-4470, no cost for this meeting.

Abstract: Slope stability analysis of an open pit mine using geostatistical simulations and limit equilibrium method, By Kateyln Kring and Snehamoy Chatterjee

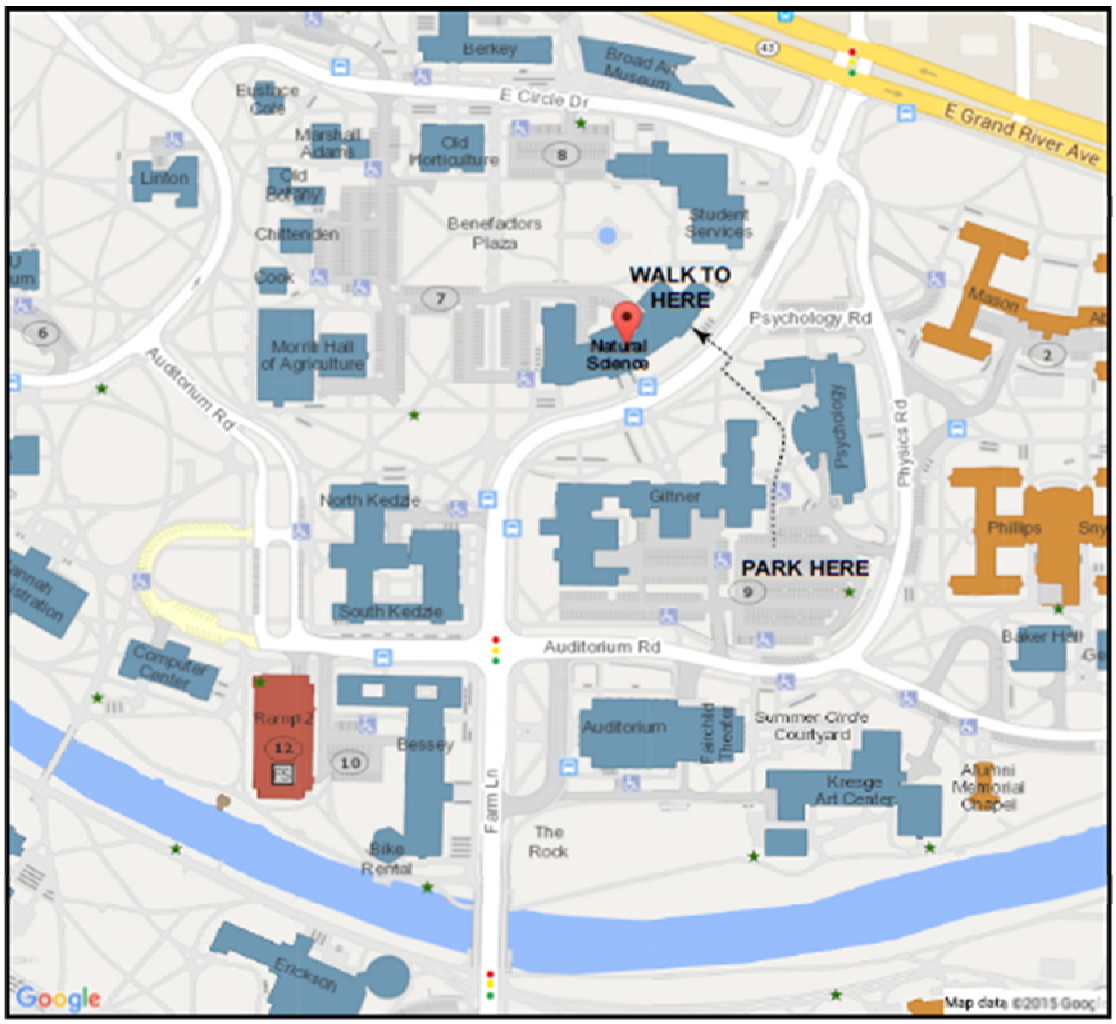
Abstract:

The reliable slope stability analysis of an open pit mine is a critical step to design a stable and risk-free mining operation. There are number of uncertain factors which impact a slope stability analysis. In this research, the uncertainty of two key factors i.e. fault zones and rock quality designation (RQD) were quantified using two different geostatistical simulation methods to generate 3-D spatial maps of the fault zones and rock quality designation (RQD) and integrated these maps in a slope stability analysis. Ten three-dimensional realizations of the fault zones were produced with sequential indicator simulations. On each of these ten fault zone maps, ten realizations of RQD were produced with sequential Gaussian simulations. The simulated RQD maps for each fault map were averaged to produce ten mean maps and RQD was categorized for each map. Two-dimensional slices of the ten, three-dimensional RQD maps were analyzed in Rocscience Slide software to determine the average steepest, safe slope angle is 43.8° for an open pit gold mining operation. The reliability index and failure probability were calculated for different slope angles to ensure reliable slope stability analysis. Future application and recommendations for methodology improvement are included.

Biography:

Katelyn is from Portage, Michigan. In 2018, she graduated Summa Cum Laude from Michigan Tech with B.S. Geological Engineering and she is currently pursuing a M.S. Geological Engineering at Michigan Tech (Expected graduation December 2020). Her research interests include: geostatistics, remote sensing, modeling geotechnical properties. Katelyn previously interned for Michigan Department of Transportation (Summer 2015) and Eagle Mine's Continuous Improvement Intern (Summer 2017) and is she is looking forward to a geomechanical internship at Freeport McMorRan this summer 2019. Katelyn hobbies include mineral/rock collecting in the Keweenaw Peninsula, hiking, and cooking.

MBGS Monthly Membership Meeting, March 13th, 2019
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: https://maps.msu.edu/

Find us on Facebook

UPCOMING EVENTS

March 5, 2019: Michigan Office of the Great Lakes, 2019 Great Lakes Conference, Kellogg Auditorium, East Lansing, http://35.8.121.91/IWR/?page_id=2736&utm_source=govdelivery

March 5-6, 2019: NGWA Groundwater Fly-In and Water Resources Congressional Summit, Washington DC, https://www.ngwa.org/get-involved/advocacy/fly-in

March 15-17, 2019: Michigan Gem and Mineral Society Show, Jackson, Michigan

April 24, 2019: The Department of Environmental Quality (DEQ), the Department of Natural Resources (DNR), and the Michigan Department of Agriculture and Rural Development (MDARD) will come together to celebrate Earth Day at Constitution Hall in Lansing, Michigan. https://www.michigan.gov/deq/0,4561,7-135-3307_3580_66835---,00.html

May 3-5, 2019: 60th Anniversary Rock and Mineral Show "Rockrama". Kalamazoo County Expo Center. Information is available at: www.kalamazoorockclub.org

May 19-20, 2019: AAPG Annual Conference and Exhibition, San Antonio, Texas https://www.aapg.org/events/conferences/ace

June 3-5, 2019: NGWA Field Methods: Groundwater Sampling and Analysis (Short Course #226), Westerville, Ohio, https://www.ngwa.org/detail/event/2019/06/03/default-calendar/226jun19

June 10-11, 2019: AIPG Michigan Section's Environmental Risk Management Workshop at the Ralph A. MacMullen Conference Center in Roscommon, Michigan.

June 19-20, 2019: NGWA The PFAS Management, Mitigation and Remediation Conference (#5010), Westerville, Ohio, https://www.ngwa.org/detail/event/2019/06/03/default-calendar/226jun19

October 11-13, 2019: Michigan Mineralogical Society, "The Show" Greater Detroit Gem, Mineral, and Fossil Show. Information is available at: www.michmin.org.

MDEQ Calendar of Training and Workshops
http://www.michigan.gov/deq/0,4561,7-135-3308_3333---,00.html

Michigan State University, College of Natural Science, Department of Earth and Environmental Science,
Events https://ees.natsci.msu.edu/events/

Michigan Tech – Geoseminars - http://pages.mtu.edu/~raman/SilverI/Geoseminar/Welcome.html

University of Michigan Earth and Environmental Science
Events https://lsa.umich.edu/earth

Western Michigan University, Geological and Environmental Sciences
Events https://wmich.edu/geology/events

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MICHIGAN BASIN GEOLOGICAL SOCIETY PUBLICATIONS 2018

The following list details the contents of each available CD-ROM.
This list is also available on-line at http://www.mbgs.org/publications.html
Prices include postage, handling and any applicable sales tax.
Orders for publications should be prepaid in U.S. dollars and addressed to:
MBGS — Publications, P.O. Box 14044, Lansing, MI 48901-4044

HISTORICAL PUBLICATIONS DISK 1

Nine out-of-print publications – Cost - $15

- The Stratigraphy of Manitoulin Island, Ontario, Canada, June 1954
- The Devonian and Silurian Rocks of Parts of Ontario, Canada and Western New York, June 1951
- The Traverse Group of the Northern Part of the Southern Peninsula of Michigan, June 1949
- The Devonian Strata of the London-Sarnia Area, Southwestern Ontario, June 1956
- The Ordovician Rocks of the Escanaba-Stonington Area, June 1950
- The Niagara Escarpment of Peninsular Ontario, Canada, June 1955
- Lower Paleozoic and Pleistocene Stratigraphy Across Central Wisconsin, May 1960
- Geology of Central Ontario, Canada, May 1965
- Classic Silurian Reefs of the Chicago Area, June 1998

HISTORICAL PUBLICATIONS DISK 2

Four out-of-print publications – Cost - $15

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

HISTORICAL PUBLICATIONS DISK 3

Six out-of-print publications – Cost - $15

- Pleistocene and Early Paleozoic of the Eastern Part of the Northern Peninsula of Michigan, June 1948
- Stratigraphy and Structure of the Devonian Rocks in Southeastern MI and Northwestern OH, June 1952
- Lower Ordovician and Upper Cambrian of Wisconsin, May 1990
- Guidebook to the Precambrian Geology and Metallogeny of the Central Upper Peninsula of Michigan, September 1991
- Diamond Bearing Kimberlite and Related Geology in the Upper Peninsula of Michigan, April - May 1993
- Karst Geology of Northeast Lower Peninsula, Michigan, April 1995

HISTORICAL PUBLICATIONS DISK 4

Six out-of-print publications – Cost - $15

- Silurian Rocks of the Northern Peninsula of Michigan, June 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 1961
- Correlation Problems of the Cambrian and Ordovician Outcrops Areas, Northern Peninsula of Michigan, June 1967
- The Geology of Manitoulin Island, June 1968
- 1970 Field Excursions - Pleistocene, Devonian, Precambrian, May 1970

HISTORICAL PUBLICATIONS DISK 5

Five out-of-print publications – Cost - $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, September 1989
- Geology of the Lake Erie Islands and Adjacent Shores, 1971
- Glacial Geology of Southwestern Michigan, Landforms of the Lake Michigan Lobe, Southwestern Michigan, September 2001

HISTORICAL PUBLICATIONS DISK 6

Eight out-of-print publications – Cost - $15

- Guidebook for Ordovician Stratigraphy of the Cincinnati, Ohio and Richmond, Indiana Areas, June 1953
- Guidebook for Ontario Geological Excursion to Kettle Point –Owen Sound- Waubaushene, June 1946
- Guidebook for the Stratigraphy of the Silurian Rocks in Western Ohio, May - June 1963
- Guidebook for Cambrian Stratigraphy in Western Wisconsin, May 1966
- Geology of the Manitoulin Area, Special Papers #3, September - October 1978
- Middle Devonian Cratonic Carbonates and Shales in Southwestern Ontario, November 1987
- The Richfield Challenge, A Review of the Richfield Developments in Michigan, 1952
- A Theory of Rogers City and Dundee Relationships in Central Michigan, Tom Knapp Master's Thesis, 1947

HISTORICAL PUBLICATIONS DISK 7

Six out-of-print publications – Cost - $15

- Silurian Rocks of the Southern Lake Michigan Area, 1962
- Studies of the Precambrian of the Michigan Basin, 1969
- The Geology of the Marquette District: a Field Guide, May 1977
- Ordovician and Silurian Geology of the N. Peninsula of Michigan, 1980
- Special Paper #4: Ordovician and Silurian Rocks of the Michigan Basin and its Margins, 1985
- Upper Keweenawan Rift-Fill Sequence, Mid-Continent Rift System, Michigan, September 1988

HISTORICAL PUBLICATIONS DISK 8

Four out-of-print publications – Cost - $15

- Niagaran Stratigraphy: Hamilton, Ontario, 1972
- Silurian Reef-Evaporite Relationships, 1974
- Special Papers #1: Middle Devonian Stratigraphy and Depositional Environments in the Michigan Basin, 1974
- Sedimentology and Paleogeography of the Pennsylvania Strata of Grand Ledge, Michigan, May 1989
- Paleozoic Geology of the Central Upper Peninsula of Michigan, August 2014

HISTORICAL PUBLICATIONS DISK 9

Five out-of-print publications – Cost - $15

- Geology and the Environment: Man, Earth and Nature in Northwestern Lower Michigan, 1973
- Special Papers #2: The Belle River Mills Gas Field: Productive Niagaran Reefs Encased by Sabkha Deposits, Michigan Basin, 1977
- Geohydrology of Carboniferous Aquifers of the Michigan Basin, September 1994
- Sedimentology, Paleogeography and Geochemical Weathering of the Pennsylvania Strata of Grand Ledge, Michigan, September 1994
- Geological and Historical Field Trip to the Keweenaw Peninsula: A Tribute to Douglass Houghton: "Michigan's Pioneer Geologist," Field Guidebook, September 2016

A DIGITAL PUBLICATION

Northeast Lower Peninsula Geological Field Conference, 2004, T.J. Black and M.S. Wollensak, 133 pp, illus., maps, digital presentations and posters (available on CD-ROM only). Cost - $10

- Road Log and Stop Descriptions by T.J. Black, D. Baxter and M.S. Wollensak
- Methane Gas Venting at Hemlock Lake, by T.J. Black
- The Glaciated Landscape in the Grand Traverse Bay Region of Michigan and the Nature of the Greatlakean Advance of the Laurentide Ice Sheet in Michigan, USA, poster by S.C. Lindstrom
- Thunder Bay Marine Sanctuary Sink Hole Investigations, poster by T.J. Black
- Evaluation of Relationships Between Hydrogeologic Environment and Petroleum Hydrocarbon Remediation in Quaternary Glacial Sediments, presentation by Lisa M. Botcher and Arden D. Davis
- Log Curve Amplitude Slicing of the Traverse Group in the Pentwater Field, Oceana County, Michigan, by Albert S. Wylie, Jr.
- Traverse Group Stratigraphy in the Michigan Basin - A Detailed Review, by Albert S. Wylie, Jr.

SPECIAL OFFERS

- Stratigraphic Lexicon for Michigan, 2001, prepared by MBGS and published by DEQ, **Cost - $4.**

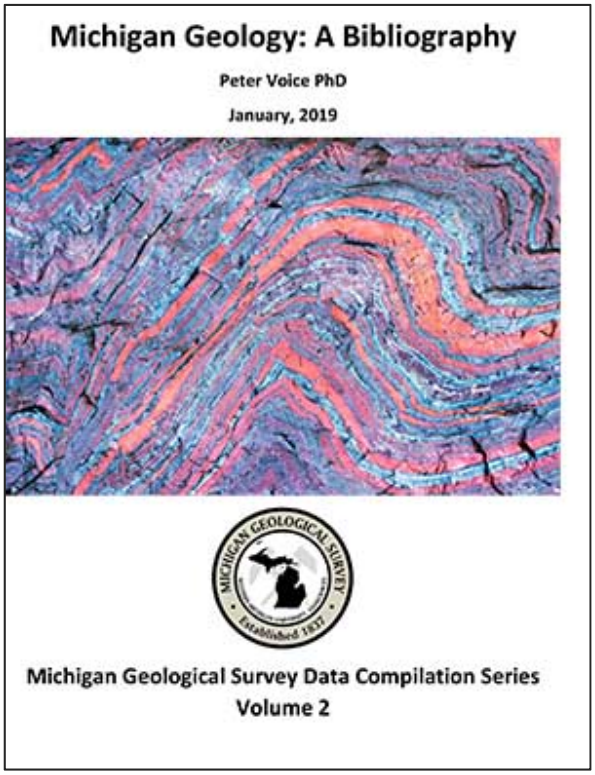
- Robert E. Mosher Geological Studies A lifetime of geological research on Silurian Rocks with John T. Sanford. The disks are organized chronologically and include field work in North America and Europe. 2007, 2 CDs **Cost - $35.**

- Historical CD Set - #1– #9 and 2004 NE LP Geological Field Conference (detailed above) for a special purchase price of **$125 (best price for all).**

INTERESTING NEWS

New Survey Publication – An Updated Bibliography of Michigan Geology

John Yellich and Peter Voice, Western Michigan University Department of Geological Sciences and Michigan Geological Survey



The Michigan Geological Survey is proud to announce a new publication: Michigan Geology: A Bibliography, the second volume in the Michigan Geological Survey Data Compilation Series. This updated compilation lists over 7,700 references from all known Michigan sources, including industry, professional associations and universities and includes publications from 1818 to present. This report documents 200 years of Geological Research in Michigan. The Bibliography is sorted into four general categories – Precambrian, Basin, Quaternary, and Other. The report is free to download at the Michigan Geological Survey's webpage: https://wmich.edu/geologysurvey/research/publications. This updated version of the bibliography also includes a short section on Michigan Stratigraphic Nomenclature, as well as brief discussion of historical trends in publication frequency in Michigan.

Job Opportunities

Storm Water Specialist, University of Michigan, Ann Arbor, MI

This posting is for an intermediate level storm water specialist that will work collaboratively as a member of the University of Michigan (U-M) Environment, Health & Safety Department's Environmental Protection and Permitting Program. The primary focus of the position will include, but not be limited to, the overall management of the University's National Pollutant Discharge Elimination System (NPDES) Stormwater Permit and other related storm water compliance issues. For consideration, applicants must have a minimum of 3 years' experience managing a MS4 NPDES permit, which includes all reporting and compliance requirements of the permit. Additional responsibilities may include: Joint Permit Applications, Threatened & Endangered Species Report evaluation, Wetland & Stream Delineation Report review, GIS, TMDL sampling, Floodplain Evaluation & permitting, sanitary sewer sampling, and other general environmental permitting & compliance.

The U-M is one of the top rated public universities in the country, and demonstrates a strong commitment to the protection of our natural resources and the environment. This open position is located in Ann Arbor, MI, which is a diverse and vibrant community that offers a wide variety of social and cultural opportunities and a high-quality of life. The U-M offers a generous benefits package, details of which can be found at: http://www.benefits.umich.edu/

For more information regarding the Stormwater Specialist position (U-M Job ID 169043), please see the University of Michigan Careers webpage located at http://umjobs.org/.

Senior Environmental Engineer / Geologist Location: Ann Arbor, MI

Geosyntec is growing and we're looking for an exceptional experienced environmental engineer or geologist for our Ann Arbor, MI office. The ideal candidate will have at least 15 years of consulting experience plus the ability to build and lead a practice in the areas of groundwater / soil remediation, industrial wastewater design, or water resources.

Collaboration and mentoring are cornerstones of Geosyntec's sell-manage-do culture. You should expect to work closely with experienced professionals who will help integrate you into Geosyntec's culture as you advance to this next stage of your career. Based on your current level of experience, you'll likely be asked to take on business and client development and project management responsibilities, along with group leadership, staff management, recruiting, and mentoring tasks. These are some of the key technical responsibilities for this position:

- Building, leading and growing a practice in one of the following areas: groundwater / soil remediation design, industrial wastewater design, or water resources;
- Identifying and developing successful client relationships and new business development opportunities with public and private clients on local, regional or national basis;
- Overseeing and managing projects and coordinating with other practices and/or offices to facilitate project delivery; and
- Managing and mentoring staff and managing subcontractors.
- **Training**: This position requires OSHA health and safety, first aid, CPR training and medical monitoring, all paid for by Geosyntec. We also offer professional development opportunities including in-house seminars, webinars, and mentoring, that allow our professionals to build the technical and business skills necessary to become successful consultants.
- **Fieldwork**: Up to 10% **Overnight travel**: Up to 25%

CANDIDATE QUALIFICATIONS:

- BS degree in environmental, civil, or chemical engineering; or chemistry. (required)
- Advanced degree in the same. (preferred)
- At least 15 years of experience in environmental consulting. (preferred)
- Professional Engineer. (required)

• Experience with pilot- and bench-scale treatability testing, technology evaluation reports, design basis reports, cost estimating, preparation of design plans and specifications, permitting, construction management, design-build. (preferred)
• In-depth knowledge of regulatory requirements (CWA, MDEQ, local pretreatment, etc.) (required)
• Experience with physical-chemical and biological treatment processes (required)
• Proven track record in business development and project management experience. (required)
• Project management certification, business development training, and leadership training. (preferred)
• Ability to succeed in a fast-paced consulting environment, handling multiple project assignments, meeting strict deadlines, and traveling to client facilities as needed. (required)
• Experience with oil & gas, aerospace, chemical, and manufacturing industries, utility (including coal-ash impoundments), Federal, State and Local Units of Government, or DOT and Potentially Responsible Parties (PRP) Groups. (preferred)
• Litigation support experience. (preferred)
• Valid driver's license and a satisfactory driving record. (required)

Michigan Department of Environmental Quality, Lansing MI

The Michigan Department of Environmental Quality (DEQ) is currently recruiting for a Geology Specialist 13 position within Oil, Gas and Minerals Division. This position is located at Constitution Hall, 525 W. Allegan, Lansing, MI. This position is permanent full-time and open to all employees.

If you are interested in being considered for this position, please apply by clicking on the posting link below. Interested applicants must apply through NEOGOV. Job Posting