We are excited that our PTTC workshop will again be held in partnership with MOGA’s 17th Annual Michigan Petroleum Conference at the Grand Traverse Resort, Acme.

Each person who registers for the PTTC workshop will be entitled to purchase a ticket to attend the MOGA strolling reception after the workshop at a $10 discount. You’ll pay only $50 each to enjoy a delicious dinner and an open bar while visiting the booths, networking, and spending more time with the cores and poster presentations.

Please see page 2 about how you can register for one or both events.

Michigan PTTC at the Michigan Geological Repository for Research and Education, Geological and Environmental Sciences Department, Michigan Geological Survey, Western Michigan University, and the Michigan Oil and Gas Association

Jointly present

Field Redevelopment Opportunities

April 18, 2019, Grand Traverse Resort, Acme Michigan

8:00-8:45—Registration and breakfast

8:45-9:00—Welcome

9:00-9:30—William B. Harrison, MGRRE Director, will provide an overview of secondary recovery in Michigan fields. Bill received his PhD from the University of Cincinnati in 1974, founded the MGRRE/Core Lab in 1982, and has authored dozens of papers on Michigan geology.

9:30-10:00—Peter Voice, Faculty Teaching Specialist and MGRRE Research Associate, will describe the lithofacies of the Richfield Member of the Lucas Formation in the Winterfield field. Waterflooding of Winterfield will be discussed in the context of the geological and structural characteristics of the field. Selected cores will be highlighted at this presentation and the core workshop. Peter received his PhD from Virginia Tech in 2010 and has worked on Michigan Basin projects for ten years.

10:00-10:30—Harry Faulkner, petrophysicist, partner, and CEO of Lambda Energy Resources, will discuss how Lambda looks at potential targets for acquisition and redevelopment. He will discuss what made the Michigan Basin a great place to “land” for his start-up, and how this process could be applied to other areas within and outside of Michigan. He will also discuss what made the Merit assets so compelling to Lambda. Harry holds a Master’s Degree in Petroleum Engineering from University of Houston, and a Bachelor’s Degree in Electrical Engineering from Purdue University. He is a registered Petroleum Engineer in the State of Texas, and he has worked both domestic and international assets since 1982.

10:30-11:15—Break, and time for visiting MOGA’s 17th Annual Petroleum Conference booths

11:15-11:45—Harold Fitch, Director of the Oil, Gas, and Minerals Division (OGMD) of the Michigan DEQ, will review the opportunities for recovering remaining reserves associated with orphaned oil and gas wells. Hal earned a BS degree in Geology from Michigan Technological University and did graduate work in Hydrology at University of Arizona. He has worked for OGMD or its predecessors for 42 years and has been the director for the past 22 years.

11:45-12:00—MGRRE’s 2019 Lifetime Achievement Award

12:00 Lunch is served and at 12:30—Our lunch speaker, Adam Wygant, Michigan Department of Environmental Quality—Oil, Gas, and Minerals Division Director, will summarize new regulatory developments and discuss his vision for the OGMD going forward. Adam graduated from Grand Valley State University, attended graduate school at Bowling Green State University, and has worked as a geologist in Michigan for 24 years.
1:15-1:45—Tim Brock, Brock Engineering, LLC, will present “Mining Old Waterflood Data from DEQ Reports – A Case History on the Beaverton South Field 1959-1972”. Tim has a BS in Geological Engineering from Michigan Technological University and has more than 35 years of experience in the oil and gas industry.

1:45-2:15—Robert Mannes, President and CEO, Core Energy, LLC, will present “A Reef is a Reef is a Reef! Or is it? Expanding the Toolbox to Better Understand What’s On the Inside.” He will discuss some innovative technologies that Core Energy has been deploying to better understand the internal architecture of a Niagaran pinnacle reef, and will provide a brief update on some recent CO2 EOR projects. Bob received his bachelor’s degree from Calvin College and has worked in the Michigan Basin since graduation.

2:15-2:45—A. Kenneth Prior, III. Operations Manager for Omimex Energy, Inc., and White River Production LLC, will discuss his Michigan experiences with pressure maintenance projects utilizing waterflooding and/or gas injection for enhanced recovery. Prior to working for Omimex Energy, Ken was a Reservoir Engineer for Unocal involved in the Beaver Creek Richfield waterflood. Ken graduated from the University of Texas with a degree in Petroleum Engineering in 1983 and has worked primarily in the Michigan Basin since that time.

2:45-2:55—Harrison Geological Field Trip Report

2:55-3:15—Stretch Break

3:15-3:45—Jac Lentz, reservoir engineer with WEC Energy Group, will discuss operations and enhanced liquids production resulting from gas storage at the Columbus 3 Niagaran reef reservoir. Bluewater Gas Storage has operated this delta pressured gas storage reservoir since 2004. Primary production totaled about 9 MMbbls liquids, 10 Bcf natural gas from a native gas cap, and another 10 Bcf of solution gas. Bluewater continues to produce liquids from this reservoir resulting from gas storage. Gas-storage-enhanced liquids production has exceeded projected primary recovery. Jac graduated from Indiana State in 1980 and has worked in the Michigan basin as an exploration and production geologist and a reservoir engineer since 1982.

3:45-4:15—Jon Garrett, Geologist with Consumers Energy, and Matthew Rine, PhD candidate at Western Michigan University, will present their ongoing work related to integrating large subsurface databases (e.g., geological, petrophysical, geophysical, and production data) in order to more effectively evaluate relationships between various data types and formats. Improved accessibility of extensive subsurface data allows for efficient and scalable visualization and analyses. Domain knowledge and expertise can then be used for making decisions to enhance existing assets and identification of new assets. The presentation will include examples comparing a variety of subsurface data for evaluation of redevelopment strategies pertaining to both gas storage and enhanced oil recovery reservoirs. Jon received his MS in geology from WMU in 2016; Matt received his MS from WMU in 2015 and will complete his PhD this year; both with a focus on Niagara-lower Salina reef complexes in Michigan.

4:15-5:30—Poster presentations and Core Examination:

- Cameron Manche, PhD candidate at Western Michigan University, “The Influence of Dolomite Crystal Textures on Reservoir Quality: Examples from the Richfield Member, Michigan Basin, U.S.A.”
- Ayu Nurhidayati, MS student at Western Michigan University, “Reservoir Characteristics from Core in the Amherstburg-Lucas Formations in the Winterfield field, Clare County, MI.”
- Matthew Rine, PhD candidate, WMU and Jon Garrett, Geologist with Consumers Energy, “Development of Static Reservoir Models for Niagara Reefs, Michigan Basin, USA.”

Location: Grand Traverse Resort, Acme Michigan. To reserve an overnight room, please call 800 236-1577.

Registration fees: Workshop Only: Early bird rate: $205, ends March 31; on or after April 1: $245. Workshop and MOGA strolling Reception: Early bird rate: $255, ends March 31; on or after April 1: $295.

To Register for One or Both Events, click on the button below and use a Visa, MasterCard or Discover Card. We’ll confirm your registration by email.

Or, you can fill out the registration form on the next page and FAX or mail it to us.

If you want a PDH continuing education certificate (5.5 hours), please type “PDH” the “Special Needs” space on the registration form.

Questions? Call Linda Harrison at (269) 387-8642 or Jenny Trout at (269) 387-8633.
Register Form

COMPANY__________________________ Contact person if not a registrant: ________________________

Phone number ______________________ Email address____________________________

STREET OR MAILING ADDRESS_____________________________________________________

CITY________________________ STATE______________ ZIP_____________________

<table>
<thead>
<tr>
<th>Name</th>
<th>Email address</th>
<th>Person to Register</th>
<th>To attend PTTC workshop ONLY ($205 if paid by March 31 or $245 if paid after that*)</th>
<th>To attend PTTC workshop PLUS MOGA strolling reception ($255 if paid by March 31 or $295 if paid after that*)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total payment for each column to the right</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total payment for all registrants $_____________________

*If you are a full-time student, please call Linda at (269) 387-8642 for information about a discounted fee.

**How are you paying?** (Please check one payment type)

_____ By Credit card FAX to (269) 387-5513 or by mail

_____ Visa  _____ MasterCard  _____ Discover card (we can accept only these types of cards)

Card No.__________________________ Exp. Date _______ Security Code _______

Name of Cardholder:_________________________________________________________

Signature of Cardholder:_____________________________________________________

Address the credit card bill is mailed to if it’s DIFFERENT than your address above:

_________________________________________________________________________

Your credit card will show the charge was made by Western Michigan University.

_____ By check—Please make it payable to “WMU Geosciences” and mail it to:

Workshop--Harrison
Geological and Environmental Sciences Dept.
Western Michigan University
1903 W. Michigan Avenue
Kalamazoo, MI 49008-5241

Do you want a PDH certificate for continuing education credits? _____yes _____no

**Registration Refunds:** Registration fees for the PTTC workshop are refunded in full if cancellation is received in writing no later than March 31 and if we are able to fill your spot with another registrant. No refund can be made for tickets to the MOGA strolling reception.