COLORADO SCHOOL OF MINES
EARTH • ENERGY • ENVIRONMENT
PETROLEUM ENGINEERING
NEWSLETTER
Vol. 21, NO. 1 September 2017

GREETINGS FROM DR. ERDAL OZKAN

F.H. "MICK" MERELLI/CIMAREX ENERGY DISTINGUISHED DEPARTMENT HEAD CHAIR

Another year has passed and not much has changed; we only appear to be more accustomed to the negative conditions and bleak outlooks of the industry. We are struggling with the financial implications of the industry downturn while also trying to improve the employment prospects of our students, modernize our curriculum, advance our research infrastructure and provide resources to our faculty to improve their teaching and scholarship.

Dr. Ozkan presenting the Outstanding Graduating Senior Award to Krista Hickey for spring 2017.

As I reported last year, our enrollment statistics are showing a considerable decline. In 2014, we had 151 freshmen who declared PE as their major (although they are not required to declare a major until their second semester of sophomore year). In 2015, we had a slight decrease of 14% to 129 freshmen, but the significant drop in the freshmen declarations of PE as their major came in 2016 and continued into this year. We only had 64 freshmen in 2016 (50% drop compared with 2015) and this year we have just 28 freshmen (a drop of 56% from 2016 and 81% from 2014). On the other hand, we still had the second largest graduating class at Mines in spring 2017 (slightly behind mechanical engineering) with 166 BS graduates, five ME, five MSc and two PhD. While enrollment is dropping, we are pleased at the continued high graduation rates.

The Externship Program we piloted for our students in Summer 2016 was a great success and we received excellent feedback from both the students and the companies interested in hiring them. This summer we will repeat the five-week program with three externship topics: Fracture Design, Petroleum Data Analytics and Reserve Estimations and Production Data Analysis. These externships will provide the participants the opportunity to work in teams, design projects, receive training on processing and analyzing data and learned new software. Most importantly, our externs will have the opportunity to interact with industry experts, who graciously contribute to the success of the program, make presentations of their projects to professionals and receive feedback. Currently, we have 41 students enrolled in the program and are confident that they will be just as successful as last year.

In addition to the Externship, we also continued the short-course series for our students. In fall 2016 and spring 2017, we offered 9 short courses to 163 students on a variety of topics of interest to the industry. The short courses are a way for students to learn very specific topics over a short period of time and not have to commit to a semester-long course.

This year we have also implemented some features of our curriculum revision project including combining the PVT lab and fluid properties courses into a single course, and reducing the Field Session 1 from two weeks to one week. We are also making some content changes in our courses to modernize the information we provide to our students. Our new minor programs in midstream engineering and petroleum data analytics have been approved and we will start offering new elective courses to support these programs. Mines has also approved the new computer science minor, which together with the existing geology and energy economics minors, will provide more alternatives for our students to diversify their skill sets.

Our Visiting Committee was here last November and as expected, the committee did not report any concerns. However, it was a good opportunity for us to collect

DR. OZKAN CONTINUED

the data and reflect on our strengths and weaknesses. Next year, we will have our industry advisory board meeting in which we are looking forward to sharing our new initiatives and plans for the department, as well as receiving the comments and suggestions of the board members.

Regrettably, the low-oil-price environment has not helped our plans to boost our research enterprise. Despite that, we kept all our consortia running, continued our major research projects, and added some new projects. We also invested over a million dollars in our research infrastructure. We have enhanced experimental research capabilities in reservoir characterization, PVT analysis, core flooding, fracturing and stimulation, formation damage, and flow in unconventional reservoirs. Over the last year, we have also added new capabilities to our experimental drilling research and started our new teaching and research infrastructure in fluid flow in pipes.

In early March, we visited Capitol Hill in Washington D.C. with a delegation representing the US petroleum engineering departments (representatives from 11 departments were included in the delegation). We conveyed our message to the members of Congress, as well as the Senate and House Energy Appropriations Sub-Committees, that the decline in federal funds for fundamental research in academia would have detrimental consequences on the future of the energy security of the nation. We have been continuing our efforts to direct the $22 million left from the 2017 budget and allocate another $30 million in 2018 for fundamental research in oil and gas. We are also closely watching the changes in DOE and the policies of the new administration to find out how we can align our efforts and work together.

I will keep my article shorter this year to cut the printing cost; no, it isn't that bad, but we appreciate your generous support of the department more than ever these days!

Thanks for your continuing support and please stay in touch.

Best,

Erdal Ozkan

PETROLEUM ENGINEERING

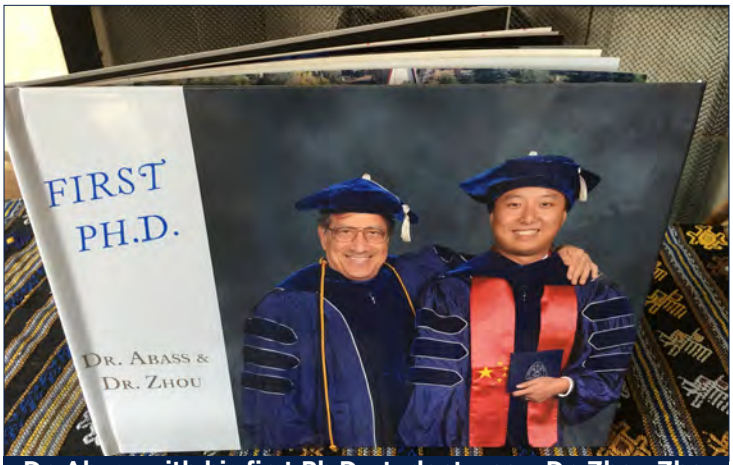
RAMONA M. GRAVES — DEAN OF THE COLLEGE OF EARTH RESOURCE SCIENCES & ENGINEERING (CERSE)

I just returned from Aberdeen, Scotland where I was attending my first SPE Board of Directors meeting. I've been elected and approved as the incoming Director for Academia and will officially begin the three-year commitment at ATCE in San Antonio in October. Mines is well represented on the 29 member board. Alumna Jennifer Miskimins, PE faculty, is the Technical Director for Completions, alumna Erin McEvers, Clearbrook Consulting, is the Regional Director for the Rocky Mountain North America Region and alumnus Chris Jenkins, Independent Energy Standards, is the Regional Director for the Mid-Continent North America Region. Mines faculty continue to be leaders in our professional organizations and in petroleum engineering education. Erdal Ozkan is currently the Chair of the US Petroleum Engineering Department Heads Committee. He is leading this group in discussions about relevant petroleum engineering curriculum, university research opportunities and recently led a delegation of department heads to Washington D.C. to meet with senate and congressional leaders to discuss issues relating to petroleum engineering education.

Erin, Jennifer, and Ramona at Dunnottar Castle in Stonehaven, Scotland. In 1297, this castle was captured by William Wallace (aka Mel Gibson).

Professionally, it has been an amazing few months for me. On May 17, I was awarded the 2017 SPE Rocky Mountain North America Region Distinguished Achievement Award for Petroleum Engineering Faculty. At the SPE Board meeting in Aberdeen, I was informed that I will be receiving the international 2017 Distinguished Achievement Award for Petroleum Engineering Faculty at ATCE in San Antonio. This award was first presented by SPE in 1981. Although there have been many, many Mines PE faculty that are deserving of this award, I am the first Mines faculty member to receive this professional acknowledgement. I am humbled by the support and recognition of my colleagues and Mines alumni. My heart is full! Thank you all.

HAZIM ABASS



Dr. Abass with his first Ph.D. student - now Dr. Zhou Zhou.

Michael, the American nickname for Dr. Zhou Zhou, sent this summer a memorable present to his previous advisor. The supervision session constitutes more than just another blocked-out hour in an advisor's busy schedule. In fact, it could engender a warm relationship that stays with the student and his advisor all their lives. A graduate advisor plays an important role in the academic and social lives of students. In my perspective, being a Ph.D. advisor is almost like parenting: one has to be tough and clear while being caring and generous. A great advisor is someone who maximizes and cultivates the potential of his graduate students and everything comes down to an implementation method to accomplish these goals.

Michael was my first Ph.D. student. He started in August 2014 when I joined Mines as a professor and Research Director of the FAST consortium. It was pleasant, to say the very least, having Michael as my first Ph.D. student. He graduated in December 2015 and he is now a faculty member teaching Petroleum Engineering at a respected university in China. I cannot, however, take all the credit. I attribute my delightful experience to Michael, a well-rounded and curious individual with an unquenchable thirst for learning. I was truly inspired by his dedication and willingness to take a simple suggestion and then build a very sophisticated model and make it an important chapter in his thesis. He often came with innovative ideas that deserve patent applications.

Michael kept in touch as a very loyal son and friend. I was touched to see in the mail a large book with significant and memorable pictures which tells a wonderful story of a student-advisor relationship and his education at the best engineering school in the universe — Colorado School of Mines.

An exceptional advisor will help their students grow professionally and socially by embracing the pursuit of knowledge as a journey rather than a destination. I must admit that interaction with students also improves the advisor's invention and wisdom.

Dr. Zhou's parents came from China to join his wife, son and advisor in celebrating his graduation.

LINDA BATTALORA

This academic year was full of exciting activities! I taught PEGN681 PE Seminar, PEGN312 Properties of Reservoir Fluids, PEGN439 Multidisciplinary Petroleum Design, and led 40 students on the PEGN315 Field Session I in Southern California. I advised over 200 UG students, served on Faculty Senate, Undergraduate (UG) Council, Teaching Faculty Promotion Committee, PE Undergraduate Curriculum Committee and as a mentor for the 2017 Trefny Summer Course Revision Intensive. I also advised two UG Research Fellowship students, Christina Suarez and Faris Izzat bin Rosli, on research topics related to climate change, the role of the Citizen Engineer in oil and gas project development, and ethics.

During the summer, I taught Health, Safety, Security, Environment and Social Responsibility (HSSE-SR) and Sustainability during the Hydraulic Fracturing Externship, TOPCORP training course for oil and gas regulators, and Petroleum SUPERSCHOOL. With colleagues from Mines' Engineering Design and Society Division, I attended a workshop at Worcester Polytechnic Institute on Project-Based Learning (PBL) and look forward to incorporating PBL in my courses. I also had the unique opportunity to attend the Society of Petroleum Engineers (SPE) France Section conference on Climate Change and spend time with my colleagues from Bonna-Auzas Avocats in Paris. The rest of my summer was

BATTALORA CONTINUED

Linda in Paris.

spent summer hiking, reading, studying art history, preparing for my fall 2017 classes, researching, and writing.

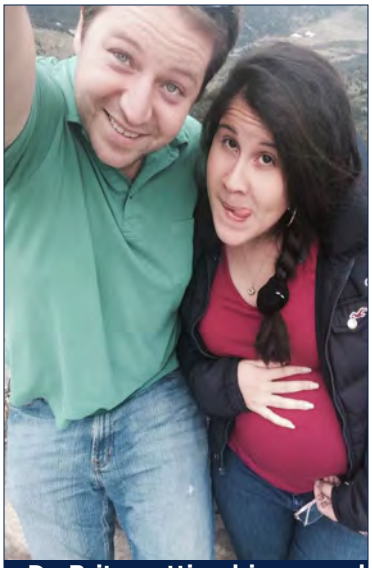
The past year was an eventful year with SPE as I served in a variety of capacities: Vice Chair of the Sustainable Development Technical Section, member of the HSSE-SR Advisory Committee and HSE Now Advisory Committee. I attended SPE 2016 ATCE in Dubai and served as Chair of the Social Responsibility Subcommittee for the 2017 HSSE-SR North America Conference, in New Orleans, Louisiana. I was an invited speaker on the topics of Stakeholder Engagement and Citizen Engineer at the February 2017 Engineering Solutions for Sustainability: Materials and Resources 3, Toward a Circular Economy Symposium. Not only are these volunteer activities enjoyable, but they also connect my classrooms to real life as industry and regulatory agency colleagues are invited to participate in classroom discussions, research, and activities with my students.

I continue to serve on the Education Advisory Board (EAB) of the Association of International Petroleum Negotiators (AIPN). One of my favorite responsibilities is to judge the annual Writing Competition which is open to all universities that have an affiliation with AIPN. I am also enjoying my service with the Colorado Bar Association Environmental Law Section Advisory Council, volunteer service at Saint Joseph Hospital, and membership with Denver Council on Foreign Affairs.

I continue to take ballet, yoga, and cardio classes, and enjoy outdoor activities with the Colorado Mountain Club. Sadly, my beloved Boston Terrier "Rosebud" crossed the Rainbow Bridge suddenly and unexpectedly in May. She was 8 years and 4 months old. The cause is unknown but presumed to be arrhythmia/heart attack.

Thank you for your continuing support of the PE Department and Mines! I look forward to seeing many of you at 2017 ATCE in San Antonio, Texas and 2018 International HSSE Conference in Abu Dhabi. Of course, we always enjoy seeing you on campus for alumni events and recruitment!

ROSMER BRITO



Dr. Brito getting bigger and bigger in 2016.

This academic year brought so many changes in my life. I was not just starting a new position as an Assistant Professor here at Mines-I discovered my husband and I were expecting a baby. Our daughter Sarah Rosamia Smith was born healthy in early December, 2016. I would like to say thank you to Carrie McClelland and Linda Battalora for helping me with my class in the last weeks when I was not able to be there.

Early this year, I came back full of energy (I'm joking-I was sleep depraved when I came back in January) to teach PEGN 411 for the first time. The experience was great; this was my first time teaching a large group of students. I really appreciated the participation and collaboration of all my students. During the semester, I took a weekend to teach the 411 students how to use Pipesim to carry out Nodal Analysis, troubleshoot the well performance, and propose possible optimizations. Thanks to my TAs Daniel Croce and Ayowole Ogunleye for helping the students with their homework and projects at the computer lab.

Early this summer we were able to start flowing our first large scale experimental facility to study three-phase liquid loading in horizontal wells. I would like to thank Scott Graham from The University of Tulsa, Eric Graham from Additive Systems Inc. and Brian Cernich from Applied Control for intensely working with us to make sure the facility was fully operational. We got our first $50K donation from Kalnin Ventures to start our first Mines

The Large Scale Three-phase Liquid Loading Experimental Facility is finally fully operational-It's alive!

Production Lab. We are going to use this funds to build a small scale horizontal well with a plunger lift system.

We are still looking for more donors to keep building more lab units. Our goal is to have a production lab with several compact lab units in order to provide a practical experience to our students. This will help students to have a better understanding of the operation and application of different downhole and surface equipment, learn to recognize and troubleshoot typical operational problems and propose possible solutions. Our goal is to get $350K more.

Little Sarah Rosamia.

We also received a $2K donation from Scott Wilson to keep working on the experimental evaluation of the GALLOP system. This is a novel artificial lift system designed by Scott Wilson to deliquify gas wells with complex well trajectories. We thank Scott for his constant collaboration with Mines; we really enjoy working with him. Furthermore, I am happy to announce that I got my first private funded project with Chevron. We will be working closely with them to carry out an experimental study to develop and test a new artificial lift system to optimize the liquid removal in gas wells.

Finally, this fall semester we will have a new course in Surface Facility Design and Operation for both undergrad and grad students. The course will cover basic operation, design, and evaluation of new technologies related to individual equipment. I look forward to the next semester; there are so many challenges ahead but I am excited about facing them.

ELIO DEAN

Side perk of attending ATCE in Dubai is flying home through Portugal. My wife and I hiking to the beautiful beaches of Lagos.

Being part of the faculty at Colorado School of Mines is an excellent place to learn and stay up to date with the industry. It is amazing just how helpful our alumni are; from assisting in classes, to proposing research ideas based on the current industry challenges. I figure the best use of my newsletter section is to share (1) what the industry is requesting from the university and (2) what we are doing to meet those requests.

The following bullets show the what the industry is requesting from us and our students:

1. Data Analytics
2. Students who can think and solve open ended problems (aka engineers)
3. Introduction of software to our students
4. Practical and economic enhanced oil recovery

My efforts to fulfil these requests:

1. Data analytics is one of the very hot topics for us these past two years. We have set up and been approved by the University to provide a Petroleum Data Analytics minor for our students. This summer Dr. Brito and I are leading a Production Data Analytics externship where we will be applying statistical analysis to many different types of applications. Industry friends (Jim Crompton, IHS, PetroDE, Blue River Analytics, Signal Hill, SAS, and others) are greatly helping us during this summer project.
2. How does one teach a student to think when there is so much data readily available on the IoT? My best answer: Give them real world problems, and real world data. In our senior design class (PEGN 439) we did just that, and changed things up a lot. We gave a rather simple problem (make a bid on a lease), and let them do all the thinking. It is amazing how bright some of these students are in their ability to tackle open ended problems, dig back into past classes, and come out with well thought out answers. Noble and Anadarko assisted us in that class and we are very thankful.
3. Introducing software to students is always a tricky job, because our students need to understand why they are pushing the buttons. Software that I've introduced to our students this last year include: CMG

DEAN CONTINUED

IMEX/WINPROP/CMOST, Value Navigator, Drilling Info, Spot Fire, and Kappa Saphir. Either myself or representatives from those companies provided training courses for our students.

4. Enhance oil recovery is my favorite oil topic, because it is reservoir engineering at its finest. I have been fortunate to be able to work with Surtek on a few international chemical EOR projects. We have been working with IRT, trying to set up a joint industry project that evaluates ethane for miscible gas injection. I presented at the University of Oslo CO2 EOR in regards to CCUS. With King Fahd University, we presented to Saudi Aramco at the EXPEC ARC Quest Event regarding CO2 monitoring. I am also on the committee of three M.Sc. students who are studying EOR. This is an exciting time for enhanced oil recovery.

Cheers — Elio

MANSUR ERMILA

Mansur with his son at Abdullah's graduation.

This year has been a special one for me and my family. While the youngest of my children, Abdullah, entered college at age 16 this past fall due to his very high academic achievements, my oldest graduated this past May with a bachelorettes degree in her most passionate subjects: English Literature and Sociology. I am a proud father who is watching his kids grow up to accomplish their dreams and strive for more and more education.

I was their age and an undergrad student at Tripoli University in the late 80s when I first heard some of my professors speaking of the legendary Colorado School of Mines. Unfortunately, I was not able to come to the US at that time so I headed to Hungry instead and received my Master's Degree in petroleum engineering. After finishing up my Masters' degree I moved back to Libya and worked in the petroleum fields for a while. I gained a lot of experience and got to practice all the knowledge I learned in school. After working in the fields for a few years I moved on to being a lecturer at Tripoli University.

Years went by and I was slowly beginning to let go of my Mines dream. Until I was informed I had been selected to do my PhD abroad. I took this opportunity to go after my dream once again and see where destiny led me. I applied to a few colleges around the world including Mines and I had little hope of being accepted. The day I received my acceptance letter was a remarkable day in my life. I was finally able to make my dream come true. I moved here in late 2006 with my family. Shortly after I have received my PhD, I started working as a research assistant. In January 2015 I got hired as a teaching associate professor at the PE department.

With his daughter at her graduation.

I used to get afraid every time I was told I will be teaching new classes or working on things I'm not familiar with, but with time I have become more comfortable tackling new subjects and materials; I have the pleasure to learn something new each day. My colleagues are such motivating and hardworking people and I truly do not know where I would be if I didn't have their support and great advice along this journey. Studying and working at Mines has made my dreams and the dreams of my family come true and I will forever be grateful for this life-changing opportunity.

ALFRED W. EUSTES

This is the start of my twenty-second year at Mines as a faculty member, twenty-eighth if you consider I started as a graduate student back in August 1990. When I left Louisiana Tech in 1978, that was the last academic institution I ever wanted to see. Now, when I consider my career in academia including elementary onwards, I have been in school for 46 years. Who knew?

Bill, Susan, and William in a Canadian rain forest.

There are a lot of wonderful things happening around here. Two years ago, the Apache Corporation gifted our department a generous grant. The focus was to be on drilling education. In cooperation with the others in the department, I have focused our efforts on two areas: drilling performance and automation and improving the success ratio of lost circulation methods. For both, we have invested in students and equipment.

For the drilling performance and automation, we bought a small-scale drilling/coring rig. You may recall the old blue LM100 water well rig we had? Well, after twenty years of student (and faculty) abuse, it was one gear tooth away from catastrophic failure. We bought a Sandvik DE130 Diamond Core Drill, named the "Apache Drill". It has a feed force of 10,350 lbf down and 13,820 lbf up, can rotate up to 1,600 rpm with 137 ft-lbf, and can drill vertically downwards to 2,674 feet with "N" pipe (2.75" OD). We can run a 2.965" core bit and collect a 1.875" core. It is a great drilling machine of the right size to be student handled. This summer, we are working with two undergraduate and two graduate students to instrument the rig for us to measure, record, and apply data analysis methods to the various drilling operational parameters we get. We have plans to eventually use the rig to develop automation algorithms to improve drilling performance.

The Apache Drilling Laboratory in Marquez Hall is now in business. We have Jorge's work in there (described elsewhere) and some new laboratory equipment for analyzing lost circulation material performance. Along with laboratory safety improvements, these include a computerized Ofite viscositymeter, a new mechanical sieving system, and a new Clemex microscope with computer control for automated particle size and shape distribution. And we now have a Fann Automated Permeability Plugging Apparatus with LCM receiver. It is our plan to create a lost circulation laboratory to investigate and develop lost circulation methods to improve the success ratio of remediation. We are already working with Apache on this goal.

Unfortunately, I am running out of room to continue discussing these, and the many other things going on here within the department. A quick recap: We have had our NSF AirWaterGas project and the two NREL geothermal projects wind down this last year. We have papers out on all of those. We have an ABET review coming up next year. And we have a new Petroleum Data Analytics minor to start up this fall.

My family is doing well with my daughter at the University of Utah working on her doctorate in microbiology. My son is in a gap year in college working as a teller. The stories he has on customer relations (or not as the case may be) are amazing. I suggested he write them up, as "Tales from the Teller". Treat your teller well; they control your money. My wife is still with IHS Markit. And I am doing fine, including health wise. May all your operations be safe and economical. And call on us to help you out with your problems.

WILLIAM FLECKENSTEIN

Continued low oil prices are becoming the new norm, and life goes on. I taught graduate classes in Workover Design and Operations and also Integrated Exploration and Development with Professor Lesli Wood (Geology) and Professor Bob Benson (Geophysics). I was also honored to be named an SPE Distinguished Lecturer. My talk, "Shale Development – Does Cheap Energy Really Mean Flaming Tap Water?" addresses one of the fundamental concerns of shale development – how well are aquifers being protected in well construction? I will be traveling to Western Canada and Argentina to give a series of lectures in areas of international shale development. I have given this talk to a variety of audiences and regulatory bodies, and will continue to give lectures to interested parties this year.

This work on aquifer contamination has broad public policy implications, and I was glad to participate in the inaugural AGU sponsored GeoPolicy Connect in Fort Collins, Colorado, which brought people together from diverse backgrounds to find new solutions to make decisions around hydraulic fracturing. A variety of national figures and politicians were in attendance and it was a very frank discussion of the issues and possible policy responses.

FLECKENSTEIN CONTINUED

Technology development and entrepreneurship are important trends in engineering education. I have continued to commercialize technology that I developed at Mines. There are three technologies that are in various stages of commercialization. One technology called the Annular Cement Seal Test (ACST) is undergoing prototype testing, and should be available for field trials shortly thereafter. Many thanks to those Miners that helped me with their frank criticisms and suggestions for improvement. This technology inexpensively and quickly verifies a cement seal at the bottom of casing, with the most immediate application for use on surface casing to verify the protection of an aquifer. Now it is a question of market demand and competition.

I am working on the other two technologies with the Mines Mechanical Engineering Senior Design project to complete the prototyping process. If successful, it may result in additional startups and attract interest in Mines for technology development. One patented technology, FracOptimal2, refined and simplified the technology from an earlier startup (which made money!), using technology advances in "disappearing" frac balls. This technology is designed to overcome the current frac sleeve limitation of the number of possible independent frac stages inherent in current technology and facilitate longer lateral completions. The second patent pending technology allows hydraulic rotation of large tubulars for downhole tractor applications. The students working on these projects gain invaluable experience in design to meet a market demand, and learn the physical boundary conditions and financial constraints involved in technology development needed to supply a product to address that market demand. Technology in all areas of shale development seems to be moving forward at a breakneck pace, and I'm glad to be a part of it.

Dr. Fleckenstein at a field tour of a drill rig in the urban landscape hosted by Ursa Operating as part of the Energy & Environment Symposium, in Rifle, Colorado.

I hope everyone has had a wonderful year and I look forward to seeing many of you at the SPE ATCE in San Antonio this fall.

HOSSEIN KAZEMI — CHESEBRO' DISTINGUISHED CHAIR

Bonnie Kazemi at ATCE in Dubai with a falcon.

It seems like a month ago when I wrote my article for last year's newsletter—time flies! Nevertheless, here is my 2016-2017 article.

The summer of 2016 was great because I enjoyed a slower pace of life, the great Colorado beauty, the neighborhood flowers, and a more relaxed academic workload. To say goodbye to the summer and to get me back into the Mines spirit, I started the fall semester with the M-climb on August 19. On September 9, Professor Ozkan and I visited the Edgar Mine in Idaho Springs to see Professor Eustes' mini-drilling rig.

In late September, I travelled to Dubai for the SPE Annual Meeting and to participate in a meeting with the faculty of King Fahad University of Petroleum and Mineral to promote collaboration between our universities. In the meantime, my wife Bonnie was enjoying the local culture as indicated in the photo with a falcon.

Just before the Thanksgiving holiday, a Chinese delegation, as Professor Yu-Shu Wu's guest, visited our department. They were interested in visiting an unconventional oil production field in Colorado. We arranged a field trip to a Niobrara drilling and production site for the visitors. It was exciting to see the Niobrara technology at its best. This was a reminder of the never-ending engineering innovations in the US oil industry to produce oil from seemingly impossible places—thus, minimizing the concern about the peak oil, or the issues raised by

Matthew Simmons in *Twilight in the Desert*. Nonetheless, 2016-2017 was a difficult academic year because of the oil price collapse and the resultant restructuring of the oil industry, which, in turn, affected job offers and university research funding.

On the bright side, with help from Ken Benching of Surtek and our own Somayeh Karimi and Joe Chen, we installed a new state of the art PVT cell as a major instrument for future EOR research in the department. We also installed a GC instrument for composition analysis. Furthermore, to enhance our experimental research status in academia, we recruited Dr. Hung-Lung Chen (Marathon Oil) and Dr. Malcolm Pitts (Surtek) to join us as research professors.

As my main academic activity, I taught five graduate courses, two of which involved co-teaching with Professor Rick Sarg (Carbone Geology) and Professor Wu (Reservoir Simulation II: Advanced Reservoir Simulation). The Carbonate Geology course is a great interdisciplinary course that brings together geologists, geophysicists and petroleum engineers. I loved the interaction between the students in the course and its field trip. Finally, I supervised fourteen graduate students during the year and served on several thesis committees in four departments. I accepted an invitation to teach a course on Fractured Reservoirs and Enhanced Oil Recovery in Hanoi in May 2017. I will present an invited paper in the International Congress YPFB Oil & Gas 2017 in late July 2017 in Bolivia on Improved Gas Recovery in Naturally Fractured Reservoirs with Strong Water-Drive.

Niobrara Drilling and Production, located north of Fort Morgan.

MARK MILLER

The frisbee exercise always raises interesting questions.

The computational methods class is being revised to have a data analytics component! In addition to learning VBA, students next semester will be exposed to Python. It is a high level language that is commonly used in data analytics and website programming. Because there are a ton of libraries written to supplement the base language, students will be able to integrate these codes and hopefully reach farther than if they tried to code everything themselves.

During the spring semester, the multidisciplinary class underwent another revision. Rather than have four different sections working on completely different projects, this year all of the sections worked on a Paradox basin project. Anadarko and Noble mentors provided guidance to the students. Geology and geophysics teammates used Schlumberger's Petrel to do seismic interpretation; their models were then imported into CMG for simulation. The class was a success at showing the challenges of multidisciplinary teamwork and the need for good and timely communication.

Helping with the second and third field session groups definitely rounded out the year. While I have seen evidence of wild fires while walking in the fields surrounding the Massadona camp and in one of the cabins, I had not experienced one there. Last year there was a lot of flowers and lush vegetation. This turned into fuel for an 18,000 acre fire which reached within eight miles of camp. Because some of our students were stranded outside of the quarantine area and due to 70 MPH wind gusts, we evacuated to Craig. Students got to skip the Skull Creek Mapping exercise and got to spend two nights in a hotel rather than at luxurious Massadona. Next year students will not have to wonder what is happening to the point bar behind the brush; there is no brush. It was definitely a change to the typical routine.

I also brought a small telescope to camp. A few students and I got to see the moons of Jupiter, rings of Saturn, and Moon craters. Venus was extremely bright, but only if you were up at 4:30 (not many students at that time). Massadona truly has great night sky viewing.

The loss of a student, Francis Manu, cut short the third group's Massadona experience. His outgoing nature meant that even if you were sitting under a rock in the back of class, you likely knew who he was. It was a terrible accident. (see article on pg 29)

JENNIFER MISKIMINS

Miskimins & fellow board members Chris Jenkins, Jeff Moss (Drilling Technical Director), and Erin McEvers with the Thai Royal Historical Architect.

Hello everyone! I'm writing this as I sit and watch all of the field camp students doing their Skull Creek mapping exercise homework. I'm sure that statement just gave a few of you some heart palpitations! This has been an interesting and busy year getting settled back into the swing of things in the department, but I feel like I'm finally there. It's amazing to see how much changed when I was gone, but also how many things stayed the same.

The year has been a full one. In November, I took the FAST (Fracturing, Acidizing, Stimulation Technology) Consortium back over as the fulltime Director. We now have around eleven students active in the consortium working on various projects. Membership in the consortium has dropped a little bit over the past couple of years, but I'm happy to say that we have some companies coming back onboard, and the consortium is starting to grow again.

I'm also keeping busy with the teaching side of things of course, which is one of my "responsibilities" that I enjoy the most. Class sizes continue to remain fairly high, so that's always a challenge, but one I look forward to. Some of you probably know that I'm also currently serving as the Associate Department Head – a task that tends to keep me fairly busy. I can't say that the administration side of things is very fun for me, but I feel like it's a service that I can do for the department and make a difference in doing so. Usually when I walk into Erdal's office, it's for a positive or negative reason, so he and I have adopted a "red light/green light" approach, and I'm only allowed to bring him so many red lights in one day!!

I continue to be very involved in SPE, with it being my second year on the SPE International Board of Directors as the first-ever Completions Technical Director. In fact, I'm happy to report that your alma mater is currently very represented on the Board with Erin McEvers (BS PE '01) and Chris Jenkins (BS PE '01), also on the Board serving as the Rocky Mountain and Mid-Continent Regional Directors, respectively, and Ramona coming on in October as the Director for Academia.

From a personal standpoint, I've been building a house this past year, which basically means that I have no personal life (for those of you who have ever untaken such, you'll know what I mean!).

As always, if you're ever around campus, stop by and say "hi". And definitely come see us at the alumni reception at ATCE in San Antonio if you can!

JORGE SAMPAIO

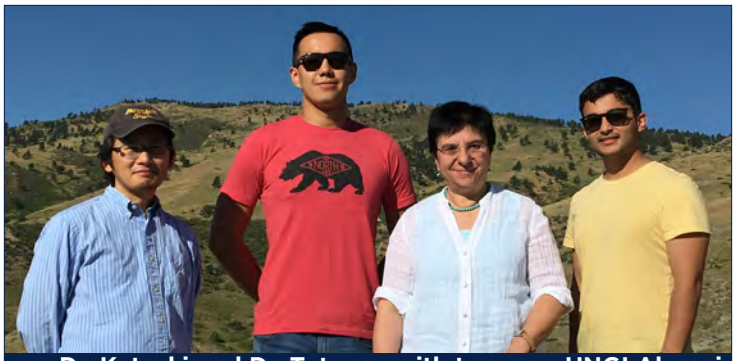
Some changes occurred in the 2016-2017 academic year with respect to drilling and completion. Although a simple change of names for the PEGN311 (Drilling) and PEGN361 (Completion) should not mean much, in fact it has an important effect. The change of the names to Drilling and Completion 1 and 2 (respectively to PEGN311 and PEGN316) facilitates our Junior students obtaining and maturing their understanding of the well construction process. Instead of presenting the various subjects in additive sequence during the junior semesters (fall and spring) in a "crescendo", we are now covering the subjects with different "levels". This means that at the end of the fall semester (Drilling and Completion 1) the students will have gained the general understanding of the processes, systems, problems (and some solutions); they will obtain the global vision of how a well is constructed, from spud-in to the abandonment. Very limited (but necessary) effort is spent in the process of design, the purpose being the understanding of how things work and relate to each other.

In the spring (Drilling and Completion 2) an in-depth effort and view of the design process is presented for those subjects introduced in the fall. The advantage of this approach is two-fold: (1) the student concludes the fall with the global view of what well construction is about, without the hassle and pain of going deep in each and every subject without quite knowing what that means for the next and all subjects. For example, why spend time in complex pore pressure calculation if it is not clearly understood the "need" for casing design, well stability (what is that?) and the like; or "what are all those hydraulic calculations about?". And (2) after the various subjects have been presented in the fall, and by re-visiting them during the spring, the students

refresh their knowledge (all we know that the second time we see something we have a better understanding) and then the details of the subject, particularly its design, is taught and exercised. For example, in the fall students learn how to use the curves or pore pressure and formation fracture pressure and in the spring they learn how to obtain the curves; they learn what sand control is in the fall and how to design a gravel packer in the spring; and many other things. This is still an on-going process, with the purpose to reach a better balance between breadth and depth.

Interestingly, also in the academic year were: the arrival of the new drill-rig for both hands-on experience and research (more details in Dr. Eustes' article), and the introduction of video resources for the Drilling Fluid lab (a series of videos and quizzes for the various activities and tests in the drilling fluid lab in which the students must "master" before they step in the lab for the various experiments) with the new and complete manual. The class notes have been upgraded and updated, and are available on-line for the students (they are in continuous improvement, thanks to the help and critiques of the students).

AZRA TUTUNCU — HARRY D. CAMPBELL CHAIR



Dr. Katsuki and Dr. Tutuncu with two new UNGI Alumni, Bekdar Baizhanov and Faisal Alhowaish, overlooking one of the Niobrara outcrops near Boulder, Colorado.

I would like to congratulate Bekdar Baizhanov, Dina Hegazy, Jessica Iriarte and Faisal Alhowaish for becoming our newest UNGI Alumni. UNGI has funded 17 PhD, 25 MS and eight ME students in PE, GP, GE, CEE, CHE with projects in UNGI CIMMM US Shale Reservoirs, UNGI CIMMM International Reservoirs and UNGI Geothermal Resources since 2012. Thanks to all students and research fellows at UNGI for their valuable contributions to our research projects. More information on alumni and research projects can be reviewed at the UNGI website (http://ungi.mines.edu).

It was another demanding year for our coupled, integrated multidisciplinary experimental and modeling research utilizing the unique experimental capabilities we have at UNGI. The triaxial and true triaxial assemblies with elevated pore pressure and temperature have been extensively used to investigate Eagle Ford, Niobrara, Bakken and Vaca Muerta formations through coupled geomechanics, acoustic, complex resistivity, permeability, geochemistry and failure measurements. Inclusion of rock-proppant-fluid interactions into our experimental and modeling studies has provided better reservoir characterization and compatible fracturing fluid and proppant selection for the various reservoir types we study contributing fracture design and production optimization, minimizing well integrity issues, environmental management and geohazard risk assessment. CO2 and low-salinity water injection and refracturing research for candidate selection are ongoing, adding value to our coupled geomechanics and fluid transport modeling in domestic and international projects along with feasibility studies for geothermal energy through utilization of shale reservoir modeling and experiments. Our research results have been presented at SPE ATCE in Dubai, 86th SEG Annual Meeting in Dallas and IPTC Meeting in Bangkok, Thailand last fall; at SPE Shale Developments Workshop in Austin recently and more findings will be shared at the 51st US Rock Mechanics/Geomechanics Symposium in San Francisco, 5th URTEC Meeting in Austin and 87th SEG Annual Meeting in Houston.

UNGI-ARMA Lunch and Learns, distinguished speakers, field trips and software training have continued to be an inseparable part of my classes providing excellent feedback. The technical and regulatory training workshops at campus and abroad are continuing to provide UNGI experts opportunities to share their experience in unconventional resources with ally countries for their environmentally friendly technical implementations through regulatory workshops with the sponsorship by the US Department of State. In TOPCORP, the joint reg-

Dr. Tutuncu celebrating the graduation of Jessica Iriarte and Dina Hegazy at the spring 2017 PE graduation reception.

TUTUNCU CONTINUED

ulatory training program in partnership with Penn State and UT Austin finally completed online Module IV, delivered Module III and piloted use of online Module IV in Austin. The next cohort will soon be at Mines for Modules I and II to be completed by hands-on experience and field trips.

On behalf of UNGI, I would like to send our gratitude to all of our sponsors and affiliates for their continuing support, even when the industry was going through the downturn; looking forward to seeing you all at Mines for a visit.

PHIL WINTERFELD

Dr. Winterfeld in Chengdu, China.

This past year has seen a number of exciting developments in my research for the Energy Modeling Group (EMG).

Our DOE sponsored carbon storage project, "Quantitative Characterization of Impacts of Coupled Geomechanics and Flow on Safe and Permanent Geological Storage of CO2 in Fractured Aquifers," is in its third and final year. The project is concerned with the likelihood of sequestered CO2 escaping through faults or fractures in the caprock that overlays the saline storage aquifer. We are starting to verify our formulation of caprock failure scenarios using benchmarks from the literature. In addition, our laboratory work measuring the relevant rock properties for this process, and studying how rocks fracture under the appropriate conditions by blasting them apart with pressurized brine and super critical CO2, is nearing its conclusion. We hope to do additional work in this area next year by applying for a no-cost extension of the project.

The second phase of the project for CNPC (China National Petroleum Corporation) to develop a simulator coupling reservoir flow and hydraulic fracturing is also being wrapped up. I made my second visit to Chengdu, China, last October, where we demonstrated the capabilities of the simulator to CPNC. Hopefully, they will declare this phase of the project completed in the near future.

I just began a project that applies our coupled fluid flow-geomechanics simulators to modeling Enhanced Geothermal Systems (EGS). This project is done jointly with NREL and EGS is an area that is well suited to our expertise.

YU-SHU WU — COMPUTER MODELING GROUP (CMG) CHAIR

It is hard to believe that this past academic year (2016-2017) turned out to be the ninth year for me to work at our Mines PE Department and live in Colorado. The time really flies. I would have to admit the past nine years are among the best times of my career and life and I enjoyed every day of the nine years in Colorado. I consider myself very fortunate to be associated with Mines' PE program and to have this opportunity to work with our wonderful PE students, faculty and staff. During the past academic year, in particular, I worked on my routine teaching and research, continuing to teach Reservoir II (co-taught with Dr. Luis Zerpa) and my graduate course: Reservoir Engineering Principles. In addition, I got involved with and learned from Dr. Hossein Kazemi's graduate class Reservoir Simulation II. Also in the past year, as we all witnessed, petroleum industry worldwide was subject to continual struggling, but there was steady improvement, indicating the resilience and bright future of the industry we are in.

Our research (Energy Modeling Group - EMG center) has been continually growing. Even during the down time of our industry, we maintained a 10-person research team consisting of graduate students, post-doc researchers and faculty, conducted state-of-the-art research in reservoir flow, stimulation, and simulation, and produced high-impact research outcomes. In our

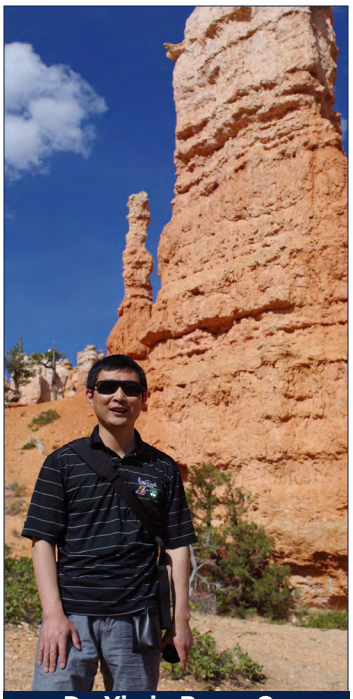

Dr. Wu at 2016 SPE ATCE in Dubai.

research area, we have a lot to report to you. For example, we published 12 peer-reviewed journal papers and six SPE conference papers during 2016-2017. We completed the development of the software package FracOPT, for optimization of design and operation of multi-stage hydraulic fracturing by fracture modeling in combination with simulation of tight gas reservoir production. Currently, this software is under field testing with real-time simulation. We continually made significant progress in developing and enhancing geomechanics-coupled flow simulation theory and technology for modeling conventional and unconventional reservoirs as well as CO2 sequestration. We are continuing our research efforts in several frontiers of reservoir simulation for coupled thermal-hydrologic-mechanic-chemical (THMC) processes in reservoirs, leading the field of reservoir simulation in incorporating geomechanics in reservoir flow and simulation. On government-sponsored projects, we continued a three-year project (funded by US DOE) for investigating CO2 geosequestration in aquifers. More importantly, earlier this year we started a new, 3-year geothermal research project, jointly with eight national laboratories (LBNL, INL, LANL, LLNL, NREL, ORNL, PNNL, SNL) and six universities (Stanford, OU, Penn State, SD, School of Mines, and Wisconsin). This multi-discipline and multi-institution, EGS Collaboration project, entitled "SIGMA-V Project: Stimulation Investigations for Geothermal Modeling Analysis and Validation," is the largest US geothermal project, led by LBNL and funded by the US DOE.


On the street of Stavanger during a meeting of SAC of the National IOR Centre of Norway.

The highlights of the past year for me include (1) attending the 2016 SPE ATCE in Dubai, seeing some of you and many friends and former colleagues and (2) starting to serve as Scientific Advisory Committee (SAC) member (one of four) for the National IOR Centre of Norway.

XIAOLONG YIN


Dr. Yin in Bryce Canyon National Park.

In fall 2016, I came back to Mines after my one-year sabbatical. The biggest change in teaching, perhaps, is the merging of old PEGN 310 Fluid Properties and PEGN 413 PVT Lab. These two classes were merged into a single, three-credit hour course. Fall 2016 was the first semester that it was offered. Hence, all of the instructors (Linda, Mansur, and me) and the teaching assistants spent much time over the summer of 2016 to get ready, especially for the labs. With the addition of labs, Fluid Properties became an all new experience to everybody. In the upcoming fall 2017, the class, now designated as PEGN 312, will be taught again by Linda, Mansur, and me. We plan to revise about 1/3 of the course materials, adding some physical chemistry contents and presenting the molecular basis of fluid properties. The lab contents and formats will be revised, too. Some new labs will be designed; with the reduced enrollment in our class, we also plan to significantly reduce the number of students per group. In the past few years, there were always six to seven students per lab group. This fall, we plan to have three to four students in each group. This should improve student experience, because each student will have more participation time.

On the research side, 2016-2017 was a very productive year. Elham Parsa, a PhD student whom I co-advise with Dr. Ozkan, successfully defended her PhD dissertation. Shaken Kenzhekhanov, MS student, also received his degree in December 2016. He continued on as a PhD student, and is likely to hang on with us for the next few years. Zach Larson, an undergraduate student who worked on a research project with me for three years, graduated and joined Devon. His good lab work turned into a first-author paper published in *Measurement Science and Technology*, the first paper from my group

YIN CONTINUED

published by an undergraduate student as the leading author. To me, this is especially notable out of the total five peer-reviewed papers and three SPE conference papers that we published in 2016-2017. Currently, my group has six PhD students and four MS students. For latest research topics, publications and news, please visit petroleum.mines.edu/research/multiphase and the websites of research groups that I have affiliation with: petroleum.mines.edu/research/urep and petroleum.mines.edu/emg.

The photo that I submitted with this newsletter article was taken at Bryce Canyon National Park, in early June, when my wife and I took a trip to Utah. As you can see from the photo, it is an amazingly colorful place. For anyone interested in geology, Southern Utah is a paradise. Within a few hundred miles, erosion has sculpted wonderful features and exposed rocks of all ages to our eyes: from the 2-billion year old in the deep of the Grand Canyon to the 20-million year upper steps of the Bryce. Needless to say, we had a GREAT time!

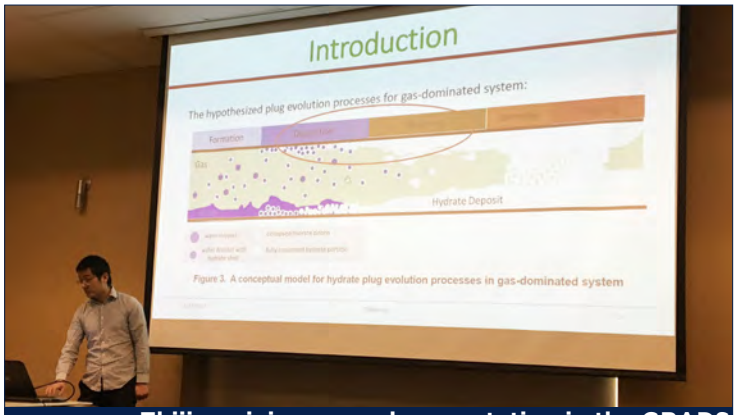
LUIS ZERPA

Dr. Zerpa with his hands full at home.

A gratifying aspect of my work as a faculty member of the Petroleum Engineering Department at Mines has been to be part of the achievements of our students. There could be moments when students see us (professors) as obstacles to their success, but we truly are interested in the success of every one of our students and also in their quality as Petroleum Engineers. It has been my professional goal since I started at Mines to provide a challenging and gratifying learning experience to our students. It seems that my goal is being achieved and my efforts are being recognized by receiving the Outstanding Faculty award from the senior students for the third time during my career at Mines. I would like to thank my team of Teaching Assistants, with whom I share this recognition; it is because of their excellent work that we can achieve our teaching goals for the benefit of our students.

This year I continued offering research opportunities to undergraduate students. I worked with three undergraduate students (two seniors and one junior) as part of the Undergraduate Research Fellowship program. The two senior students (Arun and Muhammad) presented the results from their research projects in the Graduate Research and Discovery Symposium (GRADS) organized by the Graduate Student Goverment. Two graduate students from my group also participated in the GRADS meeting with oral presentations. Alberto presented preliminary results from his Master of Science project on polymer injection for enhanced oil recovery (EOR), and Zhijian presented the main results from his PhD dissertation on gas hydrate deposits formation and sloughing in natural gas pipelines. Zhijian received the best presentation award on his session and also succesfully defended his PhD thesis in the spring 2017 semester.

In preparation for our future research projects, I am collaborating with the faculty of the MCERS research group on improving the capabilities of our PVT research lab. We are acquiring state-of-the-art equipment that will elevate our capabilities to perform full PVT analy-



Zhijian giving an oral presentation in the GRADS conference on April 7, 2017, which was awarded the best presentation of the session.

sis of reservoir fluids and their interactions with EOR injectants. Our goal is to continue leading research in the area of Enhanced Oil Recovery (EOR) and unconventional reservoir characterization. As part of these efforts, we are collaborating with a local consulting company to launch an industry sponsored EOR project, which will focus on studying the EOR potential of oil reservoirs in the Rocky Mountain region. Other areas of fundamental research we are exploring are absoption and filtration efficiency of hydrocarbons in nanoporous rocks.

On the personal side, we welcomed our newest family member Emma, who was born last September. Eva was promoted to big sister, and she loves her little sister Emma (sometimes a little too much). We feel blessed to have the opportunity to see our daughters grow here in Colorado and to be part of the Mines familiy as well. As you can see, I have my hands full at Mines and at home, but I can always make some time to discuss potential collaborations and to get to know more about your professional achievements over this next year. I wish you an outstanding year and higher oil prices.

OFFICE UPDATE

Joe, Terri and Denise doing some sight-seeing in Dubai.

We've come to the end of yet another busy year. The office staff have been adjusting to their new positions and have grown as a team. Now we have defined our individual roles, we can accomplish the everyday business more efficiently, which allows us to free up time to focus more on student issues and ideas for improving their experience and success in the program.

After 14 years of service in the department, Al Sami retired in June. We wish him the best for his retirement. Just when we started feeling comfortable about the reorganization of the PE office, Al's retirement has brought forth the need for reorganization of our teaching and research labs. We have hired Dr. Tadesse Teklu as an Assistant Research Professor to be responsible for our lab facilities while Joe Chen continues to provide technical support as the lab coordinator.

Kayla Boster's main role as the department Program Manager is financial oversight, strategic planning, project management and alumni relations. Some of her goals this year are to enhance our PE student government program in order to give our students a solid voice, find ways to boost our grad program into a higher ranking position, and dig deeper into our curriculum and find a balance between what students want to learn and need to learn to be successful. She hopes to make our alumni a part of the process.

Rachel McDonald has been digging in as the Program Assistant. In addition to tracking finances and maintaining accounts, she handles student contracts and logistics for special programs like the Chevron Short Course Series and the Externship. She loves her role as liaison with the student organizations.

Debra Marrufo is thrilled with her position as Administrative Assistant. She is the first contact in the office to greet students, faculty and visitors. She manages the office, orders supplies, and maintains and schedules rooms. In addition to handling travel authorizations and expense reports for our faculty, staff and students, she does event planning for Super School and Field Session, official functions, seminars and special events. She enjoys coming to work every day and loves getting to know the students and watching them graduate.

Denise Winn-Bowser has been with the department for 13 years and is still intrigued by the research being done in the various area of petroleum. She manages the research groups FAST, UREP, UNGI, MCERS, CMG, plus their PIs. She also works with the PE graduate program, from checking over applications, reviewing forms, advising, assisting with dates and deadlines, attending thesis defenses and getting graduates through to their graduation.

Terri Snyder has been learning a lot in her new position as Undergraduate Program Manager. She works on Bulletin changes, course scheduling, PE events, and of course everything that goes along with advising. She really enjoys working with students to make sure they are on track. She continues to go on the field sessions; as always, her favorite part is visiting with alumni and seeing them as successful professionals.

All of the ladies got to go to field session, and Denise, Terri and Joe accompanied the SPE students to Dubai for the 2016 ATCE conference! They cheered for the Petrobowl team and sat in on our student and faculty presentations. What an experience! They were very delighted to meet some of the parents of our Middle Eastern students, and visit the souks with student Shaimaa and her mother from Kuwait. One of the highlights was visiting the Petroleum Institute in Abu Dhabi.

EXTERNSHIP

We are excited to have a second year of the Externship. This year we had three different tracks: Hydraulic Fracture Design in Unconventional Reservoirs (Instructors Jennifer Miskimins & Mansur Ermila), Production Data Analysis and Reserve Estimation (Instructor Luis Zerpa) and Reservoir & Production Data Analytics (Instructors Elio Dean & Rosmer Brito). Participants included 41 students, five faculty members, eight teaching assistants and several industry volunteers who gave significant amounts of time.

Students were excited to have this opportunity after hearing good things from last year's participants; even graduate students and students from other departments wanted in!

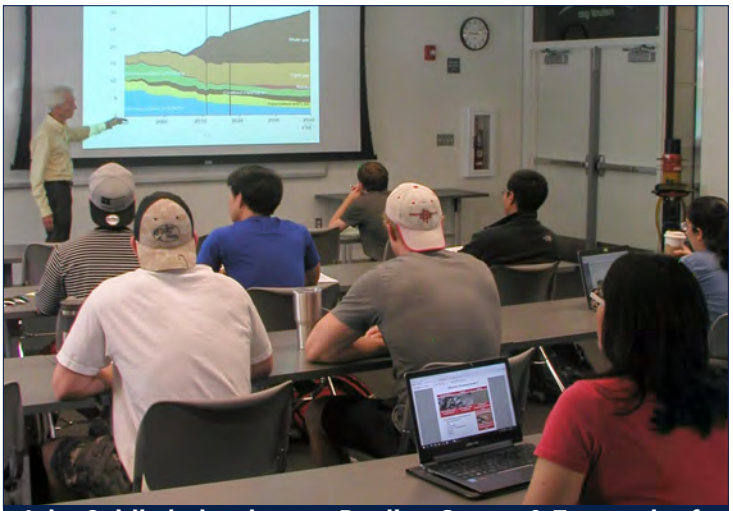
During each externship, the students used industry-provided data sets to work on various projects. They were exposed to and trained on industry software packages. Deliverables varied between the externships but included weekly updates, final written reports, and final presentations. Several representatives of the companies that sponsored the externships, both monetarily and with data, attended the final presentations. The students received a certificate of completion.

The department could not have provided this opportunity without the generous support of numerous companies and individuals. Donations to fund the associated costs were provided by Chevron, BHP Billiton, Shell, Sand Ridge Energy, BP and Whiting. Additionally, Great Western, Devon, Kalnin Venture, PetroDE, Fracture ID, Blue River Analytics, Drillinginfo, Kappa Engineering, Pat Galuska, Ted Williams, Lia Sedillos (Farimont Sontrol), and IHS Markit donated data sets, software, training, and/or their time in other ways. Special thanks to Jim Crompton, Mindy Stone (Blue River Analytics), Alan Lindsey (PetroDE), Russell Roundtree (IHS), John Seidle (MHA Consultants), Ashlyn Munson (Mines Applied Math & Statistics) and Dicle Cengiz for giving their time to act as mentors and instructors.

The Data Analytics students pondered deeply during Jim Crompton's presentation.

We hope that next the year oil prices continue to rebound and internship hires return to previous levels. However, if not, we'll plan to provide these opportunities again next summer. If you'd like to be involved next year, please contact Erdal Ozkan (eozkan@mines.edu) or Jennifer Miskimins (jmiskimi@mines.edu) for more information on how to get involved.

The Hydraulic Fracture track on their way to an Anadarko fracking well.



John Seidle led a class on Decline Curves & Economics for Unconventional Wells for the Reserve Estimation track.

#IDIGMINES GIVING DAY

This past spring was the inaugural #idigmines Giving Day. Departments and organizations across campus competed to see who could get the largest numbers of donations in 24 hours, with a bonus $25k as the prize. We did well with 95 donors raising $10,845, but came in sixth for number of donors. Geology won the top prize with 613 donors raising $54,451.

We don't want to get beat this year! Please put February 8th on your calendar and be ready to participate so we can claim our spot on top! Donations can be as little as $10, and with our large alumni base, we can be victorious in nabbing both the bragging rights, and the top prize.

CHEVRON SHORT COURSE SERIES

We expanded the Chevron Short Course Series to nine sessions this year. They included: *Trouble Free Drilling,* presented by John Mitchell; *Decline Curve Analysis,* presented by Value Navigator Representative Ryan Mohrman; *Sucker Rod Pumping Fundamentals,* presented by Thomas Van Akkeren; *Spotfire*, presented by Mindy Stone of Blue River Analytics; and *Wellbore Positioning: MWD Surveying, Magnetic Ranging, Anti-collision, and Wellbore Intercepts,* presented by Neil Bergstrom, Colorado Geoscience. Elio Dean presented *Introduction to Numerical Simulation* and *Reservoir Fluid Characterization* on behalf of CMG.

Upon completion of the short course, the students received a certificate of completion as well as additional skills, knowledge, and training to put on their resume.

Students were excited for the opportunity to learn skills and software that were immediately useful in classes and internships. We are always looking for interesting and useful instructors and courses, so please contact Elio Dean (edean@mines.edu) if you would like to participate or share an opportunity for a course students would benefit from.

CRAIG W. VAN KIRK ENDOWED SCHOLARSHIP FUND

The Craig W. Van Kirk Endowed Scholarship Fund has been established by John H. and Leslie Gould. John graduated from Mines in 1980 with an undergraduate degree in petroleum engineering and in 1995 with a master's degree in Mineral Economics. This fund was created in honor of Dr. Craig W. Van Kirk, Professor Emeritus and former Department Head of Petroleum Engineering. Dr. Van Kirk received his PhD from Mines in 1972 and later returned as a faculty member in 1978. Known for his practical and theoretical approach to research on complex reservoir management, Dr. Van Kirk has shared the thrill of discovery and the satisfaction of problem solving with thousands of students at Mines.

Dr. Van Kirk and John Gould at the luncheon celebrating the launching of this new scholarshp.

The scholarship provides much needed financial assistance to undergraduate students pursuing studies in the Department of Petroleum Engineering, especially to those who demonstrate a passion for learning and applying new knowledge in support of the science and engineering community.

You too can support the Craig W. Van Kirk Endowed Scholarship Fund by making a gift, in any amount.

Go Online: giving.mines.edu/give

Please be sure to include Craig Van Kirk Fund as your gift designation.

Mail a Check: Use the enclosed envelope.

Visit Us: Starzer Welcome Center
1812 Illinois St
Golden, CO 80401

You can also donate to any of the following petroleum engineering scholarships:

- Ramona Graves Endowed Scholarship- Undergraduate or graduate student. *Dr. Graves will match the first $5,000 raised this academic year!*
- Robert Thompson Memorial Scholarship- Undergraduate students who exemplify qualities that Dr. Thompson represented.
- Steve Gruver- Undergraduate student with preference to students with low GPA, but high potential.
- Dr. Billy Mitchell Scholarship- Undergraduate or graduate student with a strong interest in pursuing a career in drilling.
- J. Bergeson Endowed Scholarship- Undergraduate and graduate students with financial need.
- Vicky (Jackson) and Erik Nielsen Endowed Scholarship- Undergraduate female involved in PE professional societies or other Mines activities, athletics, or clubs.
- Poettmann Scholarship Fund- Graduate students pursuing a degree in petroleum engineering.
- Bass Endowed Scholarship- Undergraduate students with financial need that exemplify qualities that Dr. Bass represented.

AMERICAN ASSOCIATION OF DRILLING ENGINEERS (AADE)

The Colorado School of Mines Chapter of AADE remains one of the most active professional organizations on campus. This past year has been a banner year for AADE at Mines and has been filled with plenty of events and activities. AADE is a tight knit, yet inclusive, community that remains stronger than ever.

Our 2017 leadership includes: Steve Benfield, President; Craig Evangelista, Vice President; Marcus Merritt, Secretary; Steve Yow, Treasurer; Evan Halpern, Logistics Manager, Hannah Golike, Outreach; Camden Lang, Parliamentarian; Lauren Badger, Matt Pinello, Brian Merlino, Nick Rosenhagen, Justin Eckes, Brent Skelton, Jayant Saxena, and Arlybek Altazhanov as Event Coordinators. Outgoing President Taylor Carlson and Vice President Bryan McDowell ensured the organization ran smoothly in the fall, and were valuable mentors for the new leadership in the spring. Both should be commended for their diligent work and time put in to make AADE a better organization.

Mines AADE enjoying the Fin Feather Fur Food Festival.

AADE continues to have strong ties with Industry through our weekly Lunch and Learns. We want to say thank you to Fracture ID, Antero Resources, XTO Energy, SM Energy, Anadarko Petroleum Corporation, and Liberty Oilfield Services for taking the time to present to us on campus.

Building on our established traditions and organization goals, AADE continued to promote off-site tours, campus events, and community events throughout the year.

This past semester also included many off-site tours. AADE was fortunate to be able to visit an operational drilling rig in the DJ Basin courtesy of IPT and Bayswater Exploration and Production. During our annual trip to the AADE technical conference, we were also able to tour Dyna-drill's power section facilities, National Oilwell Varco's real-time drilling facilities, and cold-stacked semi-submersible offshore rigs in Galveston.


Enjoying a semi-submersible rig tour in Galveston.

In September, AADE participated in the Fin Feather Fur Food Festival with the Denver Chapter. Members stayed up the entire night before the event preparing delicious food for the festival. In October, AADE had its second annual pumpkin carving contest to raise money for breast cancer. October also featured a movie screening of "Deepwater Horizon" at the local movie theater followed by a special presentation from John Turley, author of *The Simple Truth*, a novel detailing the cause of the blowout. Over 100 students were in attendance. February featured a drilling simulator night followed by a screening of "Armageddon" to attract freshmen and sophomores to the organization. March featured our third annual keynote speaker. This year, Gregory Zuckerman of the *Wall Street Journal*, and author of *The Frackers*, came to campus and talked about the historic and unlikely rise of hydraulic fracturing in the United States. In addition, in April, AADE worked in


A fun night out watching "Deepwater Horizon".

conjunction with SPE to run the Oilfield Olympics for E-Days. Events included drill bit toss, dunk tank, mud bucket relay, chew spit, and giant ski ball. AADE also continued to partner with Wild Well Control in order to understand how to manage dangerous situations on a drilling rig. Finally, AADE and SPE teamed up for an end-of-the-year crawfish boil.

AADE looks forward to welcoming new students on the "M-Climb" this August, and we plan to visit a seamless pipe mill and the National Ice Core Laboratory this fall.

As always, AADE is continually looking to improve the organization. The future of the club is bright, as the club is more active than ever. The Mines AADE would also like to thank all the alumni who support the school and its many professional societies. We also would like to thank the Denver AADE Chapter for their support, networking events, and scholarship opportunities. We look forward to another great year in AADE.

Sincerely,

Steve Benfield

AMERICAN ROCK MECHANICS ASSOCIATION (ARMA)

It has been another remarkable year for ARMA! We are an organization focused on discussing rock mechanics, rock engineering, and geomechanics which also provides students with a platform to interact and collaborate with professionals with diverse career backgrounds. We have continued to host field trips as well as highly technical and diverse seminars. This year we had lectures focused on fiber optics in O&G, drillbit geomechanics, ultrasonic measurements in the laboratory, rock physics models and prediction of formation properties related to seismic responses, among others. We also had a movie session where we showed two documentaries which displayed two opposing views on hydraulic fracturing operations: "Gasland" and "Fracknation". We also organized software training classes for our members, such as RokDoc from Ikon Science and Petrel/Mangrove from Schlumberger teaching us about building rock physics and earth models.

Yoryenys Del Moro and Joel Loeffler, Geophysicists at IkonScience, flanked by Jessica Iriarte and Olawale Adenkule, ARMA President and VP, respectively.

Since we love interdepartmental collaboration, we organized a field trip to the Niobrara Outcrops in Colorado in the spring semester. We had the exceptional Dr. Steve Sonnenberg, from the Geology department, leading the visit to the CEMEX Quarry and other outcrops within the area. His vast knowledge about the basin made the trip even more enlightening, teaching us about natural fractures, their orientation, and their contribution to the development of the formation. Throughout the year, we also joined SPE and AADE in various activities, such as the "Deepwater Horizon" movie night, lectures and technical seminars on rate transient analysis and chemical tracers.

Mike Mayerhofer and Leen Weijers from Liberty Oilfield Services spoke about "Optimizing Well Spacing and Well Performance in the Piceance Basin Niobrara Formation".

Our activities wouldn't have been possible without the sponsorship of Chevron and Exxon Mobil and the hard work of our officers, Dina Hegazy, Olawale Adekunle, Maxat Toktarov, Aamer Albanny, Bin Binh, and our enthusiastic faculty advisor, Dr. Azra Tutuncu.

As the industry continues to expand operations in more complex reservoirs, having interdisciplinary skills while getting involved with professional organizations has become increas-

ARMA CONTINUED

ingly important for students. Networking opportunities are created through participation in courses, field trips and software training offered by all PE organizations and this could really make the difference.

We continue to plan lots of exciting activities, including a field trip to New Mexico this fall! If you have any questions regarding our club, please feel free to contact our incoming president Olawale "Wale" Adekunle.

Best,

Jessica Iriarte,

President, Mines ARMA Student Chapter

May 2017

Dr. Steve Sonnenberg and ARMA members at the CEMEX Niobrara Quarry during the Niobrara Outcrop Field Day.

PI EPSILON TAU (PET)

After another year of ups and downs in the petroleum industry, the dedication and excitement of the Mines PE department hasn't faltered. As we gear up for yet another year full of gaining knowledge, meeting new people, and the occasional Friday night study session, let us take a moment to reflect on this past year's accomplishments.

My name is Tyler Eickstaedt, and I am the current chapter president of Pi Epsilon Tau. It is such an honor to be a part of this organization which represents the Petroleum Engineering Honor Society from the Colorado School of Mines. We are a group that represents both graduate and undergraduate students who display not only high academic achievements, but also leadership and outstanding character.

Pi Epsilon Tau is dedicated to enhancing student involvement on campus, in industry, and in the community. Our group conducts and participates in different events each year, including Castle of Cans, Energy4Me, Petroleum Engineering Tutoring Night, a plunger lift course put on by Well Master Corporation, and the department mentorship program. Each spring we hold an initiation event to welcome the newly selected students into the organization.

PET Officers for 2016-2017: Anssar Tamli, Eric Bryan, Matt Balderston, Emily Knox, Hannah Thomas, Tyler Eickstadt, and advisor Mark Miller.

Pi Epsilon Tau has been given the honor and responsibility of representing the department in many facets. We continue to serve as ambassadors of the Department of Petroleum Engineering with high school students during both the Preview and Discover Mines events. These events are a favorite among members, as they give us the chance to show off our wonderful building, Marquez Hall, and to share the exciting opportunities the Mines Department of Petroleum Engineering has to offer.

One of the greatest successes of the past year was the founding of the Pi Epsilon Tau mentorship program. This program connects junior and senior petroleum engineering students with underclassmen who are either interested in petroleum engineering, or have already started their petroleum engineering coursework. The program will serve as a way for students to receive guidance and to strengthen the bond between students in the department. We have continued to integrate an industry partner aspect to the mentorship program, continually aiming to connect undergraduate students with alumni who currently work in oil and gas. I am very excited to see the mentorship program grow in the future.

Spring 2017 PET Initiates.

We were also very excited to once again participate in the Castle of Cans event at Mines. Castle of Cans is a school wide food bank drive that occurs right around Thanksgiving. I am proud to announce that we successfully defended our title and the Castle of Cans trophy once again sits in Marquez Hall.

We capped off the year by initiating another very impressive class of petroleum engineers into Pi Epsilon Tau. The class consisted of 23 extremely well-qualified graduate and undergraduate students who exhibited integrity and will represent Mines in the best possible light.

PET Initiates are led out of the room for the next phase of the spring 2017 ceremony.

I would like to take a minute to thank last year's officer team for another successful year. The officers, along with the help of our wonderful faculty adviser Dr. Miller, were able to advance Pi Epsilon Tau and help to improve the experience for students in the department. I would also like to take this opportunity to welcome in this year's officer team. I am very excited for what this upcoming school year has in store. We have an incredible new executive team, and I believe Pi Epsilon Tau will have another successful year under their leadership.

Finally, I would like to thank our faculty and staff for all that they do to make this department one of the premier petroleum engineering programs. With their help and guidance, the Colorado School of Mines petroleum engineering program will continue to be one of the best in the world.

Regards,

Tyler Eickstaedt

SOCIETY OF PETROLEUM ENGINEERS (SPE)

The Mines SPE Student Chapter had another incredible year filled with industry engagement, diverse technical content, community involvement, and professional development through technical presentations, networking opportunities, mock interviews, and our mentorship program.

The club has placed special emphasis on innovation over the past two semesters. Our unique corporate-style officer structure and student-to-student technical presentations are a few examples where we foster new ideas and challenge existing norms.

Over the last year, the club has organized and/or participated in nearly fifty events, including:

- Sixteen company Lunch & Learns
- Mock interviews for the fall and spring semesters
- Two technical seminars
- Sporting clay tournament for fundraising

SPE CONTINUED

- Private screening of the "*Deepwater Horizon*" movie
- Football tailgate
- Seven student-to-student technical presentations (known as our "TechTalks")
- Student-to-student panel discussing graduate school opportunities
- End-of-year crawfish boil (in conjunction with Mines AADE)

Our chapter was also hard at work competing (and winning) in numerous contests within SPE. Our PetroBowl team landed fourth place in the PetroBowl 2016 Championship held in Dubai at the SPE ATCE conference. Bryan McDowell and Angela Dang also competed in the Student Paper contest held during ATCE in the Ph.D. and Master's divisions, respectively.

The Mines SPE team won fourth place at the PetroBowl Championship in Dubai. From left to right: Bryan McDowell (Team Captain), James Blaney, Zak Hartman, Joe Brandenburg, and Jason Cateora.

Mines SPE President Bryan McDowell shows off part of the 300 lbs. of crawfish cooked for the 2nd Annual Mudbug Masquerade. Thanks to BHP Billiton for sponsoring the event!

In February, the club co-hosted the North America Student Summit (NASS) with New Mexico Tech, Texas A&M University, and the University of Texas. We had 350 students and professionals come to Denver to mingle with other chapters and listen to presentations on a variety of topics. During the symposium, Jessica Iriarte and Manju Murugesu won first place in the Master's and Bachelor's divisions of the Rocky Mountain Student Paper Contest. They will go on to compete in the international competition held in San Antonio this fall at SPE ATCE.

Jessica Iriarte (left) and Manju Murugesu (right) won first place in the Master's and Bachelor's degree categories, respectively, at the SPE Rocky Mountain Student Paper Contest held during the North American Student Symposium.

In April, we had our annual Joint Session meeting between the student chapter and the Denver SPE section. Janeen Judah, President of SPE International, headlined the event and presented on the skills needed for young engineers to enter the workforce. Two days later we hosted our annual sporting clay tournament on a beautiful Colorado day.

And finally, to wrap up the semester the Mines SPE and AADE student chapters joined forces to throw the 2nd Annual Mudbug Masquerade. The clubs hosted nearly 100 people on Stratton Commons and cooked over 300 lbs of crawfish for a fun break between the end of classes and finals. BHP Billiton sponsored the event and sent out company representatives to talk about the company and oilfield in general.

This is only a small sampling of the events the student chapter has held over the year and we hope to continue. Here's to another great year as we look forward to 2017/2018!

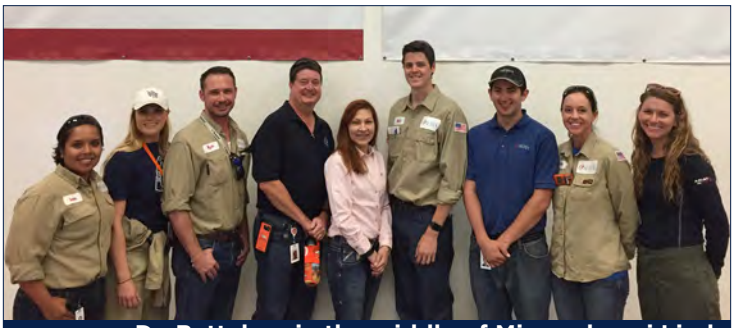
PEGN 315—CALIFORNIA by Linda Battalora

Thanks to the generosity and enthusiasm of our many alumni and friends, the 2017 PEGN 315 California Field Session was a great success. Al Sami, Kayla Boster (PE Program Director), 40 students, three Teaching Assistants (Ayush Rastogi, Faraj Ahmad, and Rong Lu) and I enjoyed an action-packed session in Southern California.

Our first field tour was hosted by **California Resource Corporation (CRC)** and Mines alums Michael LeBaron, Steve Clark, and Dave Mayer. At the **Mount Poso Field**, we visited operation and production facilities, and a workover rig. Afterward, Fred Holmes (**Holmes Western Oil Corporation**), with assistance by Josh Yurkanin (PE alum), hosted a delicious barbecue lunch at the West Kern Oil Museum in Taft. During lunch, Joe Nahama (PE alum, President of **PetroRock**) provided thought provoking career advice including a rap song performance based on the Broadway musical *Hamilton*. After lunch, Mike Clark (Mines alum) led an afternoon field trip with stops at the Lakeview Gusher and McKittrick Tar Seeps. Many thanks to Fred, Michael, Josh, Joe, Dave, Mike and Steve for a memorable day in the field!

Our visit to Bakersfield would not be complete without a visit to **Aera Energy's Belridge field**. PE alums Ilsa Gustafson, Linda Mohammad, Tanner Ottaway, Angie Ransom, George Hunsaker, Matt Erbes, Jennifer Mahoney, and Lizzy Reale hosted us for breakfast, a tour of field operations, vendor services, and lunch. We also enjoyed a presentation by AERA's CEO and President, Christina Sistrunk. Thank you Aera and PE alums for providing an informative and exciting second day in the field!

Many thanks to Miller Newlon, PE alum and Aera Production/Process Reliability Engineer, San Ardo Field, for designing and hosting an educational and interactive field trip including the opportunity to learn about fishing tools and production problems with field personnel. We are very appreciative of Aera's support (Belridge Field, San Ardo Field, and Historical Sites Field Trip) throughout the field session.



Dr. Battalora in the middle of Mines alumni Linda Mohammad, Ilsa Gustafson, Ryan Stef, George Hunsacker, Matt Erbes, Tanner Otootway, Jennifer Mahoney and Lizzy Reale at AERA's Belridge Field.

We were fortunate again this year, that Jon Schwalbach, accompanied by PE alum Dave Mayer (CRC), led us on a beach geology field trip. We visited Arroyo Burro Beach Park where we learned about petroleum systems including source rocks, fractured reservoirs and conventional clastic reservoirs. The beach geology field trip is always a highlight of the field session. The students enjoy sending "selfies" with the beach and Pacific Ocean in the background to their friends on the Midland and Wyoming trips.

Our last day in the field was hosted by CRC and Mines alums Tom Turner, Max Willis, and Dan Fletcher. We vis-

CA Field Session – Beach Geology Field Trip led by Jon Schwalbach.

CALIFORNIA CONTINUED

ited CRC's Long Beach office for lunch and presentations on CRC assets Wilmington Field and THUMS islands. After a safety meeting, we took a boat ride to Island Grissom for a tour of the production facilities. Earlier that day, we visited **C & J Energy Services/Tiger Wireline** in Signal Hill where the students learned about wireline logging, well perforating, and pipe recovery equipment and services. We appreciate the hospitality shown to us by CRC and Tiger during our time in California.

The field session in Southern California would not be possible without the generosity of our alums and friends in the area. The students, TAs, staff, and faculty had a wonderful learning experience and another enjoyable visit to California. Thanks again! We hope to see you next year!

CA Field Session students working on the beach.

CA Field Session students at AERA's San Ardo Field.

PEGN 315—COLORADO & WYOMING by Luis Zerpa

Our field session started at home in Golden, with a group of 27 students, three TAs and three instructors. We had a great learning experience about current industry operations related to drilling, hydraulic fracturing, well completions, surface production and processing facilities, industry safety practices, and corporate social responsibility. We visited different service and operating companies. Our first stop was the **Schlumberger Drilling and Measurement base** in Commerce City, Colorado. We learned from the Schlumberger team about directional drilling tools, measuring-while-drilling (MWD) and logging-while-drilling (LWD) systems. This was the best way to start our field session, considering that we were about to visit three drilling rigs performing directional drilling in the following days of our field session.

Hydraulic fracturing job at the Wattenberg field.

WY group at Anadarko's Platteville office.

Our second stop was the **Wattenberg field**, where **SRC Energy** gave an overview of their operations and design approach for the horizontal wells and its completions. With SRC Energy we learned about different fracturing fluids that they are using depending on the formation properties and behavior. We visited our first drill rig of the field session and the first hydraulic fracturing job.

We started our second day in Colorado hosted by **Anadarko Oil Corporation** in their Platteville office, which supports their operations in the Wattenberg field. They gave a thorough description of the Integrated Operation Center that monitors wells, pipelines and production facilities. With Anadarko we also visited a tankless production facility, a drilling rig and a hydraulic fracturing job. At the end of our visit to Anadarko, we headed to Cheyenne, Wyoming.

A TA was trying to get his van off-road...

On our third day, we visited **Samson Energy**'s well pad in Laramie county and learned about their production facilities and gas lift equipment. Samson Energy's presentation was given from the engineering design perspective, highlighting how the facilities design was performed with the operators in mind. After the visit with Samson Energy we moved on to Rock Springs, Wyoming.

In the morning of our fourth day, we visited **ExxonMobil's Shute Creek** facility, which processes sour gas from the Madison formation with a high content of CO2, H2S and Helium. At this facility, we learned about the rigoruous safety measures that are required when dealing with H2S in the produced gas stream. In the afternoon of our fourth day, we went back to Rock Springs and visited the **Halliburton** facility. With Halliburton, we had a lab demonstration of the properties of cement used in well completion operations and hydraulic fracturing fluids. Also, we walked under the snow looking at the trucks used in fracturing and cementing jobs.

Our last visit was to **Jonah Energy's** operations in the Jonah gas field. With Jonah Energy we learned about their drilling strategies in fluvial sand lenses using deviated wells. Jonah Energy took us to see one of their drilling rigs, a hydraulic fracturing job, and their surface production facilities.

We appreciate very much the support from these companies, their excellent presentations and guidance during the tours, and their willingness to work around our schedule.

Group with a workover rig in the background in Laramie county, WY.

CO/WY CONTINUED

WY group at Jonah field.

PEGN 315—MIDLANDS, TX by Bill Eustes

This year marks the eighteenth Field Session I. I led a group of 38 students through my "old stomping grounds" in Midland. Terri Snyder was the staff team giving incredible support. And assisting me were Kyle McGowen, Stephan Yow, and Ted Rutkowsky. Student Brian Merlino helped drive, too.

Day 1: We started field session by participating in a Fort Worth traffic jam getting to **Frost Brothers Resources**. Dr. Robert Frost, retired metallurgy faculty from Mines, owns four wells and a production facility in the shadow of downtown Fort Worth. He and James gave a great discussion of engineering reality and his production operations. The gas compressor had failed a few days before, so that was a good lesson to review. After that, we visited **Ulterra Bits**; they make PDC bits. Brittany McPherson arranged the tour for us. Marty Beggs, Johnny Boutsikakis, and Rocky Frazier showed us how PDC's are made. They had a headset/microphone set up for each of us, making it easy to hear what was going on. We finished the tour with Al Skinner, VP of Engineering going over PDC bit design. At that point, the **Devon** team met us at the plant and guided us over to the Lake Benbrook well pad. Here, 30 wells have been drilled under Lake Benbrook. We had a talented team of Devon engineers, technicians, and HSE folks lead by Jay Ewing and including Ryan Madden, Terry Thomas, and Chance Wilson to name a few, show us around the pad. They have quite an operation going on. It is impressive their attention to detail on engaging the local neighborhoods.

Devon's Lake Benbrook Pad.

Day 2: We rejoined Jay Ewing with Ryan and Chance at a **Barnett** well site that was once out in the middle of "nowhere" but now sits in the middle of a new neighborhood. From there, we went to **Enlink's Gas Plant** near Bridgeport. Robert Whitley, Chris Van Bramer, and Randall Aaron along with others shepherded us around the plant site showing us how mid-stream works. After a nice luncheon with Devon back in Bridgeport, we headed west for Midland.

Day 3: We started the day with **Oxy** at their Training Center north of Midland. Joe Howard organized the day for us; but both Brent Vangolen and Mitch Tilley were on hand to assist. To start, we had Robert Chapman give a

At one of the Frost Brother's Wells in Fort Worth.

useful and entertaining safety review. We headed out to the nearby production wells and had a great overview of production from pumping unit to tank battery. After a nice lunch, half of us went to a drill rig and the other half to a frac job. We swapped locations later that afternoon. We had a lot of help with this tour so thanks goes to Stefanie Pate, Sony Patel, Matt Henwood, Cyndi Leal, Mike Tuttle, Molly Giltner, Dave Mikkelson, Lawson Farrar, Jerry Eubank, Brad Wied, and Scott Savoy. That's quite a logistical feat. Rick Davis of **Encore Wellheads** met us in their facility later that day. We were running late so I really appreciated Rick's and the Encore team's patience with us. He showed us how to assemble a wellhead. Thank you, Rick and your Encore Team.

Outside of Enlink's Gas Plant.

Day 4: Thursday we spent the morning with **Don-Nan Pump and Supply**. They had a show and tell about rod pumps and took us around to see how they are assembled and tested. Thank you, Josh Carty, for arranging it all and guiding us on our tours; Bob Bilbo and Rick Roderick for the talk; to Aaron Leonard, Zach Smith, and Levins Thompson for the tours; and to Stubby Arnold, Todd Brooks, and Wendal New for the great lunch. It was truly an "all hands-on deck" performance. After the nice pizza lunch, we went off to the **Permian Basin Oil Museum**, the premier oil museum ever and even better than I recalled seventeen years ago. Olivia Thompson orchestrated the three docents, Morris Burns, Tom Chandler, and Tom Cook as they showed and explained about the museum's exhibits. In a disturbing turn of events, the museum has a rig that is very much like the type of rig I started with back in my day. The drilling equipment I started with are now museum pieces.

At Oxy's drilling operation in the Permian Basin.

Day 5: Early Friday, we started with Taylor Hall of **XTO**. We drove out to a frac site, a water holding facility, and production facility where Taylor, Cody Everett, Ryan Ewen, Nathan Franka, Adam Johnson, Jeremy Ray, and Wes Turner showed us how XTO ran their operations.

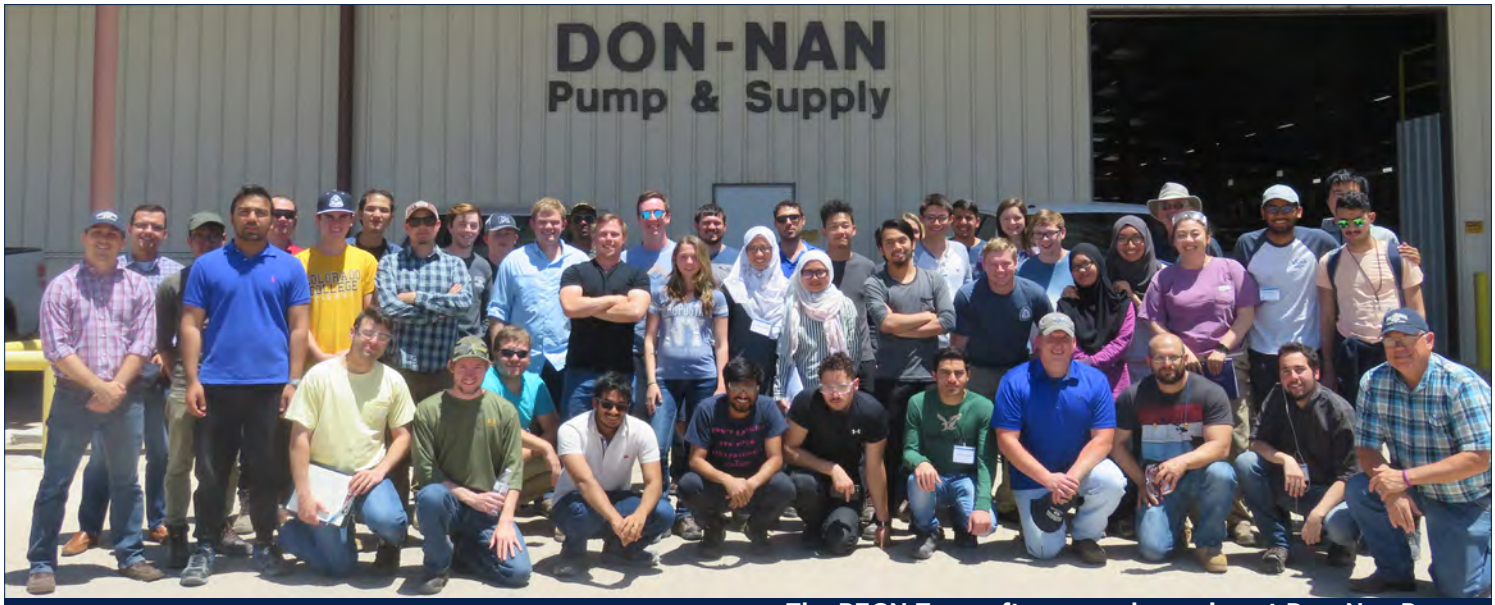
MIDLANDS CONTINUED

Those are quite the engineering and logistics intensive operations. After a nice BBQ lunch hosted by XTO, we drove to west Midland to the **Schlumberger Camp**. Cody Carter had arranged for quite a show for us with live demonstrations of wireline use, sidewall coring, perforating, seismic, and completion engineering. The Schlumberger team included Richard Satterfield, Brett Dobinsky, Alfredo Jiminez, Carlos Segovia, Massiel Melo, Eloise Coutoure, Caleb Borden, and Angel Cobos. That was quite instructive to see that, plus, we have some souvenir sidewall cores they cut for us. At the end of the day, Anthony Bordonaro of **Wood Mackenzie** came by the hotel to visit with the students and explain what he does with data as well as his first experiences as a newly minted engineer. We appreciated his efforts to join us there.

Uncertainty regarding which one is the museum piece.

Rick Davis explaining Wellhead Assembly.

Saturday saw us leave Midland early in the morning. My parents, who live in western Fort Worth, hosted the entire field session group at their home. We had a well-organized catered BBQ luncheon at their home. Thank you, Mom and Dad, and Brother and Sister-in-law for hosting us. And as usual for these trips, thank you's go out to all named and unnamed that make these opportunities so valuable for our students. I know the value of these trips to our students and the reconnections for us. Thank you for hosting us wherever we may wind up. See you somewhere next year!



The PEGN Team after a good morning at Don-Nan Pumps.

THE LOSS OF FRANCIS MANU

The final session of the Massadona field session ended in tragedy this year. A group of students went swimming in the Kenney Reservoir by Rangely after the daily scheduled activities, and Francis Manu, a Senior in the Department of Petroleum Engineering, drowned. This unfortunate accident has effected all of us. Francis was thought highly of in the department and was a model student. The remainder of this article is the tribute the department sent to Francis' family to be read at his funeral.

FRANCIS' TRIBUTE

Francis entered Colorado School of Mines in fall of 2015 as a transfer student. His first semester at Mines was not easy and he struggled in his first petroleum engineering class, not uncommon for many students. His work ethic and desire to learn and understand the material ultimately awarded him with success the second time and he passed with no issues. He was a student who cheerfully worked hard and consistently showed his willingness to put in the work. His aspiration to excel was also expressed in his creativity and unique way of thinking. Francis didn't just put in the minimum effort on projects and assignments; he found ways to be creative and expressive while also achieving the goal of learning.

Francis was often the leader in group projects and kept things on track in order to make sure everything got done. Faculty have expressed that they learned his name quickly because he was positive, participated in class and would always ask questions. He was someone who uplifted everyone around him and all of the faculty have noted and praised Francis' diligence, perseverance and optimism.

One of the key features of the petroleum engineering program at Colorado School of Mines is the two field sessions students attend the summers between their junior and senior years. During senior filed session, they camp out in north-eastern Colorado to learn about different geological features and how those affect their jobs as Petroleum Engineers. They also attend lectures and corporate presentations, as well as participate in other field exercises.

Tragically, Francis drowned while swimming with friends in the Kenney Reservoir by Rangely after that day's scheduled activities. He was amongst friends that he had made during Field Session.

While situations like these are never easy, we must remember the good times that were spent together and value how precious life can be. The pain we feel may never completely subside, but eventually the memories will take over and only the good times will remain.

PEGN 316—MASSADONA by Jennifer Miskimins

The Massadona PEGN 316 field camp was a little like the story of the three bears this year. The first session was too cold! The third session was too hot (and buggy)! And the middle section was just right – well, almost, it did start to get into the +90º F temperature range toward the end of it. As most of you know, weather is always a challenge out there, but this year seemed to be a little more chaotic than usual with snow, sleet, plenty of rain, a little hail, and sunshine – sometimes all in one day!!

Um, I think I'm going back to bed...

Over the three sessions, we had a total of 182 students, with four faculty (myself, Carrie McClelland, Wes Buchanan, and Mark Miller), two staff (Denise Winn-Bower and Rachel McDonald) and ten different TA's involved. Wes Buchanan from the geology department joined us for the first time. He taught our students sed/strat and structural geology courses this past year and did a phenomenal job of linking those courses to the field session exercises. More than once we heard a comment along the lines of "grumble, grumble, I don't like being here, but, boy, have I learned a lot"! I'm not sure if it's the best compliment we've ever gotten, but we'll take it!

Wes explaining the local geology.

We did have a little excitement during the second and third sessions, when wildfires started burning west of us. The first one (in late May) was along Highway 40 between Dinosaur, CO, and Jensen, UT. The students and camp were never in any direct danger, but it did make for some juggling of exercise days and avoiding certain areas. The second one happened right at the start of the third session (mid-June) and caused a few more issues for us. It was located a few miles to the SW of camp and forced us to move into hotels in Craig for a couple of days.

Fire to the west of camp.

Another interesting event during our visit to the area was a first-time-ever turnaround of the Rangely CO2 plant, which brought an additional ~400 people to the Rangely area. As you can imagine, that definitely impacted traffic, restaurants, and most everything else in the area (Rangely reported a population of 2,381 in 2015). Never any shortage of excitement at or around camp, that's for sure!!

No, really, there is an anticline out there. Can't you see it?

Once again, **Chevron**, led by Roy Cramer, and **Production Logging Services**, led by Craig Stratton, helped us out and provided excellent presentations. We also need to thank Leona, the owner of the **Bedrock Depot** in Dinosaur, CO, for stepping up to the plate for us. The Skull Creek area that we've mapped for the past +20 years was lost to us due to some land access issues, and Leona and her husband allowed us to access their private land on which to do our mapping. It's people like all of these folks that help to make the field camp a success and educational experience for our students.

Hopefully, you'll enjoy the photos included with this commentary. On a final note, if this article and associated pictures bring back some fond memories, keep an eye out for the Massadona Field Camp reunion that we're planning for fall 2018!!

Section A class photo

Section B class photo

Section C class photo

Students get a bit desperate for shade at times.

How many students does it take to paint one cabin?

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Please watch your mailbox for registration information from the Alumni Association.

MONDAY, OCT 9TH

5:30-7PM

Grand Hyatt
Lonestar Ballroom F

FACULTY ACHIEVEMENTS

- Manika Prasad was named the 2017 recipient of the Society of Exploration Geophysicists Virgil Kauffman Gold Medal.
- Hossein Kazemi taught a course on Fractured Reservoirs and Enhanced Oil Recovery in Hanoi in May. He was also the keynote speaker at the International Congress YPFB Oil & Gas 2017 in late July in Bolivia and the invited speaker at grand opening ceremony of University of Wyoming's $150 million Visualization Center in June.
- Yu-Shu Wu started serving as a Scientific Advisory Committee (SAC) member (one of four) for the National IOR Centre of Norway.
- Bill Eustes was the 2017 recipient of the Ross Kastor Educator's Award given by the Petroleum Division of the American Society of Mechanical Engineers.
- Luis Zerpa & Jennifer Miskimins received the Outstanding Faculty Award from the senior PE students.
- Ramona Graves was the 2017 recipient of the Society of Petroleum Engineering Regional Distinguished Achievement for Petroleum Engineering faculty.
- Will Fleckenstein was named SPE Distinguished Lecturer for 2017-2018. "Shale Development – Does Cheap Energy Really Mean Flaming Tap Water?"
- Linda Battalora was an invited speaker on the topics of Stakeholder Engagement and Citizen Engineer at the February 2017 Engineering Solutions for Sustainability: Materials and Resources 3, Toward a Circular Economy Symposium.

ALUMNI SURVEY

In order to renew our ABET accreditation, we require a few minutes of our Alumni's time. Please follow the below link to a short survey. Your participation is greatly appreciated!

https://www.surveymonkey.com/r/23L8J55