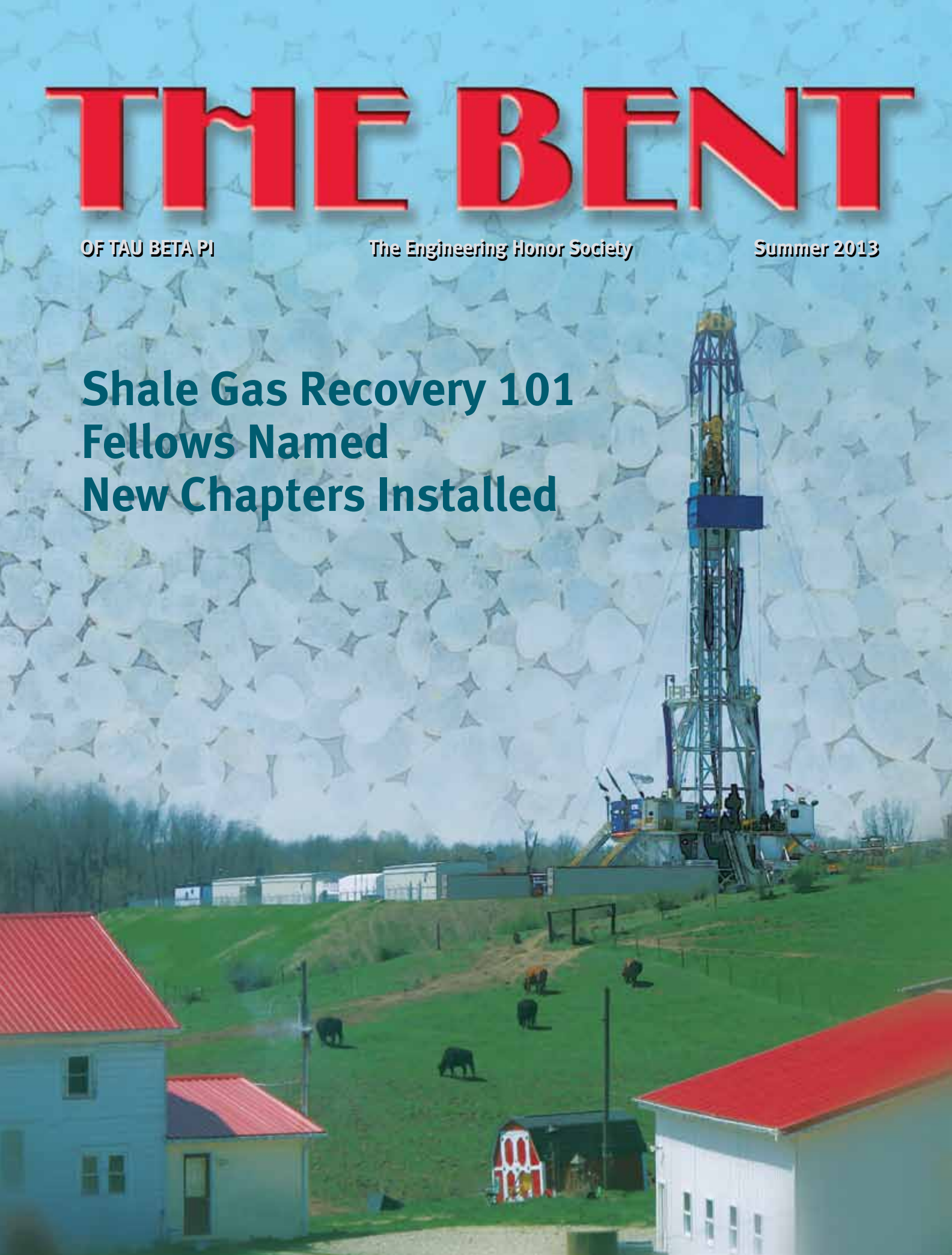
THE BENT

OF TAU BETA PI | The Engineering Honor Society | Summer 2013

Shale Gas Recovery 101
Fellows Named
New Chapters Installed



CHAPTERS

ALUMNI CHAPTERS

• *denotes active chapter*

District 1
- *Boston, MA*
- *Central Connecticut, Hartford*

District 2
Buffalo, NY
Long Island Suburban, NY
Newark, NJ
- *New York, NY*
- *Rochester, NY*

Schenectady, NY
- *Southern Tier, Binghamton, NY*

District 3
Lehigh Valley, Bethlehem, PA
- *Philadelphia, PA*

Wilmington, DE

District 4
Baltimore, MD
Hampton Roads, Newport News, VA
Kanawha Valley, Charleston, WV
Research Triangle, Durham-Chapel Hill-Raleigh, NC
Richmond, VA
- *Washington, DC*

District 5
- *Atlanta, GA*
- *Central Florida, Orlando*

Daytona Beach, FL
Gainesville, FL
Miami, FL
Midlands, Columbia, SC
- *Palm Beach/Broward, FL*

Piedmont, Clemson, SC
Puerto Rico
- *Tampa Bay, FL*

District 6
- *Bluegrass, Lexington-Frankfort, KY*

Central Alabama, Birmingham
- *Great Smoky Mountains, Knoxville-Oak Ridge, TN*
- *Louisville, KY*

Greater Gulf Coast, Mobile, AL
Mid-South, Memphis, TN

District 7
- *Ann Arbor, MI*

Central Michigan, Lansing
Cincinnati, OH
- *Dayton, OH*
- *Southeastern Michigan, Detroit*

Flint, MI
- *Ohio's North Coast, Cleveland*

Columbus, OH
- *West Michigan, Grand Rapids*

District 8
- *Chicago Area, IL*

Central Illinois, Urbana-Champaign
Milwaukee, WI

District 9
Rolla, MO
St. Louis, MO

District 10
- *Texas Gulf Coast, Houston*

District 11
Ames, IA
- *Minnesota, Twin Cities, MN*

District 12
- *Front Range, CO/WY*

Salt Lake City, UT
- *Treasure Valley, Boise, ID*

District 13
El Paso, TX
Phoenix, AZ
Sun City, AZ

District 14
Columbia River Basin, Richland, WA
Portland, OR
- *Puget Sound, Seattle, WA*

District 15
- *Sacramento, CA*
- *San Francisco Bay Area, CA*

San Francisco Peninsula, Palo Alto, CA

District 16
- *Southern California, Los Angeles*

COLLEGIATE CHAPTERS (248)

Chap.	*Dist.*	*Institution*
AL A	6	Auburn Univ.
AL B	6	Univ. of Alabama
AL Γ	6	Univ. of Ala. at Birmingham
AL Δ	6	Univ. of Ala. in Huntsville
AL E	6	Univ. of South Alabama
AK A	14	Univ. of Alaska Fairbanks
AZ A	13	Univ. of Arizona
AZ B	13	Arizona State Univ.
AZ Γ	13	Northern Arizona Univ.
AR A	9	Univ. of Arkansas
CA A	15	Univ. of California, Berkeley
CA B	16	California Inst. of Technology
CA Γ	15	Stanford Univ.
CA Δ	16	Univ. of Southern California
CA E	16	Univ. of California, Los Angeles
CA Z	15	Santa Clara Univ.
CA H	15	San Jose State Univ.
CA Θ	16	California State Univ., Long Beach
CA I	16	California State Univ., Los Angeles
CA K	16	California State Univ., Northridge
CA Λ	15	Univ. of California, Davis
CA M	15	Calif. Poly. St. Univ., San Luis Obispo
CA N	16	California State Poly. Univ., Pomona
CA Ξ	16	San Diego State Univ.
CA O	16	Loyola Marymount Univ.
CA Π	16	Northrop Univ. (inactive)
CA P	15	California State Univ., Fresno
CA Σ	16	Univ. of California, Santa Barbara
CA T	16	Univ. of California, Irvine
CA Y	15	California State Univ., Sacramento
CA Φ	15	Univ. of the Pacific
CA X	16	California State Univ., Fullerton
CA Ψ	16	Univ. of California, San Diego
CA Ω	16	Harvey Mudd College
CA AA	15	California State Univ., Chico
CA AB	16	Univ. of California, Riverside
CA AΓ	15	San Francisco State Univ.
CA AΔ	15	Univ. of California, Santa Cruz
CA AE	16	Univ. of San Diego
CO A	12	Colorado School of Mines
CO B	12	Univ. of Colorado at Boulder
CO Γ	12	Univ. of Denver (inactive)
CO Δ	12	Colorado State Univ.
CO E	12	Univ. of Colorado at Denver
CO Z	12	United States Air Force Academy
CT A	1	Yale Univ.
CT B	1	Univ. of Connecticut
CT Γ	1	Univ. of Hartford
DE A	3	Univ. of Delaware
DC A	4	Howard Univ.
DC B	4	Catholic Univ. of America
DC Γ	4	George Washington Univ.
FL A	5	Univ. of Florida
FL B	5	Univ. of Miami
FL Γ	5	Univ. of South Florida
FL Δ	5	Univ. of Central Florida
FL E	5	Florida Atlantic Univ.
FL Z	5	Florida Inst. of Technology
FL H	5	Florida A&M Univ.-Florida State Univ.
FL Θ	5	Florida International Univ.
FL I	5	Embry-Riddle Aeronautical Univ.
GA A	5	Georgia Inst. of Technology
GA B	5	Mercer Univ.
ID A	14	Univ. of Idaho
ID B	12	Idaho State Univ.
ID Γ	12	Boise State Univ.
IL A	8	Univ. of Illinois at Urbana-Champaign
IL B	8	Illinois Inst. of Technology
IL Γ	8	Northwestern Univ.
IL Δ	8	Bradley Univ.
IL E	8	Southern Illinois Univ. at Carbondale
IL Z	8	Univ. of Illinois at Chicago
IN A	8	Purdue Univ.
IN B	8	Rose-Hulman Inst. of Technology
IN Γ	8	Univ. of Notre Dame
IN Δ	8	Valparaiso Univ.
IN E	8	Trine Univ.
IA A	11	Iowa State Univ.
IA B	11	Univ. of Iowa
KS A	9	Univ. of Kansas
KS B	9	Wichita State Univ.
KS Γ	9	Kansas State Univ.
KY A	6	Univ. of Kentucky
KY B	6	Univ. of Louisville
KY Γ	6	Western Kentucky Univ.
LA A	10	Louisiana State Univ.
LA B	10	Tulane Univ. of Louisiana
LA Γ	10	Louisiana Tech Univ.
LA Δ	10	Univ. of Louisiana at Lafayette
LA E	10	Univ. of New Orleans
ME A	1	Univ. of Maine
MD A	4	Johns Hopkins Univ.
MD B	4	Univ. of Maryland
MD Γ	4	United States Naval Academy
MD Δ	4	Univ. of Maryland Baltimore County
MD E	4	Morgan State Univ.
MA A	1	Worcester Polytechnic Inst.
MA B	1	Massachusetts Inst. of Technology
MA Γ	1	Harvard Univ. (inactive)
MA Δ	1	Tufts Univ
MA E	1	Northeastern Univ.
MA Z	1	Univ. of Massachusetts at Amherst
MA H	1	Boston Univ.
MA Θ	1	Univ. of Massachusetts Lowell
MA I	1	Western New England Univ.
MI A	7	Michigan State Univ.
MI B	11	Michigan Tech. Univ.
MI Γ	7	Univ. of Michigan
MI Δ	7	Univ. of Detroit Mercy
MI E	7	Wayne State Univ.
MI Z	7	Kettering Univ.
MI H	7	Lawrence Technological Univ.
MI Θ	7	Oakland Univ.
MI I	7	Univ. of Michigan-Dearborn
MI K	7	Western Michigan Univ.
MI Λ	7	Grand Valley State Univ.
MN A	11	Univ. of Minnesota-Twin Cities
MN B	11	Univ. of Minnesota, Duluth
MS A	6	Mississippi State Univ.
MS B	6	Univ. of Mississippi
MO A	9	Univ. of Missouri-Columbia
MO B	9	Missouri Univ. of Science & Technology
MO Γ	9	Washington Univ.
MO Δ	9	Univ. of Missouri-Kansas City
MO E	9	Saint Louis University
MT A	12	Montana State Univ.
MT B	12	Montana Tech of the Univ. of Montana
NE A	9	Univ. of Nebraska-Lincoln
NV A	15	Univ. of Nevada, Reno
NV B	16	Univ. of Nevada, Las Vegas
NH A	1	Univ. of New Hampshire
NH B	1	Dartmouth College
NJ A	2	Stevens Inst. of Technology
NJ B	2	Rutgers Univ.
NJ Γ	2	New Jersey Inst. of Technology
NJ Δ	2	Princeton Univ.
NJ Z	2	The College of New Jersey
NJ E	2	Rowan Univ.
NM A	13	New Mexico State Univ.
NM B	13	Univ. of New Mexico
NM Γ	13	New Mexico Inst. of Mining & Tech.
NY A	2	Columbia Univ.
NY B	2	Syracuse Univ.
NY Γ	2	Rensselaer Polytechnic Inst.
NY Δ	2	Cornell Univ.
NY E	2	New York Univ. (inactive)
NY Z	2	Polytechnic Inst. of Brooklyn (inactive)
NY H	2	City College of CUNY
NY Θ	2	Clarkson Univ.
NY I	2	Cooper Union School of Engineering
NY K	2	Univ. of Rochester
NY Λ	2	Pratt Inst. (inactive)
NY M	2	Union College
NY N	2	SUNY at Buffalo
NY Ξ	2	Manhattan College
NY O	2	SUNY at Stony Brook
NY Π	2	Rochester Inst. of Technology
NY P	2	Polytechnic Institute of New York Univ.
NY Σ	2	Alfred Univ.
NY T	2	Binghamton University
NY Y	2	United States Military Academy
NC A	4	North Carolina State Univ.
NC B	4	Univ. of N.C. at Chapel Hill (inactive)
NC Γ	4	Duke Univ.
NC Δ	4	Univ. of North Carolina at Charlotte
NC E	4	North Carolina A&T State Univ.
ND A	11	North Dakota State Univ.
ND B	11	Univ. of North Dakota
OH A	7	Case Western Reserve Univ.
OH B	7	Univ. of Cincinnati
OH Γ	7	Ohio State Univ.
OH Δ	7	Ohio Univ.
OH E	7	Cleveland State Univ.
OH Z	7	Univ. of Toledo
OH H	7	Air Force Inst. of Technology
OH Θ	7	Univ. of Dayton
OH I	7	Ohio Northern Univ.
OH K	7	Univ. of Akron
OH Λ	7	Youngstown State Univ.
OH M	7	Wright State Univ.
OH N	7	Cedarville Univ.
OH Ξ	7	Miami Univ.
OK A	9	Univ. of Oklahoma
OK B	9	Univ. of Tulsa
OK Γ	9	Oklahoma State Univ.
OR A	14	Oregon State Univ.
OR B	14	Portland State Univ.
OR Γ	14	Univ. of Portland
PA A	3	Lehigh Univ.
PA B	3	Pennsylvania State Univ.
PA Γ	3	Carnegie Mellon Univ.
PA Δ	3	Univ. of Pennsylvania
PA E	3	Lafayette College
PA Z	3	Drexel Univ.
PA H	3	Bucknell Univ.
PA Θ	3	Villanova Univ.
PA I	3	Widener Univ.
PA K	3	Swarthmore College
PA Λ	3	Univ. of Pittsburgh
PA M	3	Penn State Erie, The Behrend College
PR A	5	Univ. of Puerto Rico
RI A	1	Brown Univ.
RI B	1	Univ. of Rhode Island
SC A	5	Clemson Univ.
SC B	5	Univ. of South Carolina
SC Γ	5	The Citadel
SD A	12	South Dakota School of Mines & Tech.
SD B	11	South Dakota State Univ.
TN A	6	Univ. of Tennessee
TN B	6	Vanderbilt Univ.
TN Γ	6	Tennessee Tech. Univ.
TN Δ	6	Christian Brothers Univ.
TN E	6	Univ. of Memphis
TN Z	6	Univ. of Tennessee at Chattanooga
TX A	10	Univ. of Texas at Austin
TX B	13	Texas Tech Univ.
TX Γ	10	Rice Univ.
TX Δ	10	Texas A & M Univ.
TX E	10	Univ. of Houston
TX Z	10	Lamar Univ.
TX H	10	Univ. of Texas at Arlington
TX Θ	13	Univ. of Texas at El Paso
TX I	10	Southern Methodist Univ.
TX K	10	Prairie View A & M Univ.
TX Λ	10	Texas A & M Univ.-Kingsville
TX M	10	Univ. of Texas at San Antonio
UT A	12	Univ. of Utah
UT B	12	Brigham Young Univ.
UT Γ	12	Utah State Univ.
VT A	1	Univ. of Vermont
VT B	1	Norwich Univ.
VA A	4	Univ. of Virginia
VA B	4	Virginia Polytechnic Inst. & State Univ.
VA Γ	4	Old Dominion Univ.
VA Δ	4	Virginia Military Inst.
VA E	4	Virginia Commonwealth Univ.
WA A	14	Univ. of Washington
WA B	14	Washington State Univ.
WA Γ	14	Seattle Univ.
WA Δ	14	Gonzaga Univ.
WV A	4	West Virginia Univ.
WV B	4	West Virginia Univ. Inst. of Technology
WI A	8	Univ. of Wisconsin-Madison
WI B	8	Marquette Univ.
WI Γ	8	Univ. of Wisconsin-Milwaukee
WI Δ	8	Milwaukee School of Engineering
WI E	8	Univ. of Wisconsin-Platteville
WY A	12	Univ. of Wyoming

the Bent of Tau Beta Pi — The Engineering Honor Society

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founded at Lehigh University, South Bethlehem, Pennsylvania, June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933). Key and name registered in U.S. Patent Office. Member, American Society for Engineering Education and (co-founder) Association of College Honor Societies. Affiliate, American Association for the Advancement of Science.

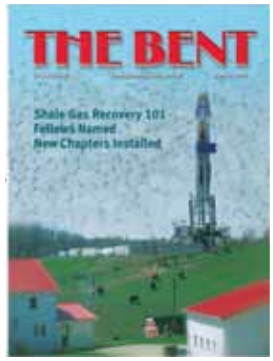
Features

ON THE COVER:

Trudy E. Bell looks at the facts and figures of shale gas extraction.

Beth Stephan outlines the ways in which Chapters get things done.

Cover artist: Dali Polivka



Reports

Departments

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The Tau Beta Pi Association was founded at Lehigh University in 1885 by Edward Higginson Williams Jr. to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. —Preamble to the Constitution

Reconnecting with Alumni

A new Executive Council will be elected on November 2, 2013. As we prepare for the transition, it seems appropriate to glance back at some of the activities established during the past seven years by this Council and to wonder which will continue. In my Spring 2008 article, *Enjoying Our Alumni*, I described a Council pilot project of inviting alumni to participate in the 2005 District 12E Conference in Estes Park, CO. That one successful event launched the practice of inviting alumni to District Conferences. In fact, alumni attended each of the 16 Conferences this year, participating in seminars and discussions, or joining the students for a meal.

My position at the South Dakota School of Mines and Technology, which requires extensive traveling, has provided additional possibilities to meet with groups of alumni throughout the country. In early 2007, the first two receptions were held in Naples, FL, and, with help from Capers McDonald, *NC Γ '74*, at the Congressional Country Club in Bethesda, MD. Scores of regional receptions and small group or individual meetings have since occurred nationwide.

Although different from a university alumni gathering, reconnecting with TBP alumni has been rewarding. A recurring comment has been: "This is the first time I have heard from or been invited to a Tau Beta Pi event since I graduated." It has been wonderful to hear alumni share stories about their careers, engage in discussions and offer suggestions for our programs, and to update them on the work that we do as a Society. Most of them were learning about this for the first time.

Outreach events also introduced us to alumni who are helping us define our purpose and direction. Looking back, I can identify such connections with key alumni whose resulting participation is contributing greatly to advance our Association. Rodger Smith, *WI A '64*, who has been Chairman of the Trust Advisory Committee (TAC) since 1986, accepted our invitation, along with TAC member Harry Lange, *MI Z '75*, to attend the 2009 Convention at East Brunswick, NJ. Rodger and Harry were impressed and found the experience very energizing. Neither has missed a Convention since. Based on his observations, Roger asked the question, "What could Tau Beta Pi do for its members and for the profession of engineering?" That interaction led to his leadership role in forming the Vision Development Group (VDG), with the assistance of Harry.

At an outreach reception in Phoenix, AZ, in 2008, I met Ralph Rockow, *OH Γ '58*, who was intrigued by the MindSET program and wanted to apply the concept to a project in which he had an interest, the Job Corps. Three years later, Ralph accepted an invitation to join the VDG.

Later in 2008, I met Ray Rothrock, *TX Δ '77*, at a lunch in Palo Alto, CA. Ray's initial interest in reconnecting with TBΠ was based on his involvement as Texas Delta President and chair of the 1976 Convention in College Station. In 2011, Ray also joined the VDG.

Rodger, Harry, Ralph, and Ray were joined by Gil Amelio, *GA A '65*, Henry Schacht, *CT A '56*, Pat Harker, *PA Δ 81*, and Jay Light, *NY Δ '64*. The VDG identified the need to connect with our "Army of 9,000" new graduates and recommended that focus groups be held to collect that information. After four meetings, new Vision, Mission and Purpose statements were created and proposals made to start a Young Engineer's Organization, develop a new major award to recognize an outstanding engineering accomplishment, and to form an Executive Advisory Board.

Much has been achieved in the past year to address the VDG recommendations and the focus group data that pointed to a need to put in place more alumni activities. Tricia Gomulinski, *SD A '98*, has volunteered to re-activate existing alumni chapters and begin the chartering for others. Since April 2012, Tricia and Curt Gomulinski have either attended or helped to plan more than 50 alumni events in 25 states! Atlanta, Boston, Ann Arbor and Treasure Valley, in Boise, are among the new alumni chapters. Existing chapters in Chicago, New York City, Dayton, Palm Beach, Central Connecticut, Southern Tier New York, Southern California, and Tampa are among those reactivated. Similar chartering and reactivation work is also in process in 14 other parts of the U.S.

I hope these activities are only the first of many initiatives that future leaders of Tau Beta Pi will embrace. We can accomplish much with teamwork that involves many stakeholders, including students and alumni. If we can unite as many of us as possible, and we each discover what we can do, the possibilities are endless.

—Larry A. Simonson, Ph.D., P.E.,
South Dakota Alpha '69, President

Constitutional Amendments Ratified

The 2012 Convention approved six packages of amendments to the Constitution and Bylaws of Tau Beta Pi and sent it to the chapters for ratification. In accord with the Association's amending procedure, with 241 chapters eligible to vote, 181 or more affirmative chapter votes are required to ratify an amendment, and 60 or more negative votes would defeat it.

Headquarters received 186 valid ballots by the voting deadline of April 1, 2013 (plus 6 invalid for lack of a chapter quorum). The Council acted on Amendments 1 – 4 on April 14 and voted on behalf of those chapters submitting an invalid or no ballot. The remaining two amendments were ratified by chapter vote, and all amendments are now in effect.

Amendment	Outcome
1. Consider graduate students eligible if they are "enrolled" rather than "in residence." Constitution Article VIII, Sec. 3 (a)	**1.** Unresolved by chapter vote; 176 affirmative, 10 negative. Ratified by Council vote for invalid and missing chapters.
2. Allow certain required actions to be completed without written documentation. Constitution Articles VI, Sec. 3; VII, Sec. 1 (a) and (b); Bylaws III, Sec. 3.01 (e)(9) and V, Sec. 5.03 (d)(6)	**2.** Unresolved by chapter vote; 151 affirmative, 35 negative. Ratified by Council vote for invalid and missing chapters.
3. Update Association officials' terms to begin at any point and be up to three years in length. Constitution Article IV, Sec. 2 (g); Bylaw XIV, Sec. 14.03	**3.** Unresolved by chapter vote; 161 affirmative, 25 negative. Ratified by Council vote for invalid and missing chapters.
4. Clarified the amending process by removing the words "undergraduate" and "collegiate." Constitution Article XVIII, Sec. 1 (b); Bylaw XV, Sec. 15.01	**4.** Unresolved by chapter vote; 168 affirmative, 18 negative. Ratified by Council vote for invalid and missing chapters.
5. Establish a position of Director of Alumni Affairs. Constitution Articles IV, Sec. 1, Secs. 2 (g), and 2 (g)(3); Article IV, Sec. 2 (g)(5); Bylaw III, Sec. 3.07	**5.** Ratified by chapter vote; 181 affirmative, 5 negative.
6. Change the name of "Alumnus" Chapters to "Alumni" Chapters. Constitution Articles II, Sec. 1; III, Sec. 2 (a) and (d); III, Sec. 3 (b); IV, Sec. 2 (g) (3); VII, Secs. 1, 2, 3, 4, and 5; and XVIII, Sec. 4; Bylaws I, Secs. 1.03 and 1.06 (b); III, Sec. 3.01 (e)(13) and (14); III, Sec. 3.01 (n); and XV, Sec. 15.03	**6.** Ratified by chapter vote; 181 affirmative, 5 negative.

EDITORIAL

The Ups and Downs of Flying & Bent Updates

I *love* to travel. The first flight I remember was when I was eight and my family flew on Republic Airlines through Memphis on our way to Orlando and Disney World. I recall the flight well, not because of the excitement, but because my younger brother and I screamed in pain during landing because our ears didn't pop. We heeded the advice of our parents on the connecting flight and chewed gum—and did so for many years.

I am by no means an extensive traveler like many Tau Bates, but my involvement in Tau Beta Pi has accounted for nearly half of the 75 flights I have taken in my life. Even now, I still get nervous at the prospect of flying. However, engineering, like it did for my fear of roller coasters, helps mitigate my anxiety each time I take a seat. It is also reassuring to note that data shows travelers are more likely to be in an accident driving to or from the airport than during the flight.

The statistics for flying are astounding. Each day, there are approximately 87,000 flights (27,000 commercial) in the skies over the United States. In 2011, there were just over nine million commercial flights in the U.S. and not a single fatality was reported, although there were 31 accidents. This is a testament to the pilots, crew, airline staff, mechanics, and yes, engineers who make air travel safe. Few industries employ such a broad group of engineers: aerospace, civil, computer, electrical, industrial, materials, and mechanical.

Nearly everyone can recount a bad experience while flying, and I am no exception. Frequent headlines highlight delays, rude passengers or employees, aircraft problems, congested airports, and a slew of other issues. At the same time, hundreds of millions of people are delivered safely to their destination each year. Given the alternative modes of transportation available and the need to get somewhere quickly, air travel is a miracle of our modern world. Of course, that doesn't mean it is always a pleasant experience!

While on a layover in April, I received an email with a subject of "Elite Upgrade Notification." After many flights, I had finally earned a free upgrade to first class, although it was on a small regional plane to Sioux Falls, South Dakota. It was a nice change from the normal experience in the coach cabin. Reflecting on my travels of the past year, the "free" upgrade was not without cost: an aborted takeoff, two aborted landings, an overnight stay in Reagan National, a seven-hour delay in Chicago, missing a couple connecting flights, and even leaving my wife in coach while I enjoyed my brief stint in first class—since she had flown first class before, she gave me the okay! The only thing missing is a lost piece of luggage—I'm sure that is yet to come.

Scholarships

Astute readers of The Bent will notice that the scholarship announcements and biographies are noticeably absent from this issue. The application deadline was extended to April 1 this year to allow students who would be initiated by June 1 to apply. This has been a frequent request of students, chapter advisors, and Director of Fellowships Steve Pierre. Recipients will be selected in June, and information about the 2013 Scholars will appear in the fall issue of the magazine.

Alumni Giving

This issue also features a list of members who donated to Tau Beta Pi—something only included in the winter and spring issues in years past. In order to recognize our donors closer to the date we receive a gift, the contributor's list will appear in each issue. Donors who contributed from February to April appear in this issue; May to August donors will appear in the fall issue, and so on. As always, *Thank You* to the many members who so generously support the work of the Association.

Photo by Chris Wooten

Lyle's Laws

I am pleased to announce that Lyle's Laws is back—although sadly only for this issue. At the encouragement of a number of members, Lyle has published "Lyle's Laws" in book format which can now be ordered online. In addition, Lyle is offering a special deal to ΤΒΠ members interested in an autographed copy while also supporting the Association. Information is provided on page 46 along with a reprint of Lyle's favorite law, "The Law of Thinking." Additional details about the offer and the book are available on our website, *tbp.org/pubs/LylesLaws.cfm.*

Until Later,

GOLDWATER SCHOLARS NAMED

The Barry M. Goldwater Scholarship and Excellence in Education Foundation has announced 271 scholarships for the 2013–14 academic year to undergraduate sophomores and juniors from the United States.

Some 35 Tau Bates were among those named for the awards, which comprise one and two year scholarships to cover the cost of tuition, fees, books, and room and board up to a maximum of $7,500 per year. They are:

Amin Aalipour, *CA Γ '14*
Eric A. Alt, *TX I '14*
Arslan Arshad, *AL E '15*
Peter M. Attia, *DE A '14*
(Chapter Treasurer)
Madelyn R.B. Ball, *NH A '14*
Matthew S. Berk, *MS A '14*
Drew A. Birrenkott, *WI A '13*
Davis W. Blalock, *VA A '14*
Alissa C. Bleem, *MT A '14*
Nikhil K. Bommakanti, *IL Z '14*
Emily C. Buck, *PA Z '14*
Annicka K. Carter, *UT A '14*
Amanda Chen, *NY K '14*
(Chapter President)
Qi Chen, *KS A '14*
Steven R. DelaCruz, *NV A '15*
Ria C. Domier, *AL B '14*
(Recording Secretary)
Brittany A. Earle, *CO B '15*
Sara A. Ehlert, *UT B '14*
Braden J. Hancock, *UT B '15*
Josiah P. Hanna, *KY A '14*
(Corresponding Secretary)
Weston K. Kightlinger, *OK B '14*
(Chapter President)
Noah A. Kurinsky, *MA Δ '14*
(Chapter Vice President)
Corey R. Landrey, *LA A '14*
Joseph M. Mitzel, *MT B '13*
David A. Monteiro, *NJ A '14*
Joshua D. Moon, *AL B '14*
Katherine A. Moravec, *IN B '14*
(Chapter President)
Benjamin M. Rouleau, *VT A '14*
Kushal Seetharam, *NC Γ '14*
Matthew L. Sherick, *MT A '14*
Grace V. Tilton, *NY Γ '14*
Jonathan P. Timcheck, *OH Γ '15*
Matthew C. Vedrin, *FL H '14*
Shannon Wongvibulsin, *CA E '14*
Joshua S. Yarmush, *NJ B '14*

CALL FOR WRITERS

The Editor of The Bent is frequently searching for well-written, general interest, feature articles for the magazine. Many of you have the appropriate experience and are qualified for and capable of preparing such a feature. If you have a topic that you believe would be suitable, email proposals to *tbp@tbp.org*. Members working on interesting research or design projects are encouraged to submit an article. Manuscripts should be 1,000-3,000 words, double-spaced, and submitted as a text or MS Word document. Publishing decisions cannot be guaranteed.

Pramod P. Khargonekar, Ph.D., *Florida Alpha '81*, has been chosen by the National Science Foundation to be assistant director for the directorate of engineering. He will lead the ENG directorate with an annual budget of more than $800 million, investing in research and education. Currently, Khargonekar is deputy director for technology at the Department of Energy's Advanced Research Projects Agency-Energy. He will remain professor of electrical and computer engineering at University of Florida.

Thomas H. Massie, *Massachusetts Beta '93*, is the United States Representative for Kentucky's 4th Congressional District. Previously the Republican was judge-executive of Lewis County, KY, from 2011 to 2012. At MIT, Massie and his wife Rhonda started SensAble Technologies, based on haptics (tactile feedback) systems used in 3D design. SensAble acquired over $40 million in venture capital funding and developed many patents before the couple returned to Kentucky to raise their four children.

Michael R. Bloomberg, *Maryland Alpha '64*, has become the largest living donor to education in American history with a $350 million gift to Johns Hopkins University. This brings to $1.1 billion the amount the New York mayor has donated to his alma mater. The latest gift will see $250 million spent on faculty devoted to such projects as the global water crisis and urban planning and $100 million for financial aid. Bloomberg also recently pledged $100 million to the Bill & Melinda Gates Foundation and others to fight polio. He has vowed to give away his entire $25 billion dollar fortune during his lifetime.

Nicholas J. Altiero, Ph.D., *Indiana Gamma '69*, has become president-elect of the American Society for Engineering Education. He is dean of the Tulane University school of science and engineering. Altiero will take over as ASEE president in June 2014.

Bevlee A. Watford, Ph.D., *Virginia Beta '81*, was elected ASEE vice president, external relations. She is associate dean, academic affairs, and professor of engineering education at Virginia Tech.

Bonnie J. Dunbar, Ph.D., *Texas Epsilon '83*, has been recruited by the University of Houston to lead a new STEM center there and to join the faculty of the college of engineering. The retired NASA astronaut and veteran of five space flights went on to hold senior management positions with the space agency. Prior to joining UH, Dunbar was based in the Seattle area, consulting on STEM education and space flight technology.

Col. Kevin A. Ford, Ph.D., *Indiana Gamma '82*, launched into space October 23 aboard *Soyuz TMA-06M*. The NASA astronaut and retired USAF colonel became commander of Expedition 34 on November 18 with the departure from the *ISS* of the *Soyuz TMA-05M* spacecraft, which returned the Expedition 33 crew to Earth. He, along with the crew of *Soyuz TMA-06M*, returned to Earth on March 16.

Robert E. Kahn, Ph.D., *New York Eta '60*, is among the five Internet pioneers named as the first winner of the Queen Elizabeth Prize for Engineering. The U.K.-based award aims to be a *Nobel Prize* for engineering. The engineer and computer scientist, along with Vinton G. Cerf, invented the Transmission Control Protocol (TCP) and the Internet Protocol (IP), the fundamental communication protocols of the Internet.

Stephen A. Cook, Ph.D., *Michigan Gamma '61*, received the Gerhard Herzberg Canada Gold Medal for Science and Engineering. He is professor emeritus of computer science at the University of Toronto, and is a pioneering mathematician who posed the "P versus NP problem." His ideas led to new fields of inquiry, and he made contributions to complexity theory, computational theory, algorithms and programming. The award is the highest of Canada's Natural Sciences and Engineering Research Council and comes with C$1 million in research funding.

EXECUTIVE COUNCIL MEETINGS

The Executive Council met via teleconference on January 16, February 20, and March 20, 2013.

The Council enthusiastically voted three ΤΒΠ Superior Service Awards and one Resolution of Appreciation to retiring advisors of the collegiate chapters.

Andrea M. Ramsey, *KY A '12*, and Christina M. Harrison, *TN A '93*, were appointed as District 6 and 11 Directors, respectively, to terms ending June 30, 2015.

A.J. Passman, *FL A '06*, was appointed to the Engineering Futures Planning Committee to a term ending June 30, 2014.

B.A. DeVantier, Ph.D., P.E., *IL E '77*, was appointed to the Laureate Selection Committee to a term ending June 2014; S.L. Forkner, *WI A '96*, was appointed to the Alumnus Recognition Selection Committee to a term ending June 2015; and Sandra L. Woods, Ph.D., *MI A '76*, was appointed to the Outstanding Advisor Selection Committee to a term ending June 2015.

Petitions to charter the Greater Boston Area Alumnus Chapter and the Ann Arbor Alumnus Chapter were approved. Petitions to rename the "Houston Alumnus Chapter" to the "Texas Gulf Coast Alumnus Chapter" and the "West Palm Beach Alumnus Chapter" to the "Palm Beach/Broward Alumnus Chapter" were also approved.

Executive Director Gomulinski reported on the status of the Student Advisory Board and discussed a proposal for a new member benefit that would be presented at the April Council meeting.

Mr. Gomulinski reviewed the status of the 2012 Alumni Giving Program; the 2nd quarter financial report was accepted; and final distributions of $35,000 from the estate of Charles O. Forge, *CA Γ '56*, and $700 from Robert D. Sickafoose, *IL B '50*, were received. The Council allocated these distributions to the General Fund.

The schedule of District Conferences was discussed, and the presentation from the Council representative was reviewed and finalized.

The status of the Distinguished Alumnus Award was reviewed, and the Council agreed to extend the nomination deadline to April 1, 2013.

A proposal to establish a nominating committee of Alumnus Chapter representatives to complement nominations received from chapters and individual members was approved.

The Council accepted a proposal for the number of Fellowships with stipend to be awarded in 2013-14 as well as the amount of outside support a Fellow may receive with stipend. A scheduling conflict with one of the Fellowship Board members was reviewed, and the Council agreed to the Director of Fellowship's plan.

Councillor J.F.K. Earle reviewed the status of the MindSET program and presented an action plan for the teacher training component of the program. Several school districts are now interested in this component, and Councillor Earle reviewed the plan that would involve local school districts conducting the training.

The Executive Council met in Orlando, FL, on April 13 - 14, 2013.

The Council voted a ΤΒΠ Resolution of Appreciation to R.J. Marley, Ph.D., *MT A '83*, for his service on the Outstanding Advisor Selection Committee. It also voted a ΤΒΠ Distinguished Service Award to M.L. Peterson, *IA A '89*, and a ΤΒΠ Resolution of Appreciation Award to R. Singhal, *PA Γ '00*, for their volunteer work as Engineering Futures Facilitators.

Executive Director Gomulinski reported that enough chapters had voted to ratify only two of the Constitution amendments from the 2012 Convention: changed "Alumnus Chapters" to "Alumni Chapters" and established the position of Director of Alumni Affairs. The Council cast ratification ballots for those chapters that had not voted for the other four amendments and ratified the amendments to consider graduate students eligible if they are "enrolled" rather than in "residence," allowed actions to be taken without written documentation, updated Association officials' terms, and clarified the amending process.

The Council reviewed the inspection report of the visit to a petitioning group at the University of Texas-Pan American; that petition will be presented to the 2013 Convention.

The Councillors discussed their participation in the District Conferences and the alumni events held in conjunction with each conference. They judged the alumni

(continued on page 61)

LETTERS

Asteroids Etc.

• Regarding the letter by Marion A. Darrow, *AZ A '61*, in the Spring 2013 issue of The Bent about mid-day darkness in western New York in 1950, his memory is accurate but no extraterrestrial explanation is needed.

According to "The Great Smoke Pall—September 24-30, 1950," by Harry Wexler in the December 1950 issue of *Weatherwise*, smoke from forest fires near the boundary of British Columbia and Alberta drifted over most of the eastern United States and as far as western Europe for nearly a week.

Pilots reported heavy smoke about 8000 to 15000 feet above sea level, with generally good visibility underneath, so people on the ground did not necessarily realize that the darkness was caused by smoke. An especially thick smoke plume passed over the Great Lakes and mid-Atlantic states on Sunday, September 24, which (combined with low clouds) reduced illumination in Sault Sainte Marie to as low as one percent of the normal clear sky value, and Buffalo reported midafternoon darkness similar to pre-dawn or twilight.

The darkening in this case was unusually intense, apparently because the smoke was simply carried downwind without much dispersion due to the lack of active storm systems. When I have seen volcanic dust aloft (after the Mount Saint Helens eruption) or smoke from very distant forest fires, it resembled a thin high cloud cover that reduced the daylight only slightly.

Steven R. Schroeder, OH H '79

"Good Work"

• Enclosed is an old address label. Please change to the new address. I always read The Bent from cover to cover. Keep up the good work.

James E. Bates, LA Γ '55

• I wanted to thank you very sincerely for your wonderful letter and accompanying Spring 2013 issue of The Bent of Tau Beta Pi. I am grateful to be a member of Indiana Gamma Chapter.

My father, who was also a member of the same Chapter, was a tremendous supporter of Tau Beta Pi. He passed away in 2010. I am certain that this mention in The Bent would have made him extremely proud.

I grew up with The Bent as a constant on our coffee table. Your letter and enclosed issue reminded me what a wonderful gift The Bent truly is.

Thomas F. Degnan, Jr. IN Γ '73

MOOCs Etc.

• I just finished reading your article on MOOCs in The Bent and find the topic exhilarating. Yes, the "establishment" of universities and colleges will react in a binary manner. Fear will grasp some thinking that MOOCs may put them out of business and the more rational thinkers will realize MOOCs will only serve to GREATLY improve the world, enhance their connectedness to prospective students, and improve accessibility to education to enable the poor with hope and an opportunity (if self-motivated) to work their way out of poverty.

David W. Clark, P.E., PA Λ '86

• Did you (Alan Brown) hit a *Home Run* with your informative article in the Spring 2013 The Bent titled "MOOCs Make Their Move". Keep up the outstanding work! Also, I always enjoy your ASME magazine articles.

Joel T. Yerby, P.E., IL Δ '56

Augustine Profile

• Well done! I also enjoyed your earlier profile of Maria Klawe. Both great role models.

Two comments on Norm:

1. His book *Augustine's Laws* is a gem, worthy of an article by itself.

2. Some years ago, I believe when he was chairman of the NAE, he wrote an article for *The Bridge*, its journal, decrying the lack of interest in engineering by the young. He opined that if there were a TV program with the title *L.A. Engineer*, mimicking the then popular *L.A. Law* TV serial, the interest might be enhanced.

Keep up your profiles.

Andrew J. Viterbi, Ph.D., MA B '57

Metrics Metered

• The Winter 2013 issue of The Bent included some interesting observations on metric vs English units from Arthur Delagrange, Ph.D. His comments notwithstanding, there is one overriding reason for the U.S. to adopt the metric system: the U.S. is the only country not using it.

Jack M. Mahaney, Ph.D., P.E., VA Γ '82

Mentor's Challenge

• The biggest challenge a mentor has with a mediocre (Ph.D.) student: clipping his wings and making him humble. At MIT, the brilliant faculty members do it right. And, the MIT students are among the most accomplished in America.

America is blessed with many fine engineering schools. For myself, it is a pleasure to read in The Bent about the young students and all their substantial accomplishments. Furthermore, those students seem to have bright, wholesome-looking faces. Oh, to be young again!

Philip J. Greenberg, Ph.D., NJ A '63

Travel Article Unreadable

• I enjoyed "Notes from a Decade of Travels in a World Without Walls" in the Spring issue of The Bent, but found it very difficult to read with those background squiggles behind the text. I told my wife that she might enjoy it, and the first thing she said after finishing it was "That background made it HARD to read!"

Myron A. Calhoun, Ph.D. KS A '63

Executive Council Nomination

A new Executive Council of Tau Beta Pi, to serve the 2014-18 term, will be elected by the 2013 Convention in Ames, IA, in November. The term of the present Council will expire in the fall of 2014, the year between election of the new group and its assumption of office being used to instruct the new Councillors in their duties. In response to President Larry A. Simonson's call for Executive Council nominations, one slate of candidates has been nominated, and nominations may be made by any member at the 2013 Convention. The Council is Tau Beta Pi's board of directors and consists of five alumni who serve concurrently for a four-year term. Members of the Council may reside within any geographical area. The Executive Council names its own officers—chair, who is also the President of the Association; vice chair, who is also the Vice President of the Association; and three Councillors, one of whom serves as Secretary of the Council. Nominees of the Executive Council slate for the 2014-18 term are as follows:

Elevate Slate Nominated by the FL E Chapter

Joseph P. Blackford, *DC Gamma '95*, has served as an Engineering Futures Facilitator since 2003 and a District 4 Director since 2005. He is a graduate of George Washington University with a B.S. degree in civil engineering, summa cum laude, with a secondary field in biological anthropology, and an M.S. in environmental engineering. He is a lecturer in engineering management and systems engineering at GW and teaches undergraduate courses in probability and statistics, as well as graduate level courses on stochastic processes and decision analysis. He is also director of the GW science and engineering apprentice program which supports efforts to nurture high school and college students' interests in STEM careers. Previously, he was the senior environmental services engineer at the American Public Power Association, where he provided technical, regulatory, and compliance assistance to APPA members and staff on issues facing electric utilities. He enjoys traveling and outdoor activities in his spare time.

Susan L.R. Holl, Ph.D., *California Lambda '76*, received her B.S. in electrical engineering, and B.S and M.S. in materials science and engineering from the University of California, Davis. She earned her Ph.D. in materials science and engineering from the University of California, Berkeley. As an undergraduate, Sue was active in professional societies including SWE, IEEE, ASM, Phi Kappa Phi, and ΤΒΠ, serving as Treasurer of CA Lambda. Upon completing her Ph.D., Sue joined the faculty of the department of mechanical engineering at California State University, Sacramento. During her career at CSUS, she has taught graduate and undergraduate courses, pursued research in semiconductor device fabrication and advised student professional organizations. She is currently the department chair. When Sue joined the faculty at CSUS and found that there was no Tau Beta Pi chapter, she immediately began to establish one. CA Upsilon was installed in 1984, and Sue has been Chief Advisor ever since. Throughout her career, Sue has been active at the chapter and district level, has served on the ΤΒΠ Scholarship/Fellowship Board since 1994, supported the CA Upsilon and Lambda chapters in hosting the 2008 Convention, has been active in the Advisor and Alumni Chapter committees at Convention, and has served as President, Treasurer and Secretary of the Sacramento Alumni Chapter. During her free time, Sue enjoys local activities with her daughter, Christy (CA Λ '09), and son-in-law Mike, and visiting Jiaxing City, China, where her son, Danny, and his fiancée, Ann, currently reside.

George J. Morales, Ph.D., *Florida Epsilon '06*, has served as an Engineering Futures Facilitator since 2010 as well as serving on the Engineering Futures Planning Committee. He is a graduate of the Pennsylvania State University with a Bachelor of Science in Electrical Engineering. He graduated with a M.Sc. and Ph.D. in electrical engineering from Florida Atlantic University. Currently, George is employed at Intel Corporation as a test research and development engineer in Chandler, AZ. He currently focuses his efforts on test technology development under the sort test technology division group for a variety of client products. George has also been an active participant in the Stay with It! program, which is based on collaboration between industry, academia and government. The White House Council on Jobs and Com-

petitiveness created this program to address the high dropout rate in undergraduate STEM programs within the United States. George is an avid basketball player and enjoys spending time outdoors and traveling. He is married with two daughters and enjoys spending time with them.

Alan J. Passman, *Florida Alpha '06,* is a radiation effects test engineer for Honeywell Aerospace in Clearwater, FL. He prepares, tests, and evaluates electronic devices at both the microelectronic and system level on their ability to perform while in different radiation environments ranging from natural space to weapons effects. Alan received his B.S. and M.S. in electrical engineering from the University of Florida in 2006 and 2007, respectively. He completed his Masters in Business Administration at the Hough Graduate School of Business at UF in 2012.

While at Florida from 2003-2007, Alan was active in Tau Beta Pi, Eta Kappa Nu, the Engineering Student Advisory Council, and student government. He served twice as Treasurer for ΤΒΠ's Florida Alpha Chapter before becoming President for a year. Remaining active and involved in the Association, Alan has been an Engineering Futures Facilitator since 2008 and is a member of the Interactive Chapter Exchange Committee and Engineering Futures Planning Committee. He is passionate about traveling, practices yoga, and is an avid sports fan.

Norman Pih, *Tennessee Alpha '82,* has served as an Executive Councillor since 2006 and is a graduate of the University of Tennessee with a B.S. in chemical engineering and the University of Delaware with an M.S. in chemical engineering. On campus, he was active in AIChE, Alpha Chi Sigma, and Tau Beta Pi, serving as Recording Secretary and then as President of the Tennessee Alpha Chapter. He joined the DuPont Company's field-engineering program and worked in the polymer products division, medical division, and central research and development. Norm then joined W.L. Gore & Associates, maker of Gore-Tex® products, in the medical products division in Flagstaff, AZ and currently works in regulatory affairs. He became an Engineering Futures Facilitator in 1989, served on the Engineering Futures Planning Committee and as a District 3 Director, and is currently an Advisor to Arizona Gamma. He and his wife, Kathy, are members of the Master Chorale of Flagstaff, a 100-voice community choir, and also sing in their church's choir. They enjoy the outdoor activities and scenery available in northern Arizona through biking and hiking.

DISTRICT 4

NC Epsilon at North Carolina A&T State University hosted the 35th annual District 4 Conference on their campus in Greensboro, NC, April 6.

Engineering dean Robin Coger, Ph.D., welcomed delegates. There were activities and workshops for members of the 18 chapters attending. University chancellor Harold L. Martin, Ph.D., *NC E'73,* was guest speaker.

NC Epsilon held a model initiation inducting their newest members. Executive Councillor Jason A. Huggins, P.E., took the lead role, supported by District Director Lisa C. Gascoigne, the host chapter, with Chief Advisor DeRome O. Dunn, Ph.D. Four alumni also attended.

DC Alpha (Howard University) took first place in chapter projects, and NC Alpha (NC State University) was runner-up. VA Epsilon at Virginia Commonwealth University in Richmond was chosen to host the 36th D4 conference in 2014.

—Martin R. Blow, *NC E'12,* Vice President

The Washington, DC, Alumni Chapter held a gathering at the Army Navy Country Club in Arlington, VA. Executive Director Curt Gomulinski discussed the Association's initiatives and generated a lot of interest in the issues facing our society. Pledges of support are coming in and are already being budgeted for the next event. **—Leonard Sadauskas,** *UT A'66,* President

DISTRICT 6

The 2013 District 6 Conference was held at Tennessee Tech University in Cookeville. Taking part were some 40 students, and two alumni, as well as Association officials. The conference officially kicked off with a cookout on campus. Dinner was served in the Prescott Hall followed by DICE and an on-campus scavenger hunt.

Saturday began with breakfast at the hotel, followed by presentations by the District Directors and Executive Councillor Norman Pih. Collegiate and alumni members then broke out into chapter operations, financial planning, and advisor/alumni groups.

All chapters at the conference were encouraged to present a project they had done this past year in order to compete for grants. They were given an 18-hour notice to design a two-minute presentation. AL A received the $500 prize for their egg drop competition, KY Γ received $250 for their Lego robotics project, and TN Γ received $250 for middle school tutoring and for hosting the conference.

—Ellen S. Styles, *AL Δ'85,* District 6 Director

DISTRICT 2

New York Mu at Union College was host to 83 students, 15 alumni, and Association officials for the District 2 Conference on the weekend of February 2-3. NY Gamma at RPI assisted with logistics. Activities included leadership training, a chapter operations workshop, and social and networking opportunities.

Student leaders were welcomed by NY Mu Conference Co-Chair Kyra Burnett and NY Gamma Conference Co-Chair Shawn Makarsky.

District Directors Anthony Olenik, Tom Pinkham, Jason Rogan, and George Youssef led a chapter operations workshop, which focused on key activities like Election, Initiation, Convention, officer election and transition. Executive Director Curt Gomulinski presented several new initiatives that the leadership team is implementing.

Sunday morning started with breakfast, a group picture and several hours of Engineering Futures training. Team chartering, group process, analytical problem solving, and people skills were presented by facilitators Cheryl Cheng, Wendy Harper, Felipe Leon, and J.P. Blackford.

Student leaders continued to socialize and discuss the weekend's events and their plans over lunch. The conference closed with a well-deserved round of applause.

—**Anthony M. Olenik**, *NY T '08*, District 2 Director

DISTRICT 5

Some 60 students and advisors from Florida, Georgia, Puerto Rico, and South Carolina traveled to Savannah, GA, in March for the D5 Conference.

Saturday afternoon began with a presentation by Executive Councillor Jason Huggins. After a discussion on creating an effective plan and learning about the upcoming Convention, students participated in District Interactive Chapter Exchange. The District 5 Project Award was presented to SC Gamma (Citadel) for their Storm the Citadel project.

The Storm the Citadel Trebuchet Competition had three categories. Hop-lite was for elementary school. Centurion was divided into middle school, high school, and post-high school. Barbarian class was for Google and SPAWAR. Each category built a trebuchet to a set of rules and competed for accuracy and distance.

There followed a traditional Southern buffet dinner.

On Sunday, incoming officers participated in chapter operations training. Outgoing officers participated in career preparation.

—**Rebecca A. Holcomb,** *FL A '04*, **Josuan Hilerio Sanchez,** *PR A '07*, and **Elizabeth A. "Beth"Stephan,** *OH K '93*, District 5 Directors

DISTRICT 14

Oregon Gamma at the University of Portland hosted the District 14 Conference in Portland, OR, on Saturday, March 2.

After breakfast and a rousing icebreaker, attendees jumped into an informational session on running their chapters in the coming year. This was followed by a "simulated semester," where members were able to put this new knowledge into practice, preparing the new officers for their tasks in the year to come with the mentorship of current officers and Association officials.

During lunch, Executive Councillor Norman Pih presented an update on the state of the Association. Afternoon activities included DICE, a campus tour, and a brainstorming session on how to stay involved with ΤΒΠ after graduation.

This concluded the program, and attendees adjourned to Madison's Grill where they met with local area alumni.

It was an excellent opportunity for students and alumni to socialize and network and also generated interest in reforming the dormant Portland Area Alumni Chapter.

—**Ian J. Frank,** *NY Π '09*, District 14 Director

Pennsylvania Mu Installed

PHOTOS: COURTESY OF PENN STATE BEHREND

Charter Presentation
William C. Lasher, Matthew D. Erdman, and Jonathan F.K. Earle (left to right).

The Pennsylvania Mu Chapter of Tau Beta Pi was installed at Penn State Erie, The Behrend College, on January 26, 2013.

Councillor Jonathan F.K. Earle, Ph.D., P.E., was the official installing deputy of the Society's 246th collegiate chapter, assisted by Executive Director Curtis D. Gomulinski, District 2 Director Thomas A. Pinkham IV, and District 3 Director Alexander J. Rovnan.

The 2012 Convention granted a chapter to Tau Beta Nu, Behrend's engineering honor society, represented in Lexington, KY, by Matthew D. Erdman, president, and William C. Lasher, Ph.D., *MI Γ '76*, chief advisor.

The Reed Union on campus was the site of the formal ceremonies of initiation and chapter installation. The initiation team included: Abigail M. Erinc, *OH A '13*; Zahi M. Kakish, *OH K '13*; Bronson J. Lamoncha, *OH Λ '13*; William C. Lasher, Ph.D.; Teresa McKinney, *OH Λ '14*; Michelle M. Mekker, *NY N '13*; Peter W. Schmidt, *OH A '13*; Lauren B. Stutzman, *NY N '13*; Brian J. Widman, *OH A '13*; E. Tyler Young, *OH A '13*; and the four Association officials listed above. Twenty-three undergraduate students and twenty-two alumni (identified on the facing page) comprise Pennsylvania Mu's charter members.

Immediately after the formal initiation, the new members were constituted a new chapter in the ceremony of installation conducted by Dr. Earle. The ceremony included the formal election and installation of the chapter's charter officers and advisors (identified in a photograph caption on the facing page).

At a banquet following the installation, Mr. Erdman, chapter president, served as master of ceremonies and welcomed the initiates, visitors, faculty, and friends. Dr. Lasher expressed his gratitude to everyone for their hard work in bringing a chapter to Penn State Erie and especially called attention to Kathleen J. Muhonen, Ph.D., for her work in getting the local society started. Dr. Ralph M. Ford, Ph.D., director, school of engineering, indicated how proud the school was to have a chapter on campus and this occasion marked the realization of a goal that the faculty set over 20 years ago.

Dr. Earle, Mr. Gomulinski, and Mr. Rovnan welcomed the new members into the Association and challenged them to continue their pursuit of excellence and to serve their alma mater and fellow students. The new members were encouraged to identify their passion and utilize their engineering background to fulfill their dreams.

Student Initiates

Front row (L-R): Timothy B. Kaminske, Tyler R. Ewing, Sarah J. Crosby, Jeremy T. Hall, and Ali Y. Ismail. Back row: Steven T. Cowen, Clayton H. Altemose, Matthew D. Erdman, Matthew D. Blair, Gregory S. Fuener, and David T. Gregory.

Student Initiates

Front row (L-R): Timothy J. Karls, Dominic A. Sarachine, Robin L. Siegenthaler, John B. Pearson, and Taylor L. Pearson. Back row: Vincent M. Rice, Bryan Smith, Matthew C. Schneider, Andrew J. Opalewski, Joel R. King, Ronald J. Radovich, and Jacob P. Shaffer.

Alumni

Front row (L-R): Matthew S. Florian; Matthew J. Heid, Catherine E. Franks, Molly K. Eberly, and Colin J. Etzel-Hardman. Back row: Steelton W. Flynn, John C. Curtin, Nathan T. Hansen, Jeffrey T. Erdman, Brandon H. Bruner, and Stefan M. Gracik.

Alumni

Front row (L-R): Benjamin T. Pleso, Nathan J. Sydlik, Kathleen J. Muhonen, Jacquelyn L. Marsh, and Kathleen S. Nicholas. Back row: Nicholas M. Snyder, Erik J. Johnson, Matthew C. Krugh, Christopher M. Nocera, Timothy A. McNeal, and David T. Jesberger.

First Officers and Advisors

Front row (L-R): Andrew J. Opalewski, Matthew C. Schneider, Matthew D. Erdman, Ali Y. Ismail, and Joel R. King. Back row: William R. Miller; William C. Lasher, Oladipo Onipede, and Thomas L. Hemminger.

Initiation Team

Front row (L-R): E. Tyler Young; William C. Lasher, Curtis D. Gomulinski; Jonathan F.K. Earle, Thomas A. Pinkham IV, and Alexander J. Rovnan. Back row: Zahi M. Kakish, Lauren B. Stutzman, Michelle M. Mekker, Brian J. Widman, Abigail M. Erinc, Peter W. Schmidt, Bronson J. Lamoncha, and Teresa McKinney.

New Jersey Zeta Installed

PHOTOS: COURTESY OF WAYNE HOLLENDONNER

Chapter Installation
Charter members of New Jersey Zeta gather for a group photo following initiation.

The New Jersey Zeta Chapter of Tau Beta Pi was installed at The College of New Jersey in Ewing on March 2, 2013. Councillor Jonathan F.K. Earle, Ph.D., P.E., was the official installing deputy of the Society's 247th collegiate chapter, assisted by Executive Director Curtis D. Gomulinski, District 3 Director Alexander J. Rovnan, and District 2 Directors Anthony M. Olenik and George Youssef.

The 2012 Convention granted a chapter to The College of New Jersey Engineering Honor Society, represented in Lexington, KY, by Ashley M. Polhemus, president; Parth P. Shah, vice president; Elizabeth R. Parriott, recording secretary; Kunal Jani, corresponding secretary; and Manish Paliwal, Ph.D., *NJ Δ '03*, Chief Advisor.

The Library Auditorium on campus was the site of the formal ceremonies of initiation and chapter installation, witnessed by Joseph W. Drosdick, *PA E '55*, and Michael Shenoda, Ph.d., P.E., *NJ Γ '98*.

The initiation team included: Adam J. Freitag, *NJ B '14;* Christopher M. Gaylo, *NY Γ '75;* Nirav Giri, *PA E '13;* Christopher C. McComb, *CA P '12;* Steven Schreiner, Ph.D., P.E, *MA I '86;* and the five officials listed above. Forty-three undergraduate students and twenty-one alumni comprise New Jersey Zeta's charter members.

Immediately after the formal initiation, the new members were constituted a new chapter in the ceremony of installation conducted by Councillor Earle. The ceremony included the formal election and installation of the chapter's charter officers and advisors.

At a banquet following the installation, Ms. Polhemus, chapter president, served as mistress of ceremonies and welcomed initiates, family and friends, faculty, and guests. Dr. Schreiner, dean of engineering, thanked everyone for participating in the day's activities, and expressed his excitement in having a chapter at TCNJ. Dr. Earle, Mr. Gomulinski, and Mr. Youssef welcomed the new members into the Association and encouraged them to stay active members before and after graduation.

Charter Presentation
Ashley M. Polhemus, Jonathan F.K. Earle, and Steven Schreiner (left to right).

Student Initiates

Front row (L-R): Harrison R. Billmers, Christopher J. Lawrence, Alyssa Hartigan, and Pamela G. Hitscherich. Row 2: Michael J. Bauer, Elizabeth R. Parriott, Julia A. Baaklini, and Dana R. Mathews. Row 3: Paige M. Corvino, Kristen M. Harding, Lauren E. Hazlett, and Parth P. Shah. Row 4: Casey M. Fontana, Ashley N. Napovier, Catherine L. Brabston, and Kevin J. Weld. Back row: Nicholas S. Izzo, Stephen Shiffer, Robert J. Seither, and Ian N. Bakst.

Student Initiates

Front row (L-R): Mark A. Sidebottom, Kenneth J. Ruddick, Ashley M. Polhemus, Jonathan Wang, and Kunal Jani. Row 2: Phillip Hawley, Vincent Carbone, Christopher F. Golon, Timothy D. Nugent, Rohit K. Reddy, Ritesh D. Patel. Row 3: Elliot S. Crane, John J. Heindel, Brit Zaro, David W. Hand III, and Luke T. Capritti. Back row: Daniel J. Fisher, Brian Dorward, Matthew Loewenstein, Kevin J. Dischino, Kevin M. Mittler, and Andrew J. Specian.

Alumni Initiates

Front row (L-R): Mary Waller, Kyle S. Wilson, Sean E. Brigandi, and Donald Docimo. Row 2: Caroline Wang, Brian C. Carrigan, Kamila Paluch, and Richard J. Castellano. Back: Elliot A. Stein, Shannon Frone, and Erin L. Dovel.

Alumni Initiates

Front row (L-R): Justin M. Binger, Kelly E. Brennan, and Michelle Sempkowski. Row 2: David J. Talarico, Amanda J. Hess, and Richa Lamba. Back row: Robert Allsop, Christopher G. Brinton, Steven D. Voinier, and Naiim S. Ali.

First Officers and Advisors

Front row (L-R): Advisor Michael Shenoda, Advisor Allen Katz, President Ashley M. Polhemus; Vice President Parth P. Shah; and Advisor Steven Schreiner. Back row: Corresponding Secretary Kunal Jani; Recording Secretary Elizabeth R. Parriott, and Treasurer Dana R. Matthews. Not Pictured: Chief Advisor Manish Paliwal.

Initiation Team

Front row (L-R): Christopher C. McComb; Adam J. Freitag; Anthony M. Olenik; Alexander J. Rovnan; Steven Schreiner, Jonathan F.K. Earle, and Christopher M. Gaylo. Back row: Curtis D. Gomulinski and George Youssef. Not pictured: Nirav Giri.

Missouri Epsilon Installed

PHOTOS: COURTESY OF SAINT LOUIS UNIVERSITY

First Officers and Advisors

Front row (L-R): Chief Advisor Krishnaswamy Ravindra, Advisor Raymond P. LeBeau, and Advisor Jessica E. Wagenseil. Back row: Corresponding Secretary Matthew A. Hackett; Cataloger Gayatri C. Nijsure; President Margaret F. Foster; Vice President Elizabeth R. Kreienkamp; Recording Secretary Miranda P. Turlin; and Treasurer Yolatl Ruiz de Gordoa.

Missouri Epsilon was installed as a Chapter of Tau Beta Pi at Saint Louis University on March 23, 2013. President Larry A. Simonson, Ph.D., P.E., was the official installing deputy of the Society's 248th collegiate chapter, assisted by Executive Director Curtis D. Gomulinski, District 8 Director Bruce A. DeVantier, Ph.D., P.E., and District 9 Directors Robert C. Huck, Ph.D., and Brenda A. Kramer.

The 2012 Convention granted a chapter to the Tau Beta Epsilon Engineering Honor Society, represented in Lexington, KY, by Yolatl Ruiz de Gordoa, treasurer, and Jessica E. Wagenseil, D.Sc., *CA Ψ '97*, advisor.

DuBourg Hall on the campus was the site of the formal ceremonies of initiation and chapter installation, witnessed by Eugene L. Mleczko, *CA Δ '47*; Steven O. Oluokun, *TX Λ '87*; and Kaitlin N. Page, *KS Γ '11*.

The initiation team included: Jessica Wagenseil; Krishnaswamy Ravindra, Ph.D., *PA B '79*; Raymond P. LeBeau, Ph.D., P.E., *VA A '90*; and the five Association officials listed above. Thirty-four undergraduate students, four alumni, and one eminent engineer (identified on the facing page) comprise the charter members.

Immediately after the formal initiation, the new members were constituted a new chapter in the ceremony of installation conducted by President Simonson. The ceremony included the formal election and installation of the chapter's charter officers and advisors (identified above).

Following the banquet in the Père Marquette Room, new members were welcomed by Dean Theodosios Alexander, Sc.D., *MO E '81*, Chief Advisor Ravindra, President Simonson, Executive Director Gomulinski, and District Director Huck. Alumnus initiate Francis T. Lyons shared his professional experiences with the new members and expressed his excitement in finally seeing a chapter at St. Louis University after his early attempt in 1959 did not succeed.

Initiation Team

Krishnaswamy Ravindra, Bruce A. DeVantier, Jessica E. Wagenseil, Robert C. Huck, Raymond P. LeBeau, Curtis D. Gomulinski; Brenda A. Kramer; and Larry A. Simonson.

Student Initiates

Front row (L-R): Vishesh Mathur, Diana M. Byrne, Margaret F. Foster, Gayatri C. Nijsure, and Miranda P. Turlin. Back row: Nathan D. Bossart, Yolatl Ruiz de Gordoa, Matthew A. Hackett, and Elizabeth R. Kreienkamp.

Student Initiates

Front row (L-R): Parry J. Draper, Carlos Herrero, Ellen A. Pifer, Gauri C. Nijsure, Lyndel R. Carlson, and Adrià Serra Moral. Back row: Keval S. Shah, Benjamin R. Winokur, and Callan M. Luetkemeyer.

Student Initiates

Front row (L-R): Jiajia Wang, Abdullah B. Shoaib, Chang He, and Gregory A. Bouché. Back row: Patrick Sowa, Kyle S. Donahue, William W. Behrens Jr., and Justin D. Schmeltz.

Student Initiates

Left to right: Cory A. Seidel, Benjamin A. Minden-Birkenmaier, Timothy M. Dreyer, Jeremy C. Payne, Ryan J. Hughes, Bradley J. Winkelbauer, and James L. Kane. Not pictured: Brian C. Kovarik.

Alumni & Eminent Engineer

Left to right: Mohammad U. Zahid, Theodosios Alexander (eminent engineer), John C. Wendel, and Matthew J. Chrisler.

Alumni Recognition

Left to right: Margaret F. Foster, Krishnaswamy Ravindra, Ph.D.; Francis T. Lyons; and Theodosios Alexander.

Enough For Tau Beta Pi?

Student chapters work hard on their campuses to promote the Association, gain new members, and have a "successful" year... How do we define "success"? When have they done enough?

FOR MOST of you reading this article, May 1 is just another day—the first one of the fifth month. It's a Wednesday in 2013. For me, May 1 is the deadline for this article. In my "work" life, May 1 is smack in the middle of the most chaotic week of the year: Spring Final Exams. The entire academic year builds up to this moment, the end of a long marathon. After a short (summer) recovery period, we start the race again.

This is also the time of transition for most Tau Beta Pi collegiate chapters. Old officers are graduating; new officers are curious and excited. It is a time to reflect back on the past year, and look forward to the next one. What does this transition look like? I thought it might be helpful to provide a glimpse into the chapter for which I am Chief Advisor—SC Alpha at Clemson University.

Elizabeth A. 'Beth' Stephan, Ph.D. Ohio Kappa '93, continues a periodic series examining ΤΒΠ *in the changing world of education, student life and honor societies. She is director of the general engineering program at Clemson University, where she is Chief Advisor to South Carolina Alpha and a District 5 Director.*

How Much Is Enough?

The number of projects completed by a chapter has risen dramatically. In 1976, they averaged three activities a year; in 1985, nine a year. In 2012, chapters winning Chapter Project Awards for outstanding project activity averaged 27 projects, while the overall Association averaged 12 per chapter.

As we fill out the required Chapter Survey and Chapter Project Reports, we find ourselves asking if we have done enough to continue to win an award. For those unfamiliar with this process, a note of explanation:

The Chapter Survey is a required report, asking the chapters to summarize everything from initiation data to chapter practices to use of marketing materials. They must indicate the number of projects completed. Then, for each project, a Project Report must be completed. These reports are read by Headquarters and judged for quality, quantity, percentage of membership participation, and breadth of projects. Rankings are compiled, and the top 20 or so schools receive a Chapter Project Award at Convention. The rankings also determine who makes the "short list" to be considered for awards like the R.C. Matthews or R.H. Nagel. If a chapter wins a Chapter Project Award three years in a row, it receives a $500 scholarship every year, as long as the chapter continues to win the award.

Our Chapter has been fortunate—we have won this award for the past four years. This is a blessing, but a bit of a curse. Each spring, we reflect back and debate if we have done enough to win another award, but there is no firm measure for comparison. Some sample projects we have conducted this year include:

- A student organization fair to introduce freshmen to the various engineering organizations they can join;
- Two *Mix and Mingle with Your Major* nights for freshmen, one each semester. Freshmen can meet upperclassmen, alumni and faculty to help choose a major;
- Two K-12 outreach programs, one in February for elementary students and one in April for middle/high school students;
- Initiation of an Eminent Engineer, who spoke at the fall initiation about leadership and the new Leadership Program in Engineering at Clemson {thanks Bob Hambright!};
- On the social side...a movie night and a trivia/ice cream night each semester;
- Helped with the Habitat for Humanity house build during homecoming week;
- T-Shirt sales to prospective students, 20 Friday afternoons, as a fundraiser. A portion of the proceeds benefit the Emerson Rose Heart Foundation;
- Operated a continuous canned food drive for Clemson Community Care;
- Oh, and two initiation cycles that require multiple meetings and the ceremony...and multiple Bent polishing days…and a breakfast officers meeting every three weeks…and two members attended the national Convention…and five members attended the district conference…and…

I need to pause and admit that SC Alpha has an amazing team of advisors, which I am privileged to be a part of—I don't want you thinking I helped the chapter with all these activities by myself!

I could go on, but you get the idea. We have had, by all accounts, a very busy, productive year. But we still find ourselves asking if we have done enough. I find myself lacking an answer for my students. It sounds hollow to say, "We tried our best" and, "You did a great job even if we don't win an award."

How Many Is Enough?

One of the factors that create the internal doubt is lack of membership. As a reminder from my previous article:

In Spring 2012, only 24% of the eligible candidates nationwide were elected, and less than 14% of the candidates nationwide were actually initiated. In 2011, there were 102,102 juniors and 144,683 seniors enrolled in engineering programs. If the top 1/8 of the juniors and top 1/5 of the seniors were eligible and everyone accepted, this would put membership at 41,700…not the 14,600 current undergraduate members.

Here at SC Alpha, we had a good year in terms of membership. In the fall, out of 251 prospective members,

we initiated 35; translation: 14%, the national average. In the spring, the chapter made it a priority to try and get new members. Students valiantly attempted to hand out personal invitations for membership to the 290 eligible students to supplement the usual email notification. We were on track to initiate 102 new members, but in the end wound up with only 69 completing the ceremony. While this is a superb 24% and the highest ratio we have had in several years, it just doesn't seem like enough. We failed to "close the deal" on 33 prospective members who showed an interest in the organization. Perhaps more alarming, we failed to even get a response from most of the 193 other eligible students.

How Do We Achieve "Enough"?

I sat down with the outgoing president (Jackson) and the incoming president (Sergey) and we discussed our membership "problem." Here is part of our conversation:

What is the biggest challenge to SC Alpha membership?

Jackson: It is recognition across campus. We have our Bent in front of one of the main engineering buildings and people walk by it, and they don't know what it is. It would be great if we got more support from the administration and the faculty in the different departments.

Sergey: We have taken the secrecy portion and not that we tried to apply it, but we stayed secret to the point that even members don't know [much] about it. Exposure is the major issue.

Do you think students are just too busy with other things? Do we have too many requirements for membership? (SC A requires three events per semester.)

Jackson: I think people don't see the benefits of joining. That is where the challenge lies—how to more attractive, more compelling to become involved. For example, yes, there are scholarships, and yes, real people do win them! ΤΒΠ prides itself on being able to give many scholarships and fellowships to members, and if you can say your chapter is competitive at the national level for these awards, more students will want to try to attain that same level.

Sergey: We need to make each event interesting for them to want to take time away from studying to attend, to enjoy the event. For service, you need to (personalize) who you are helping. If you collect canned food, but don't take it to the shelter to see the faces light up of the individuals thanking you, you never see the reactions to your effort.

Jackson: There is a good cohort of eligible students who… chose their organizations as freshman and have stuck with them through the years. By the time they are juniors or seniors, they are leaders of these organizations and highly involved. That is why you need to show why ΤΒΠ is different to their departmental organizations.

So what would you tell them – why should they join us?

Jackson: ΤΒΠ presents a unique opportunity to interact with engineers from other disciplines, which you don't get when you surround yourself with people from your department. This mimics the workforce. Being able to foster those relationships with people in other departments—I think ΤΒΠ represents a great opportunity to do that. Again, scholarships and fellowships are a huge benefit.

Sergey: Other student groups do not have as strong a state, district, or national organization. We are able to consistently interact with other members not just in our chapter but all across the nation.

So what do we need to do? What are our action items?

Jackson: We need to showcase national activities our chapter is involved in. Use a PowerPoint photo montage to highlight "This is convention, this is my committee, this is what we did…"; words can only convey so much. This would show the external structure of ΤΒΠ that most members do not know exists.

Sergey: We need to hear more from alumni. When I was a prospective member, we saw a video where they had members and alumni explaining why they joined ΤΒΠ and what the Society means to them. When you can see a student you know, a professor, and then alumni expressing how important ΤΒΠ is, it ties it all together.

How do you even get people to the meeting? You can show all this great stuff…but how do you get them in the door? Why do over 75% of eligible students not even respond?

Jackson: Probably because they think ΤΒΠ is just another honor society to pour their money into and not get anything in return aside from the name. As a freshman, you join XXX, YYY, ZZZ—which acknowledge academic achievement. So students toss ΤΒΠ off as another one of "those"; another line on your resume that you paid for. They don't really understand it. Getting current members to invite prospective members, like we did this semester, is important to put a face to ΤΒΠ.

Sergey: We need to step up our game on more modern communication. I'm not sure what that path would incorporate, but not necessarily paper invitations. Some more modern way to get that message across is key.

How Much Is Enough?

At the national convention, and sometimes at district conferences, we run a program called ICE—Interactive Chapter Exchange—as a way to help chapters discuss problems they are having and come up with solutions. This is often the most popular, giving students a chance to voice to frustrations and a take away of action items.

In the evolution of the program, we have found the same issues arising every year. We now cut to the chase, and provide a list of problems to kickstart discussion. I feel like I am caught in the same situation when dealing with my chapter. Every year, we begin with the same problems:

We need more exposure on campus, more alumni involvement, and more university support.

It is clear we are reaching the point where we need to push not only student members but also our alumni to stand up and say we matter. This is clearly a problem our student officers cannot solve alone. We need to find a way to reward all students and chapters for their time and effort, even if they don't win a national award or increase their membership, even if they don't meet the mark to win that scholarship again. We need to bring meaning to their undergraduate experience, allowing them to carry that record of accomplishment forward, so when they look back they can say Tau Beta Pi matters.

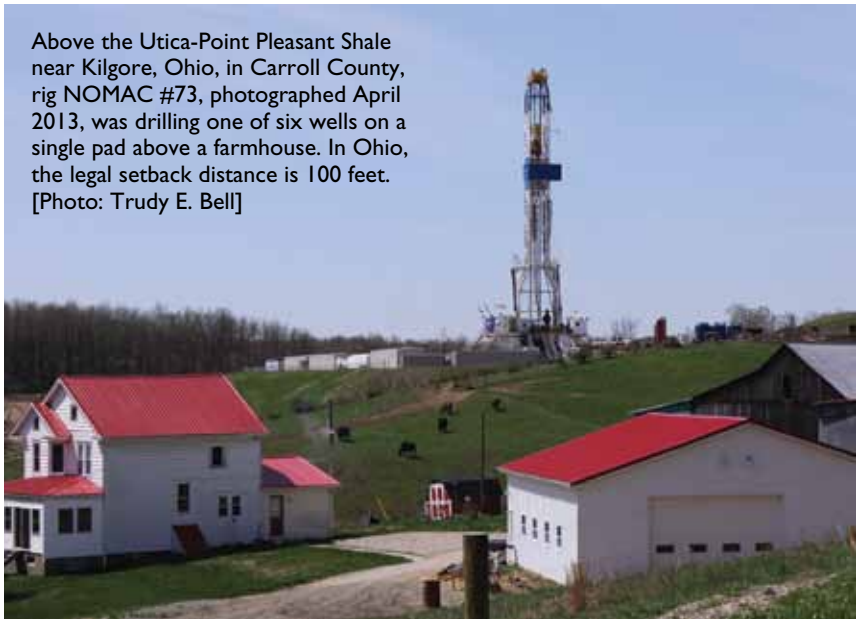
‘There’s Gas in Them Thar Shales!’ Shale Gas Recovery 101

Revolutionary engineering developments that have made shale gas economically feasible in the last decade are horizontal drilling and multistage hydraulic fracturing

By **Trudy E. Bell** (Copyright 2013 Trudy E. Bell)

$haleionaires. That is the name—complete with initial dollar sign—coined in 2010 for the newly rich farmers, ranchers, and other residents around the U.S. who have found that their homes and lands are sitting atop mammoth reserves of natural gas, in dinosaur-era shale rock a mile or more underground.

Geophysicists had known of its existence for decades, but petroleum engineers were long convinced that maybe only one or two percent of it might be recoverable. But in the last decade, technological developments have revolutionized the industry’s ability to tap shale reserves—half or more of which is now technically recoverable according to current estimates. That’s enough to power the nation for perhaps 90 years—figures that have revolutionized the industry’s commercial economics.



Above the Utica-Point Pleasant Shale near Kilgore, Ohio, in Carroll County, rig NOMAC #73, photographed April 2013, was drilling one of six wells on a single pad above a farmhouse. In Ohio, the legal setback distance is 100 feet. [Photo: Trudy E. Bell]

The result? Just as miners in the 19th Century rushed to Georgia, California, Australia, or Alaska intending to strike gold in Dahlonega, the Sierras, Victoria, or the Klondike, today oil and gas companies have been rushing to secure mineral-rights leases from individual land-owners in (just to name a few) Texas, Montana, North Dakota, Pennsylvania, and—the latest boom state right now—Ohio, to drill on or under their lands to tap the Barnett, Bakken, Marcellus, and now the Utica-Point Pleasant (Utica for short) shale “plays.” In Ohio alone, just 72 Utica shale wells had been drilled by May 2012—but even then the Ohio Department of Natural Resources was projecting 2,250 to be drilled by the end of 2015. Some visionaries speculate a future when cars might run on natural gas instead of gasoline; others foresee the U.S. becoming a net exporter of liquefied natural gas instead of a net importer of oil. Galloping after the newly rich are others hoping to profit from supporting industries: not only drilling and road construction contractors and refinery workers, but also steel makers, machine shops, truckers, hoteliers and restaurateurs, bankers, work truck and luxury car dealers, real estate agents, and lawyers.

Yet, around the nation, citizen groups have also organized vocal “anti-fracking” protests and even outlawed shale gas extraction in some states and municipalities. What are gas shales? If they are a mile or two underground, how is the natural gas extracted? And why has hydraulic fracturing for shale gas become so controversial?

Philosopher’s Stone

Oil and gas shales began as sediments 150 to 400 million years ago—primarily clay-fine silts building up on the quiescent bottoms of ancient tidal flats or deep-water oceans, mixed with organic (carbon-based) material from algae and other prehistoric organisms that died and drifted down to the sea beds. As the oceans gradually filled in, both the layers of sediments and the organic materials became compressed and heated by the weight of materials accumulating above. Over the eons, the organic-rich sediments ended up 500 to 13,500 feet underground—and by the alchemy of slow geological pressure cooking, converted into rock bearing crude oil, methane, propane, butane, ethane, and other liquid and gaseous hydrocarbons that modern society values as gold: for power, yes, but also for plastics, fertilizers, and other chemicals.

Similar to shale formations seen at the earth’s surface, the gas shales are thin horizontal layers of black or dark brown rock, some structurally strong and ductile but others quite brittle—the ones you are not supposed to trust your weight to when rock-climbing because the layers easily separate and fracture under your feet. Because some of the

TOP: Oil and gas well pads, likely over Colorado, are seen from a airliner. By 2015, a similar vista of 2,250 wells may greet travelers over Ohio. [Photo: Trudy E. Bell] CENTER: A drilling pad near Bradford, PA. [Photo: © Les Stone/ Greenpeace] BOTTOM: In Carroll County, Dominion East Ohio is laying underground natural gas pipelines. [Photo: Jeanne Bishop]

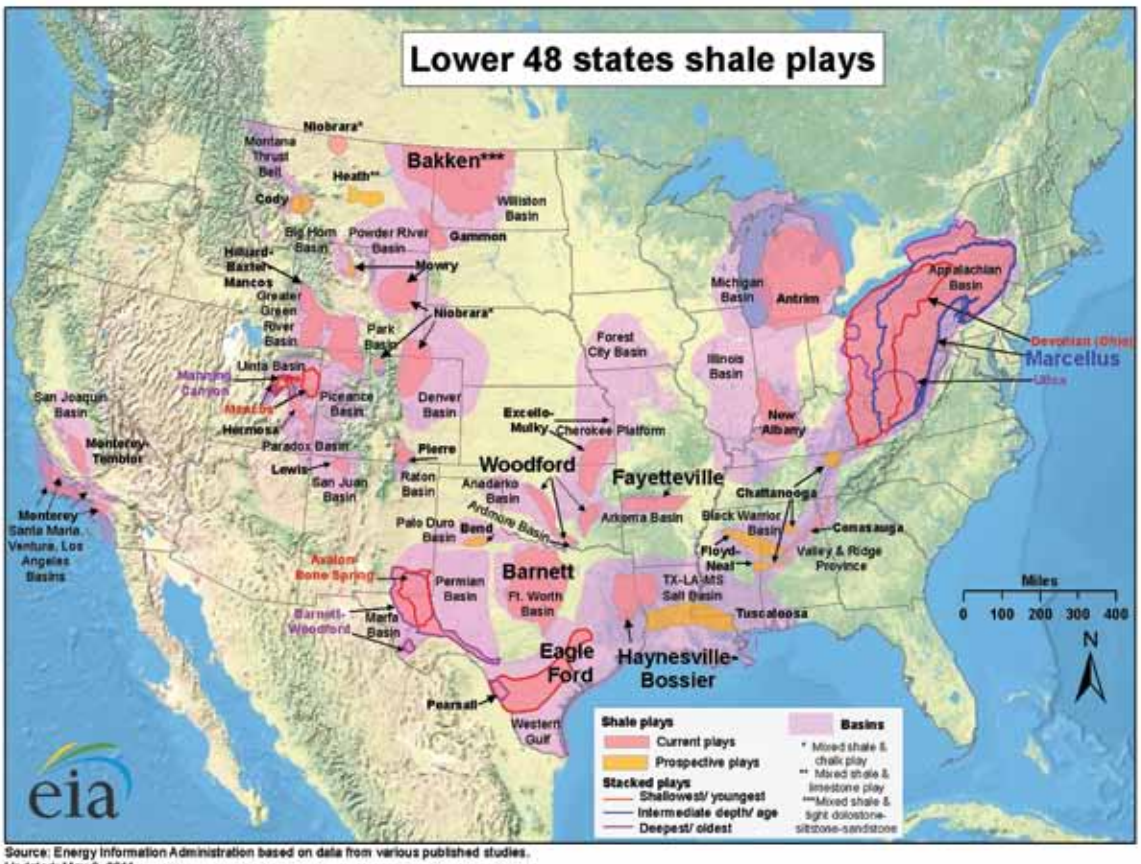
prehistoric seas were quite large, entire shale layers extend horizontally from 5,000 square miles (Barnett) to 95,000 (Marcellus), many underlying several U.S. states. Depending on location, however, a shale layer may be only 20 to 700 vertical feet thick. A few regions have overlapping shale layers: in eastern Ohio and western Pennsylvania, the Utica shale lies a couple thousand feet below the Marcellus.

Shale gas is often a dry gas consisting of perhaps 90% methane (CH_4) and needing little refining. But some formations also produce valuable "wet" gas (various heavier hydrocarbons in liquid form) and/or oil. A single shale play (including the Utica) may hold several hydrocarbons, in liquid or gaseous form, either concentrated in different regions or mixed together. In conventional reservoirs, oil, gas, or the other liquids pool in a natural cavity sealed between layers of impervious rock. In shales, the hydrocarbon molecules literally saturate the structure of the rock itself, almost like water molecules saturate the matrix of a damp sponge. You can't just stick a straw in it—or drill a well to it—and expect liquids or gas to begin flowing. Thus, gas shales are considered "unconventional" reservoirs. And unconventional reservoirs require unconventional extraction technologies.

Enter horizontal drilling and multistage slickwater fracturing—the two key technologies most often cited as revolutionizing the industry's economics. Jump-started by the OPEC crisis in the 1970s, when researchers began developing methods for tapping shale oil and boosting the recovery rates of older oil fields, both technologies were advanced primarily through collaboration among the U.S. Department of Energy (DOE), the Gas Research Institute (GRI), and petroleum companies. By the late 1980s, they became commercially viable for oil; in the early 2000s, the methods were adapted for recovering natural gas.

Drilling Sideways

Quick but essential vocabulary alert: In the general press, and even in the business press, the term "hydraulic fracturing" is often used in a broad sense that encompasses the entire months-long enterprise of locating the



Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

resources, drilling a well, fracturing the shale, extracting the hydrocarbons, and disposing of the fracturing waste. In the technical literature, the term "hydraulic fracturing" refers specifically and only to the literal fracturing of the shale rock after drilling and before extraction. Moreover, the technical literature shortens the term to "frac" or "fracing"—without either doubling the *c* or adding a *k*. With one important exception noted later, this article follows that narrower engineering usage.

Most schematic diagrams of rock strata and horizontal drilling show a vertical wellbore that turns at a neat 90-degree angle to form the horizontal lateral. Such diagrams can be misleading. Although short-radius turns can be made in particular formations for specific reasons, they pose technical challenges. Thus, many wellbores curve gradually, starting from a "kickoff point" perhaps several hundred feet above the "pay layer" of shale, until entering the reservoir at an angle. Such long-radius horizontal wells can be drilled with machinery used for drilling conventional vertical wells: the seemingly rigid drill pipe sections are flexible enough to be bent a few degrees off the vertical axis without incurring structural failure. Once in the shale pay layer, the drill bit then proceeds horizontally—or even along a complex trajectory if needed to circumvent an obstruction; such horizontal laterals routinely extend 2,500 to 5,000 feet, with some exceeding 12,000 feet. Guided in part by reference to earth's magnetic field, operators up at the surface control the altitude and azimuth of the drill bit using several "geosteering" or "geonavigation" methods along with fiber-optic sensors to measure position and downhole conditions. To maximize the flow of natural gas, the laterals are drilled more or less at right angles to the prevailing pattern of underground joints or faults in the shale (for example, in the Utica and Marcellus shales near the Ohio-Pennsylvania border, laterals are oriented generally north-northwest to south-southeast).

As the well is drilled, it is lined with several successive layers of steel casing that are anchored with cement. The casing is designed to prevent the hole from collapsing due to pressure or composition of surrounding rock; it also is intended to prevent fluids in the rocks from entering the wellbore, or natural gas from escaping from the wellbore into the rocks or into fresh drinking water aquifers. Muds are pumped into the well to lubricate and cool the drill bit, to return rock cuttings to the surface, and to force the cement upward between the outside of the casing wall and the rock. Once a lateral is drilled and cased, "perf" (perforation) guns punch holes in its casing that will allow the hydraulic fracturing fluid to enter the shale, and ultimately the natural gas to enter the wellbore. The perf guns shoot shaped charges—essentially, armor-piercing bullets—into the casing wall, commonly 120 degrees apart, along the casing. Alternatively, an uncemented pre-perforated liner may be used. Depending on depth, the process of drilling and casing generally takes 20 to 30 days (working round the clock).

Multistage Slickwater Fracturing

Once the well is drilled, cased, cemented, and perforated, the actual hydraulic fracturing begins. Because shale rock is not porous enough to let gas or liquids flow easily, the goal is to "stimulate" the well: create a dendritic (branching) pattern of connected open planar channels for the hydrocarbon molecules in the rock matrix to begin flowing to the wellbore and up to the surface. At a predetermined, calculated rate, fracturing fluid is pumped from the surface down into the shale to exert increasing pressure until the rock literally cracks—opening perhaps an eighth to a quarter of an inch. Additional fluids are pumped down the wellbore to widen and extend the fractures, along with sand. A far cry from ordinary beach sand, "fracsand" consists of uniformly sized, rounded grains of nearly pure silica quartz structurally hard enough to resist the deep underground pressures. The fluid pushes the fracsand into the newly formed network of fractures to prop them open permanently. After the fracturing is complete, fluids flow back up out of the well to the surface for a few days, followed by the hydrocarbon molecules, and the well begins producing. Q.E.D.

Of course, as always, the devil is in the details. Because laterals can be thousands of feet long, it is usually not possible to maintain the necessary downhole pressure to stimulate

their full length all at once. Also, much study has revealed that certain patterns of fractures (e.g., clusters) increase productivity. Thus, the shale is fractured in isolated stages each maybe a few hundred feet long, each isolated from the other by a temporary plug, starting at the far end of a lateral and working back to the vertical wellbore; depending on local conditions, more than 20 stages may be used, with somewhere around 10 being common.

Although wells have been stimulated using gels, foams, diesel, kerosene, or even napalm, the revolutionary advance that enabled today's wells is "slickwater" fracturing: plain old freshwater mixed with additives to reduce friction, kill bacteria, inhibit corrosion or buildup of chemical scale, or other purposes. Each stage commonly starts with a flush of a 15% solution of hydrochloric acid to dissolve salt crystals and thereby open and connect natural fractures and to unplug pores clogged by drilling mud or casing cement. Then the wellbore is filled with a "slickwater pad" to facilitate the placement of the fracsand. The volume of sand poured down the well is slowly increased as the volume of fluid is decreased; the fracsand mesh size may also be increased so that smaller fractures deeper in the shale are first filled with finer grains and larger fractures closer to the wellbore are filled with coarser grains. Then that first stage is temporarily closed off from the rest of the lateral and the process repeated for the next nearer stage. After all the stages are completed, the full wellbore and equipment are flushed with freshwater to remove excess sand. As each stage generally takes 20 minutes to 4 hours to complete, the full hydraulic fracturing process ("fracing" without a k) for an entire well takes maybe a day or two (working 24/7). Depending on the shale play, a single well commonly consumes between 2 and 6 million gallons of water (4.5 million is typical in the Marcellus and Utica shale plays) and between 0.5 and 4 million pounds (up to 2,000 tons) of fracsand.

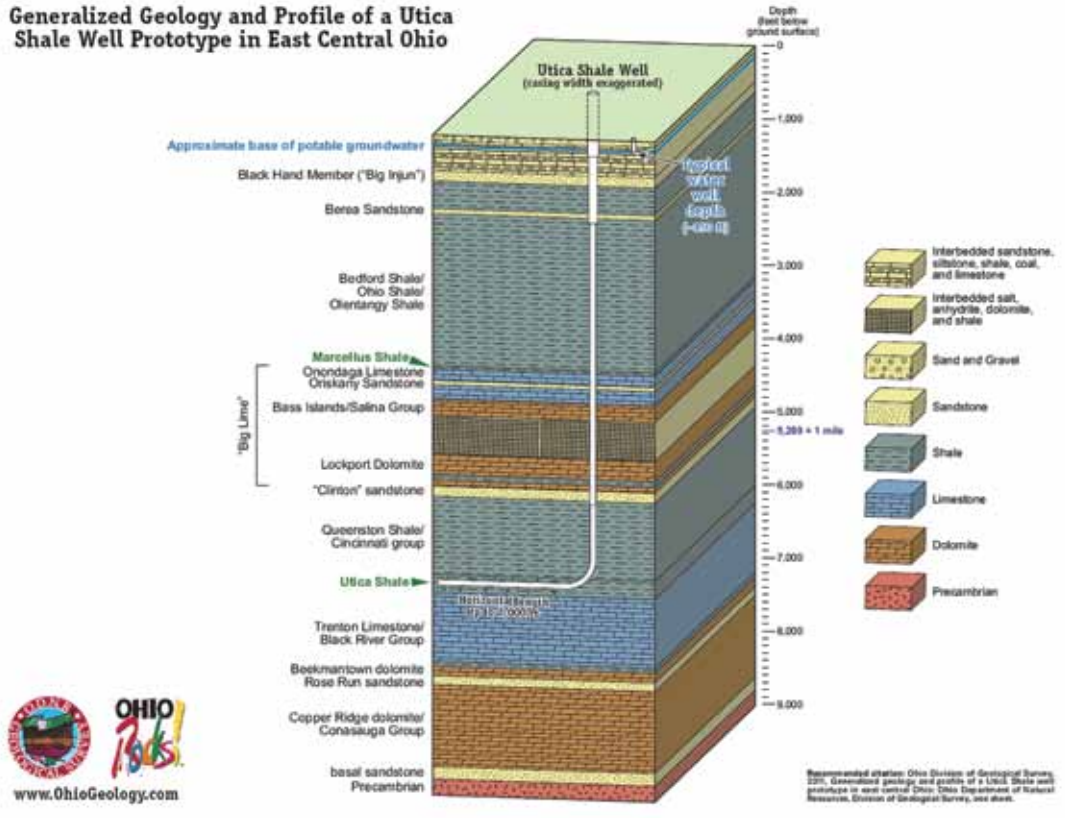
After the well has been fractured, some of the slickwater is absorbed by pores in the underground rock. But 5% to 50% of it returns as "flowback" over several days or weeks. This so-called "produced water" may have lower concentrations of any toxic additives (many of which have chemically converted to other substances or been absorbed by the rocks). In its round trip through the ancient seabed shale, however, the freshwater absorbs great concentrations of salts—sometimes returning from the wellbore as supersaturated brine up to 40% saline, 10 times saltier than seawater. It may also return with some concentration of naturally occurring radioactive materials (NORM) such as barium and strontium. Neither the great salinity nor the NORM can be handled by regular municipal sewage or water treatment plants, nor is it safe to release into waterways as is, nor to store in tanks to use for salting roads in winter ice and snow. In many shale plays, the millions of gallons of produced water is discarded: injected at high pressure into what are called Class II injection wells drilled to geological structures perhaps deeper underground than even the layers of shale. In arid regions such as Texas and the Great Plains, where freshwater is a precious and expensive resource, increasing research has been devoted to developing "closed-loop" systems that process and reuse the produced water in fracturing additional wells.

Highly Charged Epithet

Why has "fracking" (with a k) become such a highly charged epithet among a hefty portion of the general public?

Shaleionaires around the nation notwithstanding, state and local governments (indeed, other nations) have enacted moratoria, passed regulations regarding the additives used in the slickwater, or prohibited venting or flaring (the intentional releasing of hydrocarbon gases into the air, a common practice in drilling). In Ohio, tougher regulations were enacted in July 2012 when earthquakes around Youngstown were associated with injecting produced water into nearby Class II injection wells. Questions about the effects of fracking on local drinking water have been raised in several recent popular movies.

Some articles and editorials in the oil and gas industry media express bafflement at public resistance. They point out that when burned as fuel, natural gas emits about half the carbon dioxide as coal and 30% less than fuel oil (carbon dioxide is a greenhouse gas strongly implicated in climate



change), and 80 percent less of the harmful ingredients that cause smog (including nitrous oxide, a greenhouse gas more powerful than carbon dioxide). Lower-carbon natural gas could be a route away from today's coal and oil fossil fuels until renewable energy technologies such as solar and wind are commercially economic at national or global scale. For generating electric power, natural gas provides both reliable day-and-night "baseload" energy (like coal, oil, and nuclear) as well as rapid response to quick changes in demand (unlike coal, oil, or nuclear). The natural gas is underfoot here at home, increasing the nation's energy independence from foreign oil. The new abundance of natural gas has led to declining prices, reducing costs to consumers and businesses. Oil and gas jobs are pouring into regions that have long been economically depressed. State governments may benefit from severance taxes (excise taxes on resources "severed" from the earth). And horizontal drilling means far fewer wells are needed to drain an area than would be required when drilling vertically, because multiple wells can be sunk from a single pad and the laterals radiate out in different directions; fewer pads mean fewer roads built, pipelines trenched, or surface facilities installed—with perhaps less impact on wildlife habitats, agricultural resources, and surface bodies of water. What's not to like?

Critical Media

"[F]or too many years, the [oil and gas] industry has mainly responded to attacks on shale gas operations by pointing out errors or omissions in critical media accounts," observes Richard A. Liroff, executive director of the Washington, D.C.-based Investor Environmental Health Network; his article in the July 2012 *Journal of Petroleum Technology* was based on IEHN's longer report *Extracting the Facts: An Investor Guide to Disclosing Risks from Hydraulic Fracturing Operations.* "Thoughtful companies recognize that this has not been a successful strategy for building public trust, and they are beginning to speak directly to the real risks associated with their operations. …In the U.S., there have been numerous incidents of poorly constructed wells, equipment failures, degraded local and regional air quality, water contamination, strained community relations, and related government enforcement actions and private lawsuits. … Bans and moratoria are denials of companies' social license to operate—denials of public consent—arising from concerns about environmental and social risks."

Here is where the above vocabulary alert becomes critical, and where a useful distinction can and should be made between "fracing" and "fracking."

The topmost concern of the general public is the safety of drinking water aquifers. Oil and gas companies state there is no documented case of a fracture from hydraulic fracturing from a well deeper than 2,000 feet making its way through intervening rock to contaminate freshwater sands. This is entirely true for the strict, narrow engineering meaning of the process of "fracing" (without a k). Fractures rarely extend more than a few hundred feet away from the lateral; indeed, the goal is to keep fractures within the shale pay layer to avoid expending needless slickwater and sand or losing gas into a different layer of rock; moreover, thousands of feet of intervening geology has been an effective seal for millions of years. However, Liroff (among others) points out that "drinking water contamination incidents have been associated with cementing failures" around the casing installed in the uppermost few hundred or 1,000 feet where the wellbore penetrates freshwater aquifers. To the non-engineering public, however, drilling a well is an integral part of the overall enterprise encompassed in the general and business press by the word "fracking" (with a k). Splitting hairs risks making companies look like lawyers arguing to acquit a perpetrator based on a legal technicality.

Another concern is the volume of freshwater and sand needed for fracing thousands of wells per year. Companies accurately point out that in regions such as Ohio and Pennsylvania where water abounds, quantities even as large as 2 to 6 million gallons of freshwater per well are literally, well, a drop in the bucket of annual water use in the region by agriculture, businesses, and residences. Such large withdrawals over a few days can be problematic in local watersheds, however, especially in times of drought. Meantime, the boom in hydraulic fracturing has meant a monumental surge in demand for fracsand, leading to hundreds of square miles of open-pit mining of ancient sandstone formations in Wisconsin, Minnesota, Iowa, Texas and elsewhere, and raising concerns about risks of silicosis to workers and residents.

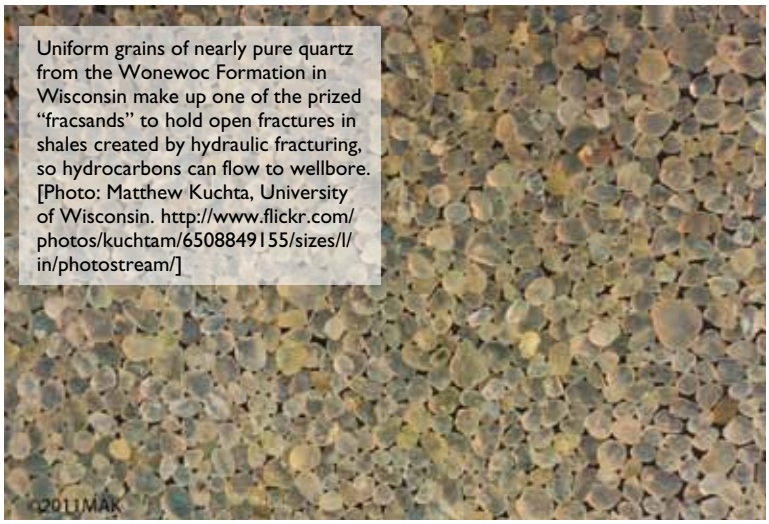
A third concern has been earthquakes associated with "fracking" (with a k, the enterprise broadly meant). Earthquakes in the middle of the continent—historically rare—have increased 11-fold between 2008 and 2011 compared with 1976–2007. Companies correctly point out that no earthquakes have been associated with "fracing" (meaning the specific process of hydraulic fracturing, although sensing microseisms—faint earth tremors—is an essential technique for mapping the development of fractures). However, earthquakes have indeed been associated with injection wells for disposal of produced water: a November 2011 quake in Oklahoma was a damaging 5.7 on the moment magnitude scale (now replacing the Richter scale) and felt in 17 states. Such induced seismicity is the focus of a 2012 National Research Council 300-page report and associated Congressional testimony.

Deliberately Burned Off

Other concerns are air emissions and safety risks of concomitant activities. In the Bakken shale of western North Dakota, valued primarily for its oil, over 240 million cubic feet of natural gas—the very product extracted from the Marcellus and Utica shales—is "flared," or deliberately burned off into the air each day; because in the Bakken Play the gas is less valuable than the oil, no infrastructure has been built for gathering it for market. That enormous daily volume represents 30 percent of the natural gas produced in the state, annually amounting to enough to heat every U.S. household for three days. Safety concerns focus on truck traffic involved in building horizontal wells, with risks of accidents and spills of chemicals and produced water. A drilling rig and earth-moving equipment, thousands of tons of fracsand, thousands of gallons of additives, and millions of gallons of freshwater per well must be

trucked to each drilling site; moreover, the produced water that returns from the well must be trucked away to a recycling facility or to an injection well. On average, each well requires 1,000 to 1,500 truckloads. In water-rich locations such as Ohio, truck traffic is being reduced by piping the freshwater through temporary hoses laid through fields. Still, for drilling 2,000+ wells projected by 2015 for the Utica shale play, that is a lot of heavy-duty traffic on the hilly, winding two-lane roads with blind curves and little shoulder characteristic of eastern Ohio, especially in winter snow and ice.

Property rights issues are straining community relations. Three biggies are split estates, forced pooling, and setback distances. In a split estate, a current land-owner does not own mineral rights. Not only does that allow the mineral lease owner to drill horizontally under the land (paying a royalty or not, depending on the specific legal agreement), but it even may allow that party use of the surface of the land to retrieve the resources beneath—including legal right to drill an oil or gas well. In forced pooling, a land-owner who may not wish to lease mineral rights may be compelled to if enough immediate neighbors agree to lease theirs—effectively, eminent domain by majority rule. A setback distance is the minimum legal distance between a wellhead and a private residence. In Fort Worth, Texas, in the Barnett shale, the setback distance is 600 feet; in Pennsylvania (Marcellus), it is 200 feet; in Ohio (Utica), it is a mere 100 feet. Short setback distances can create complications for both a homeowner and a lender in obtaining or selling a mortgage, and may invalidate title insurance.



Uniform grains of nearly pure quartz from the Wonewoc Formation in Wisconsin make up one of the prized "fracsands" to hold open fractures in shales created by hydraulic fracturing, so hydrocarbons can flow to wellbore. [Photo: Matthew Kuchta, University of Wisconsin. http://www.flickr.com/photos/kuchtam/6508849155/sizes/l/in/photostream/]

Although having nothing to do with the technology of hydraulic fracturing ("fracing") per se, such legal issues surrounding shale gas recovery operations ("fracking") have created a swirl of public distrust over perceived lack of full disclosure (at best) or trickery and coercion abetted by complicit legislators (at worst).

Avoiding the Battlefield

Thankfully, some leaders in the oil and gas industry are sounding a warning alarum that both environmental and social concerns must be taken seriously and acted upon responsibly. In two 2011 reports, the DOE's Secretary of Energy Advisory Board expressed concern over "community disruption" and warned that "if action is not taken to reduce the environmental impact accompanying the very considerable expansion of shale gas production expected across the country—perhaps as many as 100,000 wells over the next several decades—there is real risk of serious environmental consequences causing a loss of public confidence that could delay or stop this activity."

Not only is public trust at stake, but also investor trust, noted Liroff. The message of his entire IEHN report *Extracting the Facts* is: there is a strong business case to be made for earning free, prior, and informed community consent. He offers 12 core management goals that address environmental and social risks, and advocates a policy of "comply or explain."

Another major petroleum industry consultant, George E. King of Apache Corp., in his 70-page 2012 review document *Hydraulic Fracturing 101*, constructs a detailed risk matrix of all activities involved in the full enterprise and advises, "...Given the concerns of the public, the best approach is to respond to the questions being asked ...Simplifying and reducing chemical additives along with reduction to total environmental impacts are seen as a large part of the social license to operate in the world. This is a problem to be addressed and solved, not ignored."

Some oil and gas companies are getting the message. In April 2011, the Interstate Oil and Gas Compact Commission teamed with the Ground Water Protection Council to create a voluntary chemical disclosure registry FracFocus (*http://fracfocus.org/*) for additives used in hydraulic fracturing; some 200 companies now participate. Others are developing "green" (nontoxic, biodegradable) alternatives to current additives.

A uniquely foresighted pro-active approach—which could serve as a model for other states—is being pioneered by Rich Cochran, CEO of the Western Reserve Land Conservancy in Ohio. The conservancy recognizes that some landowners dream of being windfall shaleionaires, and have every right to do what they want with their land within the law. Or they feel for non-monetary reasons that continuing to develop fossil fuels is right. Thus, the conservancy has launched an ambitious effort to cut through conflict to unite people to develop a shared vision (think master plan) for ensuring the preservation of the land overlying the Utica shale. "If this oilfield becomes a battlefield, we will all lose," Cochran declared to the 600 oil and gas experts and community leaders at Crain's Business 2013 Shale Summit in Cleveland on February 5, "because it is impossible to be deliberate, planful, cooperative and constructive. Everyone is angry. Things get destroyed. Nothing good happens."

Ohio "is blessed with" three major world-class endowments that have sustained economic activity for 150 years, Cochran pointed out: prime nutrient-rich topsoils "glob-

(continued on page 61)

Tau Beta Pi Fellows for 2013-14

THE FELLOWSHIP BOARD selected 40 Tau Beta Pi Fellows for 2013-14, 27 of whom will receive $10,000 cash stipends for one year of graduate study and 13 who have other extensive financial aid for their year of advanced work. Implemented by President A.D. Moore in 1929, the Fellowship Program has provided over $5,700,000 to 988 stipend recipients.

Now in its 80th year, the Fellowship Program remains a principal philanthropic activity of the Association and continues to receive strong support from alumni. The program was initiated with funds from the operating budget of the Society, including the eventual transfer of fees from deceased life subscribers of THE BENT. It was first enlarged in 1938 by a gift from the Southern California Alumnus Chapter, and in 1948 the first Alumnus Fellowship was awarded. Since that time, gifts from alumni, industry, friends, and the earnings of the invested Fellowship Fund have all contributed to these awards.

Matching gifts to the Association from 234 companies on behalf of their TBΠ employees are allocated to fellowships and scholarships, and the Society truly appreciates this support.

In addition to its own awards, TBΠ selects recipients for named fellowships, which are administered just as other Society fellowships. Since 1956, thirty fellowships have been named for TBΠ members; 12 are so named this year.

The **Anderson Fellowship** is named for Mabel E. and Marshall Anderson, *MI Γ '32*, TBΠ Fellow No. 19, who left a bequest to the society in 2005.

The **Arm Fellowship** is named for Rena M. and David L. Arm, *PA E '30*, who left a bequest in 2007.

The **Centennial Fellowship**, given to that fellow who the board determines is most outstanding, commemorates TBΠ's 100th anniversary.

Walter E. Deuchler Sr., *IL A 1910*, left a bequest in 1979 to endow the **Deuchler Fellowship** for graduate study in water supply, wastewater treatment, and ecology.

Eighteen named awards are sponsored by the late William Fife, *CA A '21*, who bequeathed the earnings of an irrevocable trust for TBΠ fellowships. The **Fife Fellowships** are named in honor of his father, James.

The second **Forge Fellowship** is awarded this year and is named for Charles O. Forge, *CA Γ '56*, who left a bequest in 2010.

Tau Beta Pi received 177 fellowship applications. Board members Charles W. Caldwell, Susan L.R. Holl, Jammie L.H. Jamieson, James G. Reardon, and Director of Fellowships D. Stephen Pierre Jr. made the selections on April 5. Fellows are introduced on the following pages.

The 9th **Hanley Fellowship** is awarded in honor of Mary A. and Edward P. Hanley, *IL B '42*, TBΠ Fellow No. 84, who left a bequest to TBΠ in 2007.

Harold M. King, *MA A 1910*, was TBΠ President from 1954-58 and took a special interest in the student branches of the national technical societies. The **King Fellowship** is awarded for the 52nd time to recognize outstanding participation in volunteer technical-society work.

The **Lynnworth Fellowships** are named for Lawrence C. Lynnworth, *NY E '58*, TBΠ Fellow No. 140, and are matched by the GE Foundation.

Two fellowships recognize former Secretary-Treasurers. The **Matthews Fellowship** is awarded for the 16th time and honors R.C. "Red" Matthews, *IL A 1902*, who served as Secretary during 1905-12 and as Secretary-Treasurer in 1912-47. Red died in 1978 at the age of 99.

The 16th **Nagel Fellowship** is awarded in honor of Robert H. Nagel, P.E., *NY Δ '39*, who served as Secretary-Treasurer in 1947-82 and Editor of THE BENT during 1942-82. Bob died in 1997.

The **Stark Fellowship** is named for Donald A. Stark, who made significant contributions to the fluid-power industry. This award, given for the 36th time, is presented to a fellow who plans graduate study in engineering with emphasis in the field of fluid power or fluid mechanics. Stipends are provided by the earnings from a $150,000 gift to TBΠ in 1986 from the Donald A. and Jane C. Stark Charitable Trust.

The **Sigma Tau Fellowship** commemorates Clarel B. Mapes, Sigma Tau's former national president and secretary-treasurer, and perpetuates the memory of Sigma Tau, former national engineering honor society which merged with TBΠ in 1974.

The second fellowship honoring a former TBΠ President is named for Charles H. Spencer, *MI Γ 1896*, who served during 1936-47. The **Spencer Fellowship** is awarded for the 58th time and is presented to the member who has made significant contributions to his or her collegiate chapter.

The **Williams Fellowship**, established to honor the Association's Founder, Dr. Edward H. Williams Jr., *PA A 1875*. It is awarded for the 34th time to a candidate who plans to work toward a doctoral degree and enter the engineering teaching profession.

The second **Zimmerman Fellowship** is named for Marlin U. Zimmerman Jr., *MD A '44*, who left a gift of $200,000 to TBΠ in 2010.

RECIPIENT	CHAPTER	FIELD OF ADVANCED STUDY	FELLOWSHIP
Nadia L. Ahlborg	OH Γ '13	Materials Science and Engineering	Tau Beta Pi No. 803
Shabab F. Alam, F.E.	AL E '13	Electrical Engineering	Fife No. 165
Kevin V. Andreassi	MI A '13	Mechanical Engineering	Tau Beta Pi No. 804
Whitney L. Anthony, E.I.	TX Δ '13	Civil Engineering	Matthews No. 16
Alexandra V. Bayles	DE A '13	Chemical Engineering	Tau Beta Pi No. 805
Robert J. Broman	CO A '13	Finance	Fife No. 166
Benjamin D. Carmichael	AL B '13	Mechanical Engineering	Fife No. 167
Allison K. Cerutti	MO A '13	Orthotics & Prosthetics	Fife No. 168
Matthew P. Charnley	IN Γ '13	Mathematics	Tau Beta Pi No. 806
Peerawat Charuwat	VA Δ '13	Environmental Engineering	King No. 52
Chelsea M. Ehlert	NY Γ '13	Materials Engineering	Fife No. 169
Meghan C. Ferrall	FL A '12	Biomedical Engineering	Tau Beta Pi No. 807
Evan M. Gates	PA Γ '13	Biomedical Engineering	Fife No. 170
Nathan B. Gaw	AZ B '13	Biomedical Engineering	Fife No. 171
Robert J. Griffin	TN Γ '12	Mechanical Engineering	Stark No. 36
Chin Gian Hooi	FL I '13	Aerospace Engineering	Fife No. 172
Jennifer L. Jones	MD Γ '13	Materials Science and Engineering	Hanley No. 9
Bryan Quah Kah Ming	IL E '13	Civil Engineering	Spencer No. 58
Zachary A. Kaufman	FL A '13	Electrical Engineering	Forge No. 2
Carl J. Kirpes	IA A '12	Industrial & Mfg. Systems Eng'g	Fife No. 173
Kaitlyn S. Kliewer	FL H '13	Civil Engineering	Centennial No. 28
Ina A. Kundu	AZ A '13	Mechanical Engineering	Fife No. 174
Trevor J. Layh	SD B '11	Aerospace Engineering	Sigma Tau No. 40
William S. LePage	OK B '13	Mechanical Engineering	Anderson No. 7
Pawan Maharjan, E.I.	LA E '12	Mechanical Engineering	Fife No. 175
Choolwe M. Mandona	OH Ξ '13	Environmental Engineering	Zimmerman No. 2
Danielle M. Martin	SC A '13	Biomedical Engineering	Fife No. 176
Courtney M. Mazur	RI A '13	Biomedical Engineering	Fife No. 177
James P. Mazza	NY Π '14	Electrical Engineering	Lynnworth No. 7
Samantha A. McBride	NV A '13	Chemical Engineering	Deuchler No. 33
Adrien L.H. Perkins	NJ B '13	Aeronautical Engineering	Fife No. 178
Isamar Rosa Plata	PR A '13	Civil Engineering	Nagel No. 16
Jean Paul D. Santos	UT A '13	Electrical Engineering	Lynnworth No. 8
Tapash J. Sarkar	TX Γ '13	Nuclear Engineering	Fife No. 179
Jared D. Smith	NY Θ '13	Environmental Engineering	Fife No. 180
Kyle A. Steiner	FL A '13	Mechanical Engineering	Fife No. 181
Alaina L. Strickler	OH A '13	Chemical Engineering	Williams No. 34
Joseph D. Tank	IA B '13	Mechanical Engineering	Arm No. 5
Xuerong Xiao	PA B '13	Electrical Engineering	Tau Beta Pi No. 808
Gerardo A. Zamora	ND A '13	Cryptography	Fife No. 182

Tau Beta Pi Fellow No. 803

Nadia L. Ahlborg

Nadia is a materials science and engineering graduate of The Ohio State University, where she served as Order of the Engineer chair. She spent two summers working on high temperature ceramic coatings for jet turbine applications at NASA's Glenn Research Center in Cleveland, OH, and discovered a passion for materials research. Nadia will pursue her Ph.D. in materials science and engineering at Stanford University and will focus on materials for alternative energy. She believes that materials research is the key to achieving cost effective, green energy. For example, substituting or supplementing traditional photovoltaic materials with cheaper organic materials could dramatically reduce the cost of solar power. She is considering working in private industry research and development after obtaining her doctorate. Outside the classroom, Nadia has volunteered with the Women in Engineering program which encourages K-12 women to pursue degrees in science and engineering.

Tau Beta Pi Fellow No. 804

Kevin V. Andreassi

Kevin graduated from Michigan State University with a B.S. in mechanical engineering, as well as a B.A. in Spanish. He spent three years of his undergraduate career involved with Tau Beta Pi, including one year serving as Chapter President. Graduate school plans include attending the University of Notre Dame, on a Notebaert Premier Fellowship, to pursue a Ph.D. in mechanical engineering. He spent four years at Michigan State involved in a multi-disciplinary research project focused on biomass pyrolysis. This experience sparked his interest in energy, especially alternative energy sources to replace fossil fuels in order to protect the environment. After completing his research and obtaining a Ph.D., Kevin hopes to start his career in an energy–related field, doing similar work for either industry or the government. Ideally, this future occupation will be an international one that allows him to use his second language and life-long love of Spanish.

Tau Beta Pi Fellow No. 805

Alexandra V. Bayles

Alexandra graduated summa cum laude from the University of Delaware with a B.Ch.E. She was first in her class, served as Chapter Secretary and completed an honors undergraduate research thesis. As an NSF Graduate Research Fellow, Alexandra will attend the University of California, Santa Barbara, to complete a Ph.D. in chemical engineering. She plans to focus her studies on transport phenomena in complex fluids and soft materials. She first became interested in complex fluids through undergraduate research at the University of Delaware and through an internship at Procter & Gamble Co. After completing her doctoral and postdoctoral studies, Alexandra aims to go into academia. There, she hopes to lead a research group whose study of fluid systems are geared towards renewable energy and sustainability applications, as she believes the greatest engineering challenge of her generation will be to provide energy access to all peoples in a sustainable manner.

Fife Fellow No. 165

Shabab F. Alam, F.E.

Shabab is currently a master's student at the University of South Alabama. He graduated with his bachelor's in electrical engineering from the University of South Alabama at the top of his senior class. He also passed the F.E. exam before graduating. He is currently doing research on QCA cells which are a promising new technology and a potential replacement for current microprocessor technology. Shabab hopes to continue on and earn his Ph.D. at a top school with a strong nanotechnology program and state of the art lab facilities after completing his masters at South Alabama. He believes pursuing a doctorate is the best way for him to gain more knowledge in his area of interest and that this will allow him to make important contributions to the field of electrical engineering in the future. He aspires to find a promising career doing research in nanotechnology.

Matthews Fellow No. 16

Whitney L. Anthony, E.I.

Whitney earned her civil engineering degree from Texas A&M University, where she graduated first in her class. She is currently working towards a master of science in structural engineering, and hopes to learn more about the structural behavior of buildings. Her coursework will include finite element analysis, dynamic behavior of loads, many advanced design courses, and electives in architecture. Whitney has taken the F.E. exam, and is on track to become a professional engineer. During her undergraduate studies, Whitney was involved in researching the feasibility of reinforcing concrete bridge girders with AFRP tendons. She also did a brief study on the effects of dampers in buildings subjected to tornado-like winds. Whitney has served as an officer for Tau Beta Pi, and is currently a member of Chi Epsilon, ASCE, and the only student chapter of the Structural Engineers of Texas.

Fife Fellow No. 166

Robert J. Broman

Robert graduated from Colorado School of Mines with a B.S. in petroleum engineering, and minors in geological engineering and public affairs. He is a Boettcher Scholar and a National Merit Scholar. He will pursue an M.S. in finance at The University of Texas at Austin to learn the financial metrics of energy investments before entering the oil and gas industry as an engineer. He had summer petroleum engineering internships in Utah, Alaska, Texas, and Colorado, and was the first American to study abroad for a semester at The Petroleum Institute in Abu Dhabi, UAE. The global energy industry fascinates Robert, and he looks forward to working at the interface of engineering and finance to implement new technologies and provide humanity with the energy it needs to prosper. From his experience as a teaching assistant at CSM, Robert discovered that he would like to teach in the future. He hopes to do so, and research, after gaining industry experience.

Fife Fellow No. 167

Benjamin D. Carmichael

Ben graduated from the University of Alabama in Tuscaloosa with a B.S. in mechanical engineering. He maintained a 4.0 G.P.A., obtaining his minor in mathematics and staying heavily involved in the university's music department. The curriculum at UA spanned both thermal and mechanical systems; however, in the past two years, he has specialized in acoustics, vibrations, and particle dynamics. He has been accepted into the UA graduate school and plans to continue his studies in the fields of vibrations and atomic force microscopy. Ben hopes to work in collaboration with a medical student at UA in Birmingham to improve the accuracy and functionality of biomechanical sensors. These have enormous potential for the early detection of cell deformities and related phenomena by measuring small changes in the mechanical properties of cell membranes. Once he obtains his master's, he plans to gain industry experience before returning to academia or a national laboratory after obtaining his Ph.D.

Tau Beta Pi Fellow No. 806

Matthew P. Charnley

Matthew graduated from the University of Notre Dame, where he served as Chapter President, with degrees in chemical engineering and mathematics. In the fall, he is heading off to Rutgers University to pursue a Ph.D. in mathematics. In the past year, he has been undertaking research in an ionic liquids laboratory, investigating the potential of these compounds to aid in azeotropic distillation. This past summer was spent at Rose-Hulman Institute of Technology, doing research in applied mathematics on inverse problems and the heat equation. He was working on the detection of corrosion in a plate from how it responds to heat flux. In the future, Matthew plans go on to teach mathematics and do research at a university. While at Notre Dame, he was also president of the quiz bowl club, and was involved with the dorm community by playing at the weekly masses in their chapel.

Fife Fellow No. 169

Chelsea M. Ehlert

Chelsea graduated from Rensselaer Polytechnic Institute with a bachelor's in materials engineering. Chelsea's involvement in Tau Beta Pi included implementing a MindSET program into the Troy City School District for the New York Gamma, where she was Chapter President. Outside the classroom, Chelsea spends time promoting the engineering discipline to middle and high school students through the MindSET program and as an engineering ambassador for RPI. She plans to pursue a Ph.D. at Rensselaer in materials engineering. She started learning about corrosion failures during an internship with Knolls Atomic Power Laboratory and became fascinated with the research. She will be returning to Knolls to work with a corrosion research group this summer. Back at school, she plans to focus her research in corrosion or electrochemistry topics. She believes a Ph.D. will allow her to become specialized and independent with her research.

Fife Fellow No. 168

Allison K. Cerutti

Allison graduated second in her class from the University of Missouri with her B.S. in biological engineering and an emphasis in biomedical devices. She is going to Northwestern University for a master's in prosthetics and orthotics. Since beginning her undergraduate studies, Allison had wanted to use her biomedical background to advance this field. Northwestern's clinical and technical master's program will prepare her as a biomedical engineer to meet the current demand for higher prosthetic and orthotic technology. Engineering new prostheses and orthoses will not only add value to the engineering profession, but will also allow her personal growth. Beyond the technical aspects, clinical shadowing experiences have revealed the rewards that accompany advancing medical technology. Patients and clinicians have inspired Allison and encouraged her to pursue her chosen field. She anticipates a challenging and worthwhile career, which will combine her technical skills with her passion to serve.

King Fellow No. 52

Peerawat Charuwat

"Noon" graduated with top honors and a B.S. in civil and environmental engineering from the Virginia Military Institute, where he received a Royal Thai Scholarship for undergraduate study. Noon served as a vice president of Engineers Without Borders at VMI, and his passion is to help the poor in developing countries by using engineering skills to help solve irrigation and sanitation problems. He has helped to build irrigation systems, clinics, and schools in Bolivia, Haiti, and Thailand in the past five years. He is pursuing a master's at Virginia Tech and working on developing future wastewater treatment systems. Upon the graduation from Virginia Tech, he will be serving as a second lieutenant in the Royal Thai Army Corps of Engineers. His ultimate goal is to create a non-profit engineering organization to help solve infrastructure, sanitation, and irrigation problems in his homeland of Thailand.

Tau Beta Pi Fellow No. 807

Meghan C. Ferrall

Meghan received her B.S. in mechanical engineering from the University of Florida, where she was Chapter President and graduated magna cum laude. She then started a Ph.D. in biomedical engineering on the joint program between Georgia Institute of Technology and Emory University in Atlanta. She is a graduate research assistant in the Platt Lab for repair, regeneration, and remodeling where she studies enzyme kinetics of proteases involved with extracellular matrix degradation and remodeling. These proteases are often upregulated in diseases such as atherosclerosis, osteoporosis, and cancer, and Meghan hopes to apply her modeling efforts to study cathepsin protease activity in lung cancer to develop a screening method for patients at risk. After graduation, Meghan plans to pursue a career in cancer research at a comprehensive cancer center. While in Atlanta, she has served on Georgia Alpha's MindSET Committee, and been President and a founding member of the Atlanta Alumni Chapter.

Fife Fellow No. 170

Evan M. Gates

Evan graduated from Carnegie Mellon University with B.S. degrees in mechanical and biomedical engineering. Throughout his studies, he competed on the collegiate cross country and track teams. In 2011, he garnered All-American status in cross country and was named a Capital One Academic All-American. During his senior year, he served as Treasurer for Pennsylvania Gamma. He was also named an Andrew Carnegie Society Scholar. He has conducted research in the fields of cellular biomechanics, cardiovascular stents, and transparent conducting electrodes. This fall, Evan will begin pursuing a Ph.D. in biomedical engineering at Duke University. His research will concentrate on cellular biomechanics and biomaterials. More specifically, he intends to discover and utilize fundamental mechanisms in mechanotransduction to improve medical implants. After graduate school, he expects to focus more on translational research in either academia or a start-up company.

StarkFellow No. 36

Robert J. Griffin

Robert recently completed his B.S. in mechanical engineering from Tennessee Technological University, where he was Chapter Vice President. He was also heavily involved in other campus organizations, while maintaining a 4.0 G.P.A. He plans to attend Virginia Polytechnic Institute and State University starting in the Fall, and will be working towards his Ph.D., with an emphasis on automation and controls. Robert hopes to perform research focusing on mechanism mechanics and design, controls, and dynamics. Upon completion of his doctorate, he would like to work in a research facility, applying his research to human/machine interface and human ability augmentation, particularly with applications in the medical industry. Examples of this would include surgical robots and advanced prosthesis. Robert would like to see his work directly impact those with great needs for the betterment of their lives.

Hanley Fellow No. 9

Jennifer L. Jones

Jennifer graduated from the United States Naval Academy with a B.S. in mechanical engineering, where as brigade commander, she led the over 4000 person Brigade of Midshipmen as highest ranking midshipman for the spring semester. She was a Trident and Bowman scholar at the academy, allowing her to spend her senior year focused on research in corrosion sciences. The title of her undergraduate thesis was "An Evaluation of the Corrosion and Mechanical Performance of Interstitially Surface Hardened Stainless Steel." Upon being commissioned as an ensign, her initial assignment will be pursuing a master's in materials science and engineering at the University of Virginia, where she will focus on stress corrosion cracking in aluminum. Subsequent to studies, she will serve as a nuclear surface warfare officer; first on a destroyer home ported in Rota, Spain, and then on to a year of advanced nuclear power training. She will then be assigned to a nuclear powered aircraft carrier.

Fife Fellow No. 171

Nathan B. Gaw

Nathan received his bachelor's degree in biomedical engineering from Arizona State University. He achieved a 4.0 G.P.A. and graduated from Barrett, the Honors College. Nathan was involved in the Fulton Undergraduate Research Initiative, a competitive program that funds undergraduates' research. He primarily worked in the neural control of movement laboratory, where he investigated the role of retention and forgetting in context dependent sensorimotor memory of dexterous manipulation. Nathan plans to continue his research in cognitive neuroscience for his first year of graduate studies as a biomedical engineering master's student at Arizona State. Then he plans to delve into developing an algorithm, using basis function networks with multidimensional attractors, to read neuron population codes in the sensorimotor cortex of the brain for his doctoral studies. He hopes to one day create a device that can read human thought and emotions.

Fife Fellow No. 172

Chin Gian Hooi

Aerospace engineering is Chin Gian's field of choice for one reason alone: to empower everyone to fly. He envisions doing this through his startup company, Xronz, which aims to make unmanned aerial vehicles available to all. His startup is prototyping a mobile quadcopter controllable by smartphones capable of automatic stabilization on a microprocessor platform, and capturing high definition videos as well as images. Chin Gian's academic preparation is reflected through his 3.97 C.G.P.A. in B.S.A.E. from Embry-Riddle Aeronautical University. He was awarded the ERAU honors research grant in 2012 to serve as the PI for designing and manufacturing a low-cost microscale quadcopter. He conducted aerodynamic analysis, designed the stability augmentation system, and wrote the smartphone controller application. Chin Gian is to attend University of Maryland's masters program in AE. He will be conducting research in nonlinear controls and mobile sensor networks for rotary wing micro-aerial vehicle applications.

Spencer Fellow No. 58

Bryan Quah Kah Ming

Bryan has graduated from Southern Illinois University at Carbondale with a B.S. in civil and environmental engineering. He served as the 2011-12 President of Illinois Epsilon, which was awarded the J.D. Froula Most Improved Membership Award in Fall 2012. He will be pursuing a master's from SIUC in civil and environmental engineering. He plans to build upon his current research in order to obtain more mechanistic insights on the correlations between important physicochemical properties of engineered nanomaterials and their phytotoxic effect on agricultural crops. Bryan is eager to research upon phytotoxicity associated with engineered nanomaterials and its possible applications towards subsurface remediation. After achieving his master's degree, he plans to further pursue a doctorate as well as apply for the P.E. examination. After his tertiary education, Bryan plans to work with government agencies such as USDA and USGS to apply his studies to fieldwork.

Forge Fellow No. 2

Zachary A. Kaufman

Zachary received his bachelor's in electrical engineering from the University of Florida. He graduated with a 4.0 GPA and has held positions as banquet coordinator, social chair, and webmaster for Florida Alpha. Zachary's undergraduate research focused on biomedical applications of micromagnets. This led to a patent application, a presentation at the 2012 Biomedical Engineering Society conference, and numerous publications. A book chapter on magnetic needle development that he co-authored will be published next year.This Fall, Zachary will pursue a Ph.D. in electrical engineering at Stanford University. He hopes to continue research with biomedical applications and would like to develop new technologies for diagnosing, monitoring, and treating cancer and other diseases. He believes that the decreasing size of electronics will provide novel opportunities for their use in biology. Zachary hopes to either remain in academia or to work on a research and development team in industry.

Centennial Fellow No. 28

Kaitlyn S. Kliewer

Kaitlyn graduated summa cum laude from Florida State University with a bachelor's degree in civil engineering. Having earned a 4.0 GPA, she was not only first in her class but also served as Chapter Secretary and then President. Her undergraduate honors research was in structural health monitoring, specifically the development of triboluminescent optical fiber sensors monitoring cracks in infrastructure. Kaitlyn will attend Princeton University to pursue a doctorate in civil engineering as an NSF graduate research fellow, focusing on the dynamic monitoring of structures through fiber optic sensors. Then she intends to pursue a career continuing her research within structural engineering either at a national laboratory or in academia. Her goal is to develop an effective and economical structural monitoring system that will reduce the risk of catastrophic structural failures, saving both lives and resources. Within the community, she plans to remain active in ASCE and STEM outreach programs.

Sigma Tau Fellow No. 40

Trevor J. Layh

Trevor received a bachelor's in mechanical engineering from South Dakota State University, where he was Chapter President and graduated in the top 5% of his class with a 3.94 G.P.A. During his studies, he interned part-time during the school year and full-time during the summers at Daktronics Inc. and 3M. Trevor was a 2010 Department of Defense SMART Scholarship for Service recipient and has been working with the Naval Surface Warfare Center in Dahlgren, VA, since graduating in 2011. He plans to complete his master's in aerospace engineering and mechanics at the University of Minnesota where he hopes to expand on the experience he gained while working as an engineer and UAV operator for the U.S. Navy. Trevor's primary interests lie in aerospace systems development including the design of multi-sensor systems for unmanned aircraft. He hopes to continue on to a Ph.D., followed by a career in the public or private sector before eventually returning to academia as a professor and researcher.

Fife Fellow No. 173

Carl J. Kirpes

Carl graduated from Iowa State University with honors and bachelor's degrees in both mechanical engineering, and industrial and manufacturing systems engineering. He was honored to receive recognition as a Laureate and served as a TBΠ small group mentor. Also active in community service, Carl was recognized as youth volunteer of the year by United Way of Central Iowa. He has led honor societies, played varsity football for Iowa State, and written a novel incorporating his concepts of reflective leadership. Carl has conducted research in multiple engineering facets, including: GUI development related to vibration studies, hybrid vehicle market impact, and virtual reality. Carl co-authored a published research paper regarding virtual store immersion, and will be presenting another paper on systems engineering at the IIE annual conference. Carl is currently pursuing a M.S. in systems engineering at ISU. Long term, he plans to create woven-design, systems engineering approaches.

Fife Fellow No. 174

Ina A. Kundu

Ina received B.S. degrees in mathematics and mechanical engineering from the University of Arizona, where she was Chapter President. Maintaining a 4.0 G.P.A., she was first in her class, department, and group. Ina will commence graduate studies at MIT this fall, pursuing master's and doctorate degrees. Having endured numerous health problems throughout her undergraduate studies, she has decided to focus her graduate studies in biomechanics. At MIT, she will focus on microfluidics as it applies to cancer cell research. Specifically, she will try to determine why cells are more apt to metastasize in certain organs, such as the lungs. She hopes this research will give her a broader understanding of the medical field, preparing her for an M.D.-Ph.D. Ina hopes to be a professor of mechanical engineering, playing a key role in advancing modern medicine. Although the two fields have long been disparate, she believes integration of the two is critical in forming innovative solutions to modern day problems.

Anderson Fellow No. 7

William S. LePage

Will graduated with a B.S. in mechanical engineering from the University of Tulsa, where he competed in NCAA Division I Cross Country and Track. From May 2011 to May 2012, Will served at the sergeant-at-arms of SENEA (Sustainable Engineering for Needy and Emerging Areas), a student-run non-profit that connects appropriate technologies to people in developing international communities. His personal passion and research focus within SENEA is water purification. In addition to water purification, Will investigated the aerodynamic characteristics of modern volleyballs with enhanced surfaces and panel shapes. In summer 2012, Will performed research and design work at the thermal spray laboratory of Sandia National Laboratories in Albuquerque, NM. He will return to Sandia for an internship during summer 2013 as well. He then plans to pursue a Ph.D. in mechanical engineering at the University of Michigan. His career objective is teaching and research at university level.

Fife Fellow No. 175

Pawan Maharjan, E.I.

Pawan graduated top of his class with a B.S. in mechanical engineering from University of New Orleans. In addition to his academic coursework, he conducted independent research in residential heat ventilation and air conditioning, in which he designed different duct systems and wrote a report on how to decrease friction and external static air-pressure in ducts. He has passed the F.E. exam. Pawan has been an active member of TBΠ, ASME, AADE, SPE, ISO and Engineers without Borders. Since graduation, he been a volunteer tutor for LA E. He plans to pursue a graduate degree in mechanical engineering from UNO and work on a project that involves building a robotic aircraft. This imitates a house fly and has potential to be used by the U.S. military for defense and reconnaissance. He plans to take his designing and analytical skills, and expand his CAD skills to advanced levels. Ultimately, he wishes to work as a design engineer and be involved in lifelong learning.

Fife Fellow No. 176

Danielle M. Martin

Danielle graduated from Clemson University with a B.S. in biomedical engineering and a minor in business administration. She maintained a 4.0 G.P.A. and was part of a student led research team that focused on designing medical technology for the developing world and competed in several design competitions. Danielle's summer internships exposed her to both the business and engineering sides of the medical device industry, including a director of operations position with an orthopedic distribution company and a research engineering internship with COOK Medical Endoscopy. These experiences, in addition to the student led research and a senior design project, have stimulated her desire to pursue a profession that incorporates interaction among different departments in a medical device company. She will continue her studies at University of Pittsburgh in their M.B.A./M.S. bioengineering dual degree program towards her ultimate goal of a career in product development.

Lynnworth Fellow No. 7

James P. Mazza

James is currently enrolled at Rochester Institute of Technology where he will receive a master's degree in electrical engineering. He is currently ranked first in his undergraduate class with a 4.0 G.P.A. James is focusing on the design of digital circuits for his degree and is currently engaged in research on the optimization of image processing algorithms using hardware and software on an FPGA. He hopes to become published after this and would like to take on more research as time permits. James has plans to attain an MBA and possibly a Ph.D., although his immediate goal is to enter the workforce upon successful completion of the Fundamentals of Engineering examination and his current degree. He has become fascinated with the smartphone market and specifically the application processors used to power mobile devices. He hopes to get a job in VLSI layout or HDL coding of such devices.

Zimmerman Fellow No. 2

Choolwe M. Mandona

Choolwe graduated first in her department with a B.S. in chemical engineering, concentrating on environmental engineering at Miami University of Ohio. She was Chapter Vice President, and earlier activities included coordinating an after-school program to encourage eighth grade girls to pursue engineering. Choolwe has also conducted engineering research at Miami and MIT. She plans to pursue a M.S. and then a Ph.D. in environmental engineering, hoping to focus on water treatment, as well as conducting economic and sustainability assessments. Seeing the detrimental effects of the lack of clean water in her home country of Zambia, and working with Engineers Without Borders in college, Choolwe hopes to apply her graduate education to help alleviate the water crisis. Her career goal is to work with United Nations Development Program serving underprivileged communities that deal with the challenges of poverty, food insecurity, water shortage and poor sanitation.

Fife Fellow No. 177

Courtney M. Mazur

Courtney is a graduate of Brown University with a bachelor's degree in biomedical engineering. A semester at Université Pierre et Marie Curie in Paris and leadership positions within her ultimate frisbee team have helped to broaden her undergraduate experience and develop the skills she learned through engineering. She has gained valuable research experience during two summer internships that focused on cancer therapy and a senior honors project in which she investigated the use of decellularized cartilage as a scaffold for cartilage tissue engineering. Cartilage damage affects millions of Americans through sports, trauma, and general use, and she hopes that her work will lead towards a repair method that can permanently regenerate cartilage in young, active patients. Courtney will pursue a Ph.D. at the UC Berkeley-UC San Francisco graduate program in bioengineering. She plans a career in industry where she can design devices and systems for orthopedic therapy.

Deuchler Fellow No. 33

Samantha A. McBride

Samantha received her B.S. in environmental engineering from the University of Nevada, Reno. She was heavily involved in undergraduate research working for Dr. Edward Kolodziej, Ph.D., and conducted several research projects including determination of sorption mechanisms of steroids to organic material and microbial degradation of persistent pollutants. She also was project manager for the ASCE Water Treatment team for two years, where she managed a team of students to compete in ASCE's regional engineering conference. She plans to attend Rensselaer Polytechnic Institute in the fall where she will be working towards a Ph.D. in chemical engineering with the hope of one day becoming a professor. Samantha is interested in a wide variety of research topics, including separation processes for resource recovery, complex fluid mechanics, and renewable energy. She hopes to use research to accomplish real world innovations for improved quality of life around the globe.

Fife Fellow No. 178

Adrien L.H. Perkins

Adrien has received a bachelor's degree in mechanical aerospace engineering from Rutgers University, where he was top of his class and department. He is pursuing a master's degree at Stanford University with a focus on autonomous systems and aerial robotics. During his undergraduate years, Adrien was very involved in the design and construction of an unmanned aerial system for a yearly international competition. His graduate studies are aimed at furthering his knowledge in the theory and application of autonomous systems as they pertain to aerial robotics. Working with autonomous systems is the ideal mix of his two passions: planes and programming, both of which has taken up much of his personal time between flying model planes to creating android applications. While he is considering a Ph.D, Adrien's final goal is to enter industry to create innovative systems for future civilian applications, as he believes there is a wealth of possibilities for unmanned systems.

Lynnworth Fellow No.8

Jean Paul D. Santos

Jean Paul graduated from the University of Utah with his honors B.S. in electrical engineering at the top of his class with a 4.0 G.P.A. He was very active with extracurricular activities such as serving as a student ambassador for the college of engineering. He inspired high school students by building bio-innovation modules that taught engineering principles to interest students. As a student leader, he was also very passionate about sharing his experiences in how to succeed with fellow students. His next goal is to receive his Ph.D. in electrical engineering at UCLA where he hopes to study antenna designs to improve wireless communications. After that, he hopes to work for the Department of Defense to improve military communication systems. However, his ultimate goal is to become a professor and spark the imagination of future students to promote research in electrical engineering especially to underrepresented engineering students.

Fife Fellow No. 180

Jared D. Smith

Jared graduated from Clarkson University, where he was Chapter Vice President with a B.S. in environmental engineering and a minor in occupational and environmental health science. He will be attending Cornell University for an M.S./Ph.D. in environmental and water resource systems engineering. Jared plans to study the risks posed by hydraulic fracturing on surface water and groundwater resources. He first became interested in quantifying the risks of hydrofracking while an exchange student at The University of Newcastle, Australia. There he learned of the tremendous impact that humans may have on subsurface freshwater resources by drilling for oils and fracking for natural gas. Jared aspires to invoke environmentally safe and sustainable protocols, and develop environmentally conscious engineering solutions for hydrofracking into policy. Post graduate school, Jared looks to remain within academia, research, and teaching as a professor.

Nagel Fellow No. 16

Isamar Rosa Plata

Isamar graduated with a B.S. in civil engineering from the University of Puerto Rico at Mayagüez in June 2013. During her summers, Isamar researched topics in cement materials at the University of Michigan, building technology at MIT and mathematics at Williams College. She plans to pursue her doctorate in structural engineering at Stanford University. Isamar is interested in exploring the seismic modeling of damaged structures, the quantification of benefits in sustainable designs and the use of these materials in rehabilitation. As a Boren Scholar, she had the opportunity to study in Japan. Her goal is to work in national public policy and help to create government strategies in rehabilitation and sustainable development. Puerto Rico, her home island, is a prime example of the dangers of uncontrolled and unsustainable urban development. After retiring from policymaking, she hopes to teach there and inspire a new generation to preserve their island through sustainable designs.

Fife Fellow No. 179

Tapash J. Sarkar

Tapash is a graduating electrical engineering and physics senior at Rice University. It is his dream to develop a magnetically-confined nuclear fusion reactor based on one of the most natural configurations—the spheromak design. When magnetic fields are used to contain the plasma during fusion, the spheromak equilibrium is a stable, steady state configuration that naturally arises due to the helicity, twisting or winding, of the fields. He has applied for graduate school to groups at Caltech and UC Berkeley, studying spheromak physics. Tapash has also applied to the Princeton plasma physics laboratory to study spherical tokomaks. He would like to work on such reactors specifically on developing the architecture that produces the desired magnetic helicity, both primary and feedback fields, to confine the plasma during fusion. He believes these reactors hold a lot of promise as sustainable fusion devices, and plans on working with this research through graduate school and beyond to realize this potential.

Fife Fellow No. 181

Kyle A. Steiner

Kyle graduated from the University of Florida with a dual degree in electrical and mechanical engineering and a minor in music performance. He plans to pursue a Ph.D. in mechanical engineering and a master's in electrical engineering in the UF center for intelligent machines and robotics. He ultimately wants to work with a company which focuses on the control, development, and implementation of complex mechanisms for use in robotics. As an undergraduate, Kyle was involved in the interdisciplinary microsystems group and contributed to the development of a scanning Hall probe microscope for the characterization of micromagnet arrays. For his capstone design requirements, he participated in the integrated product and process design program. He and his team developed an autonomous platform for Lockheed Martin using a stock ATV. Kyle was principal trombonist in the UF Orchestra and performed at Carnegie Hall with the UF Wind Symphony. He has also been heavily involved in the UF intramural soccer program.

Williams Fellow No. 34

Alaina L. Strickler

Alaina graduated with a B.S in chemical engineering from Case Western Reserve University, where she maintained a 4.0 G.P.A. She will be attending Stanford University's chemical engineering Ph.D. program. Alaina has been conducting research in the field of electrochemical engineering over the past two years. She has been studying the effects of plating additives on the electrodeposition of metals. Alaina has submitted an abstract on this to the 223rd Electrochemical Society Symposium and is currently preparing a manuscript for publication. Although she would like to build on this research in graduate school, Alaina also envisions herself conducting research within the broader framework of energy or material science, particularly as it relates to sustainable or environmentally friendly technologies. She plans to pursue a career as a faculty member or industrial researcher. She is particularly excited at the prospect of educating the next generation of aspiring scientists.

Tau Beta Pi Fellow No. 808

Xuerong Xiao

Xuerong graduated with a B.S. in engineering science from Pennsylvania State University, where she maintained a 4.0 G.P.A. After two publications in peer reviewed journals, she was drawn to the potential of modern optics and nanotechnology to revolutionize people's daily life. Her senior research was a theoretical investigation on the spin and orbital angular momentums of multiple trains of same-color surface plasmon-polariton waves. What fascinated her was the flexibility in engineering structures and therefore properties of materials to optimize micromanipulation using light. She plans to work on a Ph.D. in electrical engineering at Stanford University with an emphasis on computational photonics. She is currently interested in designing nanophotonic structures and devices to improve transporting light as an information carrier and achieve superfast computing. She plans to follow a career in research as a professor. Xuerong served as a Chapter officer for three semesters.

Fife Fellow No. 182

Gerardo A. Zamora

Gerardo, theVenezuelan-born, soon to be the fourth engineer of his family, completed high school in his home country at sixteen as class valedictorian, and then moved to the United States to pursue a bachelor's degree. He is finishing his undergraduate studies in computer engineering at North Dakota State University with a 4.0 cumulative G.P.A. Also, he was a recipient of the highly competitive Junior/Senior International Student Scholarship, which often has a selection percentage of less than 2%. He is planning to go for his master's in electrical and computer engineering at NDSU as well. Gerardo's areas of interests are cryptography, embedded systems and digital systems, so he is hoping to ultimately go for a Ph.D. and research in hardware cryptography. He is a co-author in a paper to be published in the 2013 Euromicro Digital Systems Design conference. This describes a secure integer comparison protocol, which is faster than the most efficient known protocol.

Arm Fellow No. 5

Joseph D. Tank

Joseph graduated with a B.S. in mechanical engineering from the University of Iowa, where he maintained a 4.0 G.P.A. and served as the Tau Beta Pi Symposium Director. He plans to pursue a Ph.D. in aerospace engineering at the University of Southern California with a focus on fluid dynamics. Joseph has worked as a mechanical engineering intern at a consulting firm where he contributed to the design of HVAC systems. More recently, he worked as an undergraduate researcher and helped to develop a research laboratory. He conducted research to investigate biomimetic energy extraction from complex flow fields. This exposed Joseph to several experimental techniques, such as particle image velocimetry and dye visualization, and sparked an interest in fundamental fluids research. During his graduate career and beyond, Joseph hopes to contribute to projects that produce results with several applications, from new flying and swimming machines to hydro and wind energy technologies.

STAY INVOLVED WITH TAU BETA PI

Don't let graduation be the end of your involvement with Tau Beta Pi! We are actively working with alumni across the country to reactivate and reinvigorate alumni chapters. Opportunities for participation in the MindSET, District, and Engineering Futures Programs are available as are positions as chapter advisors.

Like "Tau Beta Pi: The BENT" on Facebook and join the "Tau Beta Pi Engineering Honor Society" group on LinkedIn to learn about the latest activities going on in Tau Beta Pi.

To connect with alumni in your area, visit:
www.tbp.org/alumni/involve.cfm.

To learn more about volunteer opportunities, visit:
www.tbp.org/memb/volunteerOpps.cfm.

To attend an alumni gathering and to check dates and locations in your area:
www.tbp.org/memb/alumni.cfm.

President Larry Simonson speaks to alumni in St. Louis on March 22, 2013.

February to April Contributors to the Alumni Giving Program

The names of an additional 4,340 Tau Beta Pi alumni who made donations to the Association in the 2013 Alumni Giving Program appear in two separate sections on the following pages. Their gifts totaling $354,646 arrived between February 1 and April 30, 2013. Gifts received after April 30th do not appear here but will be published in the Fall 2013 BENT.

The generous assistance of each member is deeply appreciated by the Executive Council and other Association Officials. The financial resources have permitted strengthening our programs in several areas that emphasize the importance of Tau Beta Pi's basic objectives and that help all collegiate chapters and student members.

Donors' names are arranged alphabetically within their chapters. Names of members who have qualified for the Tau Beta Pi Donor Recognition Clubs are listed only in the first section below. Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests. In addition to the gifts acknowledged here, several were made anonymously through the Combined Federal Campaign, Network for Good, or JustGive and are also deeply appreciated. Matching entities are not listed in this issue. A list is available in the Spring 2013 BENT *or can be found on the Tau Beta Pi website under "Giving."*

Donor Recognition Clubs

The names of 3,504 Tau Bates appear in this first section. They made donations to the 2013 Alumni Giving Program between February 1 and April 30, 2013, AND they have also made CUMULATIVE contributions (in some cases including matching gifts) and bequests to Tau Beta Pi through the years totaling from $250 to more than $1,000,000.

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. Such continuous support significantly contributes to the overall strength of the Association and allows our Society, with confidence in our financial resources, to plan for modest growth in our services to the engineering profession. These clubs were chartered by the Executive Council in 1986 and have been set at the following levels:

Matthews Club	*500,000*	*Alpha Club*	*25,000*	*Chi Club*	*1,000*
Nagel Club	*250,000*	*Beta Club*	*10,000*	*Second Century Club*	*500*
Williams Club	*100,000*	*Delta Club*	*5,000*	*Founder's Club*	*250*
Heikes Club	*50,000*	*Zeta Club*	*2,500*		

HEIKES CLUB
NY E Lynnworth, Lawrence C. '58

ALPHA CLUB
CT A Soderberg, Peter Holton '68
IN A Forney, Robert C. '47
MI Γ Fox, Gordon B. '53
TX H Taylor, Lee D. '68
WV A Clutter Jr., James H. '70

BETA CLUB
AK A Stella, P.E., Damien F. '82
CO B Hasund, Svein H. '67
Teets, Peter B. '63
FL B Robert, Raymond W. '66
IN A Clements, David '80
LA Γ Kitchens, Philip H. '67
MI Γ Clark, Walter B. '69
NY E Hollander, P.E., Lawrence J. '51
NY K Knox, Keith T. '70
NY Ξ Denning, Peter J. '64
OH Γ Mahaffey, Jack L. '54
RI B Brennan Jr., John F. '81
Keddie, William J. '59
SC B Brandel, William J. '52
SD A Gomulinski, Tricia E. '98
TN A Holmes, M.D., William S. '78
Moore, Billy J. '59

DELTA CLUB
AL A Spurlock Jr., Jerry '72
AL E Pierre Jr., P.E., Donald S. '90
AR A Brotherton, Robert H. '67
Gammill, Edward L. '50
CA A Masatani, Peter James '04
CA Δ Hadley, Arthur H. '49
CA E Case, Daniel K. '87
CA H Crotchett, Denton R. '71
CA Ξ Hickey, Robert W. '88
CO A Armentrout, Michael Lee '94
CO B Kinzie, Edward O. '64
CT A Bishop, Broughton H. '50
DE A Sharp III, Hugh Rodney '60
FL A Anonymous '99
FL E Faske, David Gene '85
IL B Clewett, Thomas Alan '88
Gendron, Roger J. '55
Miyasaki, John K. '54
IN A Wainscott, William S. '48
IN E Dausman, P.E., Alan V. '77
IA A Peterson, Michael L. '89
Smith, Richard J. '69
LA A Longwell Jr., Harry J. '63
LA Γ Baldwin Jr., George A. '78
MD B Farmer, Nick A. '68
MA B Godrej, Adi B. '63
MA Δ Lee, Richard Grayson '51
MA Z Lewis, Nelson David '73
MA H Garriques, Ronald G.C. '86
MI B Meyers, James P. '52
MI Γ Tielking, P.E., John T. '62
MI E Anderson, James A. '66
Lahti, P.E., Gerald P. '59
Strebendt, Richard E. '65
MS A Pittman, William Claude '51
MT A Melnick, Charles H. '41
NJ B Gibson, Thomas K. '45
NY A Florman, P.E., Samuel C. '44
NY B Fleisher, Richard S. '72
NY Γ DeGhetto, Ph.D., Kenneth '50
OH A † Friedman, Robert G. '44
Herke Jr., Frederick P. '54
Salamon Jr., Peter F. '71
OH B Forchione, Dennis A. '72
OH Γ Beans, E. William '53
OK Γ Wear, Steven M. '85
PA A Brunner, Thomas M. '63
PA B Norton, Richard S. '57
PA Δ Harker, Patrick T. '81
PA Z Abriola, Joseph L. '48
Feldbaumer, William C. '51
PA H Sykes, Robert F. '47
PA Λ Schuler, Joseph J. '80
TN A Wilson, Wayne '77
TX A Brill, Arno W. '71
TX Δ Sisney, Steven L. '83
TX Λ Beal, Barry A. '65
VT A Brand, Ronald P. '60
VA A White, R. Dudley '76
WA A Asplin, Lyle I. '59
WI A Grainger, David W. '50

ZETA CLUB
AL A Griffith, Gordon H. '57
Stone, Jeffrey I. '79
AL B Drummond, Garry N. '61
Mosley, Talmadge M. '65
AL Δ Fogle, Frank R. '80
AZ A Dickson Jr., Paul W. '54
Anonymous '56
AZ B Jarvi, Theodore C. '66
AR A Vratsinas, P.E., Gus M. '67
CA A Ikeda, Kenneth A. '62
Keith, Edward J. '61
CA Γ Cilker, William H. '41
Davis Jr., Joseph S. '59
Fuller, Robert O. '51
Jedenoff, George A. '40
CA Δ Duckworth, John E. '66
CA Z Fisher, Dean L. '75
Peters, Robert W. '61
CA H Noble, Gary D. '96
CA Λ Coombs, Richard A. '75
CA N Erickson, Ralph E. '71
Steenhoven, P.E., Jerry C. '77
CA Ξ Boyd, Robert A. '74
Robe, Charles E. '79
CA Y Mukhar, Marwan John '93
Neuman, William R. '61
CO B Kern, Robert E. '43
Kidd, T. Wayland '44
Walker, Richard F. '49
CT A Yamachika, Thomas '80
CT B Hunziker, Robert N. '83
DE A Kershner, Vance V. '79
FL A Alonso, Hector '72
Biasco, James R. '78
Uhler, Robert B. '74
GA A Amelio, Ph.D., Gilbert F. '65
Jenkins, William C. '68
Sitton, John H. '88
ID A Frohnen, David J. '83
IL A Goad, Thomas C. '55
Kehlet, Alan B. '51
Wait, Jay J. '71
IL B Bernhardt, John Edward '89
Carter, David W. '68
IL Γ Carlson, Norman W. '81
Dixon, David A. '63
Gross, Richard Charles '80
Nugent, D. Eugene '51
IL Z Allendorfer, Robert K. '83
IN A Brown, David R. '56
Christensen, Billy C. '50
Murdock, Jay H. '51
Sherman, Robert '49
Todd, Zane G. '51
Weigand Jr., Karl R. '66
IN B Conn, Richard Lee '76
IN Γ Jackewicz Jr., Joseph I. '75
IN Δ Brandt, Daniel M. '74
IA A Pride, Richard A. '47
IA B Smull, Warren L. '57
KS A Meyer, Leslie D. '65
Mitchell, James E. '85
Powell, Ricky S. '80
KS B Patton, Robert E. '70
KS Γ Hefty, Keith W. '87
KY B Arbaugh, Andrew Carey '95
Dahlem, Bernard A. '51
LA A Schweizer, USA Ret., Charles '36
Walker, Carolyn B. '80
LA Γ Cornish, Merrill A. '67
ME A Johnson, Christine E. '82
MD A Dackow, Paul N. '76
Gutsmuth, Henry R. '56
MD B Beard, James L. '67
Booth, Andrew W. '64
Burgio, Robert B. '87
De Oms, James H. '68
Simkins, Lee S. '77
Thompson, Leslie L. '66
Wilson, Ronald A. '68
MA A Descoteaux, Kenneth Gerard '89
MA B Hirsch, Alan R. '66
McInnes, Harold A. B. '49
MA Δ Patkin, Murray S. '64
Peterson, John W. '53
Sullivan, Gerard F. '68
MA Z Boraski, Nicholas '50
Lastella, Michael J. '72
MI A Bozian, Edwin B. '50
Chiti, James D. '71
Colbry, Ph.D., Dirk J. '06
Colbry, Ph.D., Kathleen L. '99
MI B Smith, Richard E. '48
MI Γ Burchfield, Jack E. '56
Halverson, Mark W. '72
Hopping, William D. '71
Niedenfuhr, Francis W. '50
Wackenhut, Thomas C. '69
MI Δ Cook, Clifford C. '69
Eberl, Edward G. '74
Kersich, Albert T. '52
Kogut, Kenneth J. '71
Stanczak, John S. '70
MI E Ciarkowski, Arthur A. '71
Gomulinski, Curtis D. '01
Kolodziej, David G. '59
Philippart, Nancy L. '80
Schmuhl, John C. '71
Szafranski, Joseph P. '66
MI Z Dymale, Raymond C. '70
Jordan, Gary L. '73
Quaid, Richard C. '65
MI Θ Pivitt, Barry R. '88
MN A Hemp, Gene W. '61
Stanley, Steven Francis '84
MS A Coley, James W. '61
MO A De Young, Lance G. '65
Edgington, P.E., Bobbie G. '69
Meyer, Roland P. '64
MO Γ Gillespie, Charles K. '57
Hurwitz, Dan N. '50
Philipp, Patrick William '98
Taber, Norma J. '80
MT A Royer, Erlind G. '61
NJ A Skowronski, Victor J. '71
NJ B Schelke, P.E., Joseph A. '51
NJ Γ Benson, Robert J. '65
Petruch, Raymond A. '84
Stadlin, P.E., Walter O. '52
Weibrecht Jr., Edwin H. '68
Wojslawowicz, Jack E. '70
NM A Bacastow, Jack L. '73
Smith, Jeffrey A. '84
NY B Kelley, David B. '51
Newman, Michael '84
NY Γ Anderlik, Jeffrey David '89
De Groot III, Ward W. '54
Donofuio, Nicholas M. '67
Welton, Dexter M. '52
NY Δ Aylesworth, William A. '65
Desloge, Joseph Gilles '92
Nelson, Arnold S. '50
NY E Esformes, Ira '71
Marsocci, P.E., Velio A. '53
NY Z Frohman, John E. '72
NY H Urban, Mark '78
NY Θ Bauer, Richard C. '66
Van Wagenen, William E. '78
NY K Hoffman, Thomas E. '50
Sturiale, Gino R. '52
NY Λ Kuras, John E. '69
NY N Rataj, Paul S. '83

ZETA CLUB, CONTINUED

Sherman, Lawrence J. '74
NY Ξ Mancuso, Richard G. '92
NC A Hall, Michael L. '83
NC Λ Appel, Richard Joseph '97
OH A Ikeda, George T. '54
Linsalata, Frank '63
Markuson, Donald M. '80
Soeder, James F. '72
Stock, Daniel Lee '80
OH B Dutko, Robert James '90
Pollock, Flavil M. '77
Zureick, Elizabeth Ann '73
OH Γ Bilikam Jr., Robert C. '60
OH E Pasadyn, P.E., Ronald C. '70
Wahl, Frederick B. '56
OH H Dechance, Richard P. '76
OH Θ Abdoo, Richard A. '65
OH I Starr, Brian F. '87
OK A Anderson, James K. '49
Johnson, James '59
Miller, Loyle P. '49
OR A Smith, Richard N. '57
PA A Berglund, Thomas A. '82
PA B Reese, J. Mark '80
Williams, John R. '60
PA Λ Bordogna, Joseph R. '55
Gebhardt, Robert C. '53
PA E Babbitt, Walter H. '77
PA I Salyers, John Marshall '01
SC A Bailey, Susan G. '86
Davis, Joseph Howard '91
Roesel, Helen A. '79
SC Γ Attanasio, Roger A. '57
Hanes, Richard M. '67
TN A Dallas, Bradford B. '45
Rosser, Howard W. '70
Schwerin, Carl J. '48
TN B Casson Jr., Walter A. '56
Rowan Jr., William H. '55
Shackleford III, James R. '60
Thomas, James L. '77
TX A Clark, Glynn A. '48
Dorr, Lawrence D. '68
Tran, P.E., Tan Dai '87
TX B Ellisen, Arthur R. '62
Green, Chester A. '46
TX Γ Hedrick, O. F. '44
TX Λ Baumgartner, Yoanna '84
Cloud, Eugene H. '67
Davis, Kenneth W. '49
Johnson, Dennis R. '74
Latham, Raymond E. '56
Mathis, James F. '46
Porter, Larry G. '64
TX E Sams, William N. '81
TX H Falk, Nathan M. '75
Nicholson, James E. '75
UT A Sadauskas, Leonard '66
VA A Agosti, M.D., Steven J. '81
Wadsworth, Robert M. '82
VA B Anderson, Mark E. '76
Creslein III, William E. '52
WA A O'Byrne Jr., Michael E. '61
Ross, Robert B. '61
Speece, Daymond R. '54
Williams, Donald S. '66
WA B Emery, Frederic P. '51
WV A Fourney, Michael E. '58
Miller, Betty L. '47
WV B Hughes II, Paul K. '71
WI A Debbink, John D. '49
Yee, Paul Yuen-Po '70
WI B Boyle, Richard J. '57
WY A Davidson, Steven L. '80

CHI CLUB

AL A Cowles, Gary D.E. '87
Finfrock, M. Frank '51
Pierre Sr., Donald Stephen '58
Slotkin, Arthur L. '68
Whitley III, Howard G. '63
AL B Caraccioli, Philip M. '59
Williams, Bertram L. '56
AL Γ Haggard, Warren O. '94
Jacobs, Bryan K. '81
Norton, William Boehms '91
AL Δ Appleton, Robert Scott '90
Wilkinson, Brian D. '87
AK A Keeney, Joseph H. '78
AZ A Bell, Edward A. '72
Berg, Jeffrey R. '93
Frondorf, U. George '69
Soukup, P.E., David J. '76
AZ B Berry, John Bradley '89
Claspell, Ogal B. '66
Hauptmann, Robert C. '80
Mingo, Doug M. '83
AZ Γ Dickson, Eric K. '81
Heaton, Janet Day '84
AR A Powers, Tom L. '58
CA A Bassett, James H. '50
Bragg, Robert H. '49
Butner, David N. '61
Figueira, Michael R. '73
Fong, Kirby W. '67
Gilbert, Paul H. '59
Hoe, Albert '92
Kepler II, David E. '75
Lammers, Thomas R. '50
Masson Jr., James R. '42
McCown, Donald P. '62
Pigozzi, Leo J. '50
Reynolds, Barry D. '84
Wing, Jimmie '52
Woods, Philip C. '54
CA B Burke, James D. '45
Savellano, Mark D. '93
CA Γ Dixon, Harvey L. '52
Holmen, Robert R. '85
Sutherland, Kenneth H. '78
Taniguchi, Brian Y. '77
Trowbridge, Roy P. '40
Whitehead, Peter B. '61
CA Δ Brandow, Gregg E. '67
Conlin, Carter B. '45
Farwell, Robert H. '50
Fernandez, Ferdinand F. '58
Herzberg, Donald E. '79
Holcombe, Richard P. '51
Mallis, Richard K. '52
Moulton, James R. '54
Slafer, Loren I. '68
Zehrbach, Bill E. '69
CA E Anton, Philip S. '85
Auerbach, Albert '48
Bramblett, Ernest K. '58
Bramblett, George C. '59
Brunton, Daniel W. '78
Dobbs, Michael W. '66
Evtuhov, Viktor '56
Gordon, James D. '63
Goss, John R. '52
McCandless, Roger J. '65
McDonnell, John D. '60
Nesbit, Richard A. '58
Ohgi, Frank '60
Schurr, Hermann D. '82
Schurr, Juliet S. '85
Simsarian, Gregory G. '82
Suyematsu, Herbert T. '58
Volansky, Saul A. '62
Welstand, Joseph S. '64
Yoshizumi, Steven A. '88
CA Z Greenley, Dale R. '86
Murray, R. Ian '49
Nulk, Robert A. '58
Vlahutin, Paul A. '65
Wagner, Michael J. '69
CA H Clark, William C. '72
Rawson, Rollin F. '61
Sakai, Tessi '75
Van Zwol, Jason '77
CA Θ Hinker, Fred L. '68
Lawson, Wayne A. '69
Piburn, Russell J. '75
Potter, Richard C. '40
Schirmer, Theodore C. '73
Slater, Eric K. '67
CA I Haan Sr., George T. '69
Kuspa, Joseph A. '93
Schluer, David W. '82
Thomsen, Jonathan W. '69
CA Λ Horn, Jeffrey B. '79
Lieu, Tom '94
Okpisz, Alexander E. '91
Rubke, Belinda Y. '80
Tobin, Jennifer Anne '94
CA M Brownell, Michael P. '84
Hagler, Richard D. '85
CA N Marsh, William C. '82
Snow, Terry M. '76
CA O Fiedler, James M. '78
CA Π Steinberg, Dennis P. '72
CA P Andersen, Eric K. '79
Kraft, Lyle D. '87
CA Y Dawson, P.E., Carole S. '85
Idenmill, Ethan Matthew '04
CA Φ Shelly, Ronald W. '62
CO A Abell, Joseph M. '56
Allred Jr., Ivan D. '59
Anderson, Arvid N. '54
Maurer, Mike A. '87
Rense, John A. L. '74
Sargent, William A. '77
CO B Franchino, Robert A. '60
Frey, Bryce A. '56
Geist, Jerry D. '56
Hidahl, Jerry P. '77
Luppens, John C. '76
Mueller, Anson G. '49
Purcell Jr., Robert H. '49
True, Laurence C. '78
CO Γ Mead, Richard W. '63
Pearson, J. Lawrence '64
CO Δ Clark, Ph.D., John R. '92
CT A Baublitz, John E. '60
Cleland, Alan S. '60
Kucera, Daniel J. '61
Livingston, Robert M. '57
Markell Jr., John '41
Merritt Jr., Thomas W. '50
Troutman, John L. '65
Verges, Hugo P. '49
CT B Bonazzo, Vincent A. '80
Devin, Maurice R. '73
Ezzio, Louis A. '77
Fitton, John J. '70
Staiger, Eugene H. '57
DE A Swope, Richard D. '60
DC A Gillam IV, Isaac T. '53
DC B Ford, Martha '74
Murphy, Joseph A. '60
Orzech, Joseph M. '71
Walsh, Bryan Patrick '97
DC Γ Grassel, Herbert H. '77
Haldeman, Paul M. '70
Joyce, James W. '61
Keene, Warren E. '57
Mitchell, Reginald S. '65
FL A Edmunds, Robert C. '68
Flewellen Jr., William B. '50
Gunson, William E. '50
Iwens, Ralph P. '62
Lewis, Virgil Conley '91
Walding, Joseph D. '51
FL B Alvarez, Vicente '64
FL Γ Ball, Arthur M. '70
Dip, Anthony '86
Emerson, Michael J. '83
Lyons Jr., Thomas F. '76
GA A Austin, Edward M. '56
Deloach, Thomas C. '69
Dishongh, Jefferson L. '66
Hair, James G. '59
Hancock, John L. '48
Henderson, Richard D. '53
Lorenzo, Donald K. '77
Smith, Michael M. '79
Taylor, Harvey H. '75
Winn, Charles E. '47
IL A Bein, Robert W. '56
Chang, Milton M-T '64
Deuchler Jr., Walter E. '51
Ephgrave, James T. '52
Hines, John W. '56
Laible, James R. '54
Le Blond, Peter C. '75
Schub, Linda G. '79
Sylwestrak, Daniel J. '83
Tirpak, Thomas M. '87
Uzarski, Ph.D., P.E., Donald '80
Waranauskas, Amy B. '85
IL B Anderson, Robert F. '62
Forish Jr., George E. '75
Kacek, George J. '54
Kusner, William J. '59
Lorentz, Peter Michael '89
Shannon, Paul T. '56
IL Γ Ayres, Richard O. '79
Cohen, Sanford C. '58
Gajda, Gregory J. '80
Henry, Thomas P. '73
Herzing, Henry G. '59
Witt, Frank A. '55
IL E Fligor, Pamela S. '92
Williams, Michael Joe '95
IN A Amaya, Mark A. '85
Blakeslee, Donald J. '51
Cooper, David B. '56
Dunn, Philip C. '64
Dye, Frank R. '55
Easto, William D. '79
Ehlers, Steven M. '77
Findley, Richard A. '66
Gilewski, Robert L. '73
Harvey, James A. '81
Henderson, James B. '46
Hohn, Richard E. '62
Holmes Jr., Lowell L. '40
Houze Jr., Gerald L. '58
Krontz, Max M. '62
McDonald, John D. '73
Pagerey, Paul F. '50
Papanicolas, Mitchel '65
Paszkiet, Christine A. '85
Renner, Arnold E. '54
Rossa, Leonard G. '59
Saavedra, Joaquin A. '52
Schult, Thomas H. '64
Sommer, Dianna M. '83
Suzuki, Wayne T. '67
Weiss, Arthur F. '55
Wetter, Charles R. '53
White, Harvey C. '49
Willis Jr., Charles Pressley '48
Wright, Ronald R. '71
IN B Harmon, Allen D. '73
Jackel Jr., Henry E. '57
Powell, Robert L. '51
Rosenbarger, Donald G. '78
Schipper, Michael J. '82
IN Γ Boehnen, Daniel A. '72
Harvey, Michael J. '85
Kelly, Robert A. '65
Lucey, Josephine Ann '80
McDonald, Patrick J. '60
O'Connor, Brian T. '72
Zupcic, Esq., Anthony M. '70
IN Δ Epperly, Michael P. '65
Kleve Jr., Frederic W. '67
IN E Lagrow, Timothy G. '83
Liechty, Douglas L. '73
Tyler, Thomas Lee '54
IA A Amos, L. Lyeal '69
Ask, P.E., Andrew C. '64
Hammar, Kelly Jean '89
Mankowski, Alan T. '68
Manning, Thomas W. '64
Pedersen, Robert D. '62
Puffett, George E. '83
Smith, William J. '66
Snyder, Merrill H. '68
IA B Aron, Gert '58
Lawson, James T. '70
Rasing, Joyce A. '81
Snyder, M. Duane '63
KS A Anschutz, Glenn W. '50
Becker, Frank J. '58
Butts, Jack N. '49
Conrad, Kenneth F. '74
Harmony, Marlin D. '58
Kohman, Wayne E. '51
Moore, P.E., Richard A. '51
Nash, Samuel K. '42
Parrish, Joseph V. '72
Saller, George E. '50
Timmerman, Robert W. '38
KS B Bradburn, Wayne E. '72
Brown, Cheryl Ann C '82
Hockett, James K. '66
Mikelson, Erin Kathleen '00
Wilson, Bryan K. '85
KS Γ Erickson, Ph.D., Larry E. '60
Gemaehlich, Donald J. '83
Larson, Reed E. '47
KY A Anderson, Lee R. '71
Bittle, David F. '59
Congleton, Stephen D. '79
Elwood, Persis Ann '85
Halloran, Stephen R. '75
Heckrotte, Rita W. '72
Hord, Jesse '56
KY B Lasky, William T. '86
Yee, Ngai S. '82
LA A Capell III, Robert L. '70
Payne, Howell B. '56
White Jr., Kenneth E. '69
LA B Bourgeois, Brian S. '82
Feehan, Thomas J. '44
Klegar, David '53
Metcalf, Richard T. '78
Quarles, Harry F. '74
Rickman, Philip M. '83
Rogers, P.E., R. Bradford '79
LA Γ Dronet, James B. '83
Wyche III, James E. '59
LA Δ Landry, Glen R. '75
O'Rourke Sr., Donald Joseph '51
ME A Blaisdell, John R. '66
Bragdon, Reginald Glenwood '93
Hamilton, Wayne A. '58
Henderson, USAF Ret., W.D. '58
Lord, Victor R. '70
Petherbridge, David F. '56
Smiley, Edward L. '48
MD A Beard Jr., Harry B. '48
Burck, James M. '86
DiGiorgio, Joseph B. '54
Gitomer, Steven J. '64
Guzy, Jeffrey D. '83
Harris, Matthew S. '98
Kuchta, Francis W. '53
Sadilek, Albert C. '72
Shinham Jr., Charles R. '71
Tsao, Audrey K. '82
MD B Antony, Roger W. '71
Himes, Douglas L. '82
Joseph, John H. '85
Kivi, Ahto '59
Sayre Jr., Clifford L. '47
Smith, Richard B. '67
Vogel Jr., Richard L. '72
Williams Jr., Paul L. '53
Yerkes, Michael A. '70
MD Γ Merritt Jr., Charles R. '85
MA A Achilles, Heather D M '83
Chace, Brian D. '69
De Andrea, Paul J. '75
Downs, Allen G. '75
Hamel, Peter J. '81
Oakes, Michael W. '77
MA B Ball, N. Addison '60
Broughton, William J. '61
Coburn, Joseph L. '61
Ferguson, Keith M. '62
Hazen, Nathan L. '56
Hladik, Karen J. '78
Honke, James K. '63
Inserra, Beniamino A. '57
Isnardi, Michael A. '82
Klein, Harrison J. '71
Mandell, Gordon K. '69
Marks, Lloyd A. '71
Patterson, John B. '68
Pershing Jr., John A. '75
Petrofsky, Alfred M. '50
Quick Jr., Roy F. '70
Schmitt, Ralph G. '66
Simpson, Richard A. '67
Smith, Alan J. '71
Smith, Robert P. '50
MA Λ Brown, Linfield C. '64
Buffinton, Keith W. '79
Foster, Arthur R. '45
Harrison, Michael S. '74
Laughlin, William T. '64
Milauskas, Ronald J. '62
Stark, Lucius D. '64
MA E Bittner, Douglas E. '83
Brunetto, Thomas P. '74
Calvo, Alberto B. '70
Esposito, Ronald J. '74
Jonah, Maxwell V. '55
La Lone, James C. '70
Linscott, Anne Wiklord '80
Ridlon, Stephen A. '66
MA Z Brindis, P.E., Samuel B. '80
Grzeslak, Kazimierz T. '88
Scott, George L. '63
Strzegowski Jr., Joseph C. '67
MI A Bauhahn, Paul E. '68
Chamberlain, P.E., Adrian R. '51
Mueller, James M. '70
Sandford, Thomas A. '59
Shannon, David H. '59
Spray, P.E., Kenneth E. '51
Strodtman, Carl L. '43
Woelzlein, Wilmar M. '51
MI B Lind, Earl R. '50
Ojala, William K. '54
Saccany, Richard J. '71
Scott, Kenneth J. '55
Stehulak, Edward S. '86
Vojtech, Larry J. '69
Vukovich, Robert J. '83
Wilden, P.E., Helmuth '65
MI Γ Barnes, Raymond H. '40
Baxter, John E. '57
Bonfanti, Giovanni '62
Burton, P.E., James R. '48
Campbell, John A. '62
Colby, Gary C. '82
Crouch, Dennis E. '62
Davies, John R. '50
Frederick, Frank T. '71
Ginn, Robert M. '48
Griffin, William R. '77
Gromer, John D. '74
Grossman, Michael A. '88
Hall, Henry C. '50
Hole, William E. '51
Karl, Donald E. '71
Kasper, Alan R. '62
Kenyon, Paul S. '79
Khu, Eric B. C. '53
Natvig, Anne Campbell '56
Nobunaga, Alan S. '83
Pendleton, Winston K. '62
Roof, Richard R. '51
Schoenhals, Robert J. '56
Smithies, Henry '49
Stuart, Glenn A. '51
Subramanian, Suresh '88
Washburn, John R. '69
Wentzel, Richard D. '60
MI Δ Caste, Richard A. '68
Culver, Walter '60
Dolan, William J. '62
Ponticello, John C. '78
Rose, M.D., Ph.D., Jonathan '81
Rutkowski, Paul J. '69
Stumpf, Kenneth A. '73
MI E Boileau, Ph.D., James M. '87
Chudd, Richard A. '66
Doughty, Robert E. '65
Hock, Roy Edward '51
Hong, Albert E. '80
Husak, Philip W. '72
Morin Jr., Dornis C. '48
Mutzelburg, Ronald E. '68
Rodgers, John J. '52
MI Z McEwen, Stephen N. '54
Sadlo, Thomas G. '77
Slovesko, Shawn M. '97
MI H Colegrove, Jon K. '80
Horldt, P.E., Henry B. '47
Zwally, C. Lee '41
MI Θ Spall, James C. '79
MI K Henry, Roger C. '92
MN A Benjamin, Harrison R. '57
Christensen, Thomas M. '79
Cotrill, Harry E. '51
Goodwin, Robert W. '62
Holzmer, Donald N. '60
Polacek, James H. '52
Severson, John A. '72
Shaw, John R. '59
Sunderman, Richard P. '61
Ziemer, Rodger E. '61
MS A Backus, Patricia M. '78
Black, Howard Wayne '95
Boozer, Drayton D. '66
Hatmaker Jr., P.E., John W. '79
Hibbard, Janet C. '86
Hibbard, Michael J. '78
McKay Jr., Frank F. '60
Nelms, Larry T. '63
Owens, John K. '65
Seitz, T. Bing '63
Sims, Joseph H. '63
Williams, Michael L. '80
MO A Burkholder, Scott G. '79
Connor Jr., John R. '67
Hea, James P. '68
Raines, Gary K. '65
Sandfort, Robert M. '64
Weary, Franklin G. '70
Wilson, Richard E. '77
MO B Dampf, Donald P. '50
Eldred, Benjamin T. '96
Elliott, Joseph O. '71
Frankenberger, Richard B. '93
Hacker, Alden G. '41
Hayden, Thomas M. '71
Miller, Michael J. '74
Murphy Jr., William L. '50
MO Γ Branahl, Erwin F. '43
Fisher, P.E., John W. '56
Galambos, Theodore V. '53
Gatley, William S. '56
Rehg, Larry M. '59
MT A Brown, Lloyd R. '72
Kranhold, Kenneth G. '61
Nelson, Frederick A. '69
Thera, John M. '72
Whitcomb, David L. '64
NE A Doerr, Eric A. '88
Fuerst, John M. '82
Hoffman, Ernest G. '68
Martin, John C. '85
Plummer, Scott R. '81
Schmidt, Wayne W. '70
NV B Nietling, John J. '90
NH A Bailey, Joseph G. '86
Corrigan, Leo A. '48
Dyceewicz, Vickie Sue '96
NJ A Alvey, Courtney D. '45
Brechka, Thomas M. '73
Murphy, Kevin J. '78
Sherman, Susan J. '81
Turgyan, Terrence J. '75
NJ B Sharkey, John M. '84
Starr, James W. '73
Vandergrift, Wayne J. '47
Wollmann, Norman P. '81
NJ Γ Angyal, Stephen '63
Dehn, Rudolph A. '41
Dickson, W. Henry '50
Dooley, Ronald M. '64
Furtado, Victor C. '58
Grant, Douglas J. '68
Mauermeyer, Henry A. '72
Otterbein, Richard C. '71
Pecca Jr., John A. '87
Riede, Bruce E. '67
Terry, Frederic T. '67
Zierau, Siegfried M. '61
Zygo, John P. '70
NJ Δ Coco, Elizabeth H. '87
Kline, Donald R. '55
Meyer, John E. '81
NM A Bradt, David J. '81
Gonzales, Omega S. '53
Peace, Jeffrey H. '76
NM B Andrews, Mark Jay '91
Gonzales, Michael A. '74
Menako, Jack A. '84
O'Donnell, William D. '53
NY A Epling Jr., William Y. '83
Lowe, David '81
Morgan, Thomas A. '78
Reich, Herbert '84
Richmond, James A. '72
Thomashower, William J. '70
NY B Bickley, Thomas D. '78
Chandler, George D. '70
Prach, Edwin F. '50
Roberts, S. William '58
Storrs, Edward L. '81
Wedlake, Raymond A. '73
NY Γ Bergenthal, Jon F. '75
Bond, Paul W. '72
Chamberlin, Donald M. '67
Clarke, William H. '66
Dobson, John F. '52
Hartung, Edward C. '63
Kaufman, Arthur L. '50
McCormick, Peter E. '80
Miller, John Hoover '53
Ordway III, Fred D. '69
Petersen, Stephen G. '53
Smith III, George E. '80
Thal Jr., Herbert L. '53
Uber, Charles B. '55
Vilardi, Gregory Henry '90
Wall, Thomas O. '41
Wild, Donald S. '50
NY Δ Bauer, Douglas C. '61
Feldmann, William C. '84
Frantz Jr., Rolf A. '66
Higgins Jr., J. David '53
Humphrey, John M. '67
Kingston, William J. '50
Klepeis, John E. '85
Livingston, Laura J. '73

Philip, M.D., James H. '69
Schilke, Neil A. '63
Schwenker, David W. '67
Taylor, Edgar R. '52
Zises, Matthew Scott '96
NY E Bernstein, Joseph H. '50
Brodsky, Wesley G. '71
Freier, P.E., Ret., Otto A. '70
Grinthal, E. Ted '62
Lavin, Joseph M. '73
Niebanck, Charles F. '54
Wechsler, Lawrence D. '55
NY Z Gersten, Marvin C. '60
Keller, Norman K. '58
Labianca, Frank M. '61
Lopinto, Robert A. '67
Pawelko, Michael J. '53
Tartanian, Charles N. '58
NY H Arminski, Leslie M. '75
Kaplan, Howard R. '55
Pollack, Herbert W. '50
Rimland, Marvin '50
Stoll, Eric D. '61
NY Θ Bradish, Robert W. '85
Foell, John D. '77
Kaylor, James M. '88
McKenney, John L. '62
Villiere, Paul M. '50
NY I De Fazio, Michael J. '67
Fischer, George A. '54
Koch, Peter M. '79
Neuschaefer, Howard E. '65
Rolund, Michael '61
Trentacosta, Joseph D. '69
Ulrich, James W. '70
NY K Allyn, Elwyn G. '61
Mastro, Noreen L. '79
Rudin, Murray E. '83
NY Λ Kern, P.E., Peter L. '62
Petsche, Frank '78
Rubens, Roger W. '49
Widmann, Bradley H. '69
NY M Czuba, John S. '78
Goldreich, Joseph D. '45
Montgomery, Michael E. '75
Rest, George B. '75
NY N Mendell, Todd '74
Roach, Linda J. '82
Sisson, Albert E. '66
NY Ξ Byrnes, Richard D. '83
Murphy, Vincent G. '65
O'Keefe, Luke F. '80
NY O Froeschl, Gary G. '71
Putnims, Zigmunds A. '78
Ribuffo, Michael R. '75
Venezia, Frank B. '90
Williams Jr., Robert C. '83
NY Π Brol, Michael W. '83
Cole, David M. '88
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Waters, David G. '79
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NY T Hughes, Michael K. '97
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Caudle, P.E., Daryl L. '85
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Frierson, J. Lawrence '66
Morton, Rodney E. '84
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Searle, John R. '70
Snyder, Theresa Mooney '85
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Hansen, Mikkel A. '78
Hovis, John Garrison '78
Prevatt III, Richard M. '77
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NC E Allen, James A. '88
Green, Regina Whittaker '79
ND A Herbold, Frederick J. '69
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Ferencz, Robert M. '80
Goralski, Christian T. '64
Gropp, William D. '77
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Stewart Jr., Paul V L '50
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Grandey, Loren F. '40
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Morscher, Mark J. '89
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Rogers, William M. '53
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Armstrong, Ellie Rebecca '01
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Pyers, Dean H. '84
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Tenney, P.E., Thomas H. '67
OH H Bloom, Richard L. '74
Fisher, Jack D. '69
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Liske, Robert A. '66
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Schmude, Donald J. '86
Sherrill, Shirley W. '82
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Steffanelli, Loretta M. '86
OK Γ Diggs, Robert A. '74
OR A Arsenault, P.E., Paula M. '81
Bishop, Donald L. '65
Bollen, Walter M. '47
Brooks, James S. '51
Buxton, Charles E. '62
Davis, Donald A. '51
Jones, Reilly C. '75
Miller, George E. '77
Milton, Stuart W. '84
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Talhelm, Donald L. '59
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Dreibelbies, George A. '55
Huber, Ronald K. '70
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Klingensmith, Ricky L. '82
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Kutz, Scott A. '71
McGivern, Patrick John '90
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Smyth, John '61
Walsh, John A. '52
Wilt, Kenneth D. '84
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McIlvried III, Howard G. '53
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Wisman, Craig B. '75
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Black, David L. '83
Heilmeier, George H. '58
PA E Cook Jr., Eugene M. '58
Lissenden Jr., George C. '58
Rodite, Robert R. R. '64
Ryan, Richard E. '86
Wetzel, P.E., Edward D. '74
PA Z Aepli, Theodore C. '62
Buchler, Robert Hans '92
Chatman, William C. '52
Dieter Jr., George E. '50
Leidigh, Thomas J. '49
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Rakula, Dierk H. '55
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Weggel, John R. '64
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Keil, Alan J. '72
Reiner, Robert E. '64
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Lacz, Walter '69
Lynch, Robert D. '53
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Threston, Joseph T. '57
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PA K De Burlo Jr., C. Russell '47
PA Λ Janocko, David J. '81

Combined Federal Campaign

Tau Beta Pi has been included as an eligible organization on the 2013 Combined Federal Campaign (CFC) national list. The Combined Federal Campaign is the annual workplace fund-raising drive conducted by federal employees and military personnel each fall, which raises millions of dollars benefiting thousands of nonprofit charities. Tau Beta Pi has participated since 2000.

Tau Beta Pi will appear in the listing of *National/International Organizations* which is published in each local campaign brochure. Your donation will be directed to Tau Beta Pi by using the CFC identification number **10960.**

In previous years, our Association has received thousands of dollars annually from this campaign. Unfortunately, the many local agencies gathering donations for the campaign are not able to provide us with the names of all of the donors. Because of this, a donation made through this campaign may not be included in a member's giving record. Please know that the contributions are used to support the Fellowship, Scholarship, Laureate, and District Programs.

Thank you to all who have contributed to Tau Beta Pi through this campaign!

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Lam, Carroll F. '58
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Williams, Walter L. '49
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Spence, Peter L. '80
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Grantham, Ronald J. '77
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Evers, James L. '59
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Hayes, Raymond C. '54
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Mason, William Warren '89
Moore, Robert A. '54
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AL Δ Hitt, Matthew Arnold '10
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McFadden, Terry T. '60
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Park, Trevor Howard '97
Smith, William G. '78
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Kent, Richard B. '54
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FL Z Hatfield, Thomas A. '87
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Russell, Richard C. '56
Schueler, William F. '72
Stowell, Robert L. '60
Stuber, Donald R. '71
Thomas, J.E. Dorn '58
Ware Jr., Clyde L. '59
Watts, David L. '79
ID A Cleveland, Gregory P. '87
IL A Anderson, Donald D. '80
Benjamin, Roland J. '50
Benzinger, Leonora A. '86
Clark, Elliot A. '83
Cunningham, Lawrence K. '76
Davis, Stephen R. '63
Fisher, Robert L. '80
Hebenstreit, Richard H. '45
Holm, John R. '76
Jonas, Steven G. '66
Kent, Michael E. '64
Lane, Brad G. '84
Lenzini, Peter A. '75
Mikitka, Robert W. '54
Neuhalfen, Andrew J. '83
Palkovic, Victor J. '61
Rebeschini, Michael E. '77
Schilson, Robert E. '50
Smith, Leslie G. '48
Tracy, Mark A. '86
Zartman, Charles R. '59
IL B Kinsey, Albert M. '58
Lord, Mark C. '87
Roberts, Roland W. '48
Sodoma, Mark T. '82
Thomas, Robert J. '82
Underys, Algirdas A. '78
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Miner, Warren P. '59
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IL E Chen, Juh W. '53
Garfield, William M. '83
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Bass, Steven C. '65
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Buechler, Ralph M. '39
Carson, William D. '60
Clodfelter, Donald G. '55
Cross, Perry G. '74
Dillard, James O. '77
Dillon Jr., Robert E. '77
Ferrell, John C. '61
Frazer, William B. '47
Frazier, George E. '57
Hall, Thomas W. '67
Harrod, Byron N. '71
Hartter, Larry L. '65
Hibbard, George L. '65
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Keene, Alice Fay '05
Klingsporn Jr., Paul A. '43
Kuivanen, David P. '78
Kurtz, John W. '45
Matheson, Harold M. '55
Nichols, Donald O. '61
Paustian, Harold H. '73
Rerucha, Thomas L. '81
Van Zante, Dale E. '90
Walter, Gordon E. '41
Winchester, Richard B. '42
IA B Bicknell, Murray S. '59
Boldt, Donald B. '57
Brink, Richard E. '44
Dawson, Robert J. '60
Guerdet, Steven J. '65
Huff, Herbert D. '60
Jacobs, David L. E. '51
Toerber, Erwin D. '66
KS A Benso, William E. '59
Harden, Dan R. '71
Hood, John T. '62
Lewis, Herbert D. '50
Muirhead, Vincent U. '41
KS B Barkell Jr., James W. '74
Marks, Kevin B. '79
KS Γ Brockway, Michael D. '92
Lebak, James M. '89
Tracey, Deborah S. '86
KY A Baker, P.E., Merl '45
Cook, Robert H. '74
Davis Jr., L. Berkley '66
Freeman, Richard E. '73
Stephens, Michael M. '79
KY B Black, Leslie E. '50
Heaton, William S. '46
Johnson, Alan A. '52
Kehlbeck, Joseph H. '50
Meyers, James F. '69
Minsterl, James R. '71
Schuler, Walter L. '60
Thornton, Patrick J. '82
LA A Armistead, William T. '71
Brack, Karen Guenther '84
Correa, Domingo M. '59
Kolb, Frank R. '68
Martel, James Troy '75
McNulty, Whitney P. '85
Nelson Jr., George G. '52
Stansbury, Merlin C. '71
LA B Boyle Jr., William M. '62
Garrido, Louis A. '57
Lazarus, William B. '79
Marin, Justo E. '79
Rouquette, P.E., Robert '74
LA Γ Davis Jr., John F. '50
Hogan, Harry A. '79
Jenkins, James S. '80
Jones Jr., G. Clifton '64
McPhate, Andrew J. '60
Needles, Charles R. '72
Schwartzenburg, David '80
Thomas, Robin C. '92
LA Δ Barbay, Norman J. '74
Key, John A. '75
Menard, Stafford J. '73
Young, Ronald D. '66
ME A Carsley, Denice Loring '92
Hei Jr., Donald J. '67
Hutchison, Mark E. '77
Laskey, Henry L. '51
Richter, Robert A. '50
Tomko, William C. '48
Welch, Peter J. '72
MD A Armstrong, John E. '56
Beatty Jr., Ph.D., Millard '59
Cummings, Lori Malloy '83
Dryden, Thomas E. '79
Gift, Elwood H. '54
Gormley, Paul E. '68
Lang, John C. '72
Lu, Stanley '95
Monmonier, Ph.D., Mark '64
Piedrafita, James L. '78
Ver Valen, Henry C. '73
Winter, George W. '48
MD B Alexander, Dwain W. '74
Brownstein, Barry J. '68
Devereaux, John P. '67
Errera, David R. '75
Galloway Jr., John P. '73
Halvorsen, Fred H. '64
Iacangelo, Gerard F. '80
Mentzer Jr., William R. '61
Roth, W. Clint '78
Wahl, William F. '82
Wolfe, Deborah L. '77
MD Γ Quint, John H. '84
Surina Jr., John J. '86
MD Δ Iannvzzi, Jo '96
MA A Haringa, Glenn E. '74
Lancey, Roderic C. '51
Lescoe, James Terrence '05
Mangiarelli, Christopher '96
Mitschang, George W. '65
Villani, Thomas M. '82
Wielk, Michael C. '86
Zlotek, David A. '69
MA B Braisted, Paul E. '79
Clardy, David T. '74
Dodson, John O. '68
Guppy Jr., John W. '53
Kendall, Robert E. '50
Koehler Jr., Richard F. '67
Maskrey, Robert H. '63
McGrew, John D. '51
Miller, Paul G. '49
Nelson, Percy L. '47
Osterberg, Peter M. '78
Piness Jr., George '49
Spradlin, Louis W. '57
Woolling Jr., Kenneth R. '71
MA Δ Adams, Randolph K. '70
Bloch, Frederick H. '68
Green, Samuel H. '51
Ingalls, David P. '51
Murch, Robert E. '58
Russell, John H. '54
Simon, Henry J. '60
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White, Edward A. '47
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Fernald, Wayne D. '70
McEachern, James F. '70
Payne, Robert J. '86
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Soulis, Wilbur T. '72
Tuck, John S. '57
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Ewell, Kenneth A. '68
Hellyar, Kenneth G. '69
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Cubitt, E. Duane '62
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Deleeuw, Samuel L. '56
Hoshaw, Susan J. '86
McIntosh, Carl L. '70
Payne, Lynnette M. '95
Santoro Jr., Thomas V. '66
MI B Bentley, James H. '57
Dejonge, Michael K. '65
Hammar, Richard H. '65
Krause, Lawrence C. '86
Mattson, James A. '70
Newman, Frederick A. '83
Pearson, Walter C. '62
Plutchak, Raoul E. '62
Sonsalla, P.E., Tim C. '95
Stamm, John A. '61
Weber, Scott C. '88
MI Γ Baehre, Eric E. '82
Barr, William R. '70
Blair, David J. '57
Boesiger, Edward A. '82
Brown, John M. '67
Burton, Theodore R. '79
De Boo, Robert J. '72
Delgass, William N. '64
Engler, Ronald H. '71
Hannig, William A. '47
Hansen, Peter E. '61
Hensel, John C. '52
Iler, Gerald W. '49
Koops, Leigh W. '72
Laity, USNR Ret., Thomas '45
Leeds, Thomas M. '85
Lempke, James D. '83
MacIka, Raymond E. '86
Miller, Stephen Scott '78
Outzs, Allan H. '51
Pace Jr., George D. '61
Propson, Thomas P. '55
Pulley, Craig M. '78
Snyder, Robert J. '77
Stewart, David M. '76
Stinchcombe, James D. '49
Wingard, Joseph '80
Winter, Steven D. '81
MI Δ Devere, Gerald J. '59
Elward, Robert M. '75
Huber, Paul P. '57
Kaunelis, Pranciskus S. '69
Smith, Charles O. '41
MI E Czarnota, Paul S. '86
McCarty Jr., James C. '51
MI Z Foraker Jr., David E. '58
Kirsch, Gary A. '75
Kowalik Jr., John '72
Lenz, Ronald L. '81
Morman, Kenneth F. '58
Reardon, Robert W. '74
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Obudzinski, Gary T. '76
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MI Θ Bohdanowicz, Edward '80
Chreston, Kevin J. '82
Edwards, Steven C. '80
Kanfer, Marvin E. '71
MI K Sikkenga, Chad Douglas '98
MN A Amann, Charles A. '46
Avery, Carlos P. '61
Clarke, Richard W. '53
Halladay, Henry E. '64
Hegna, P.E., Harwood A. '69
Hennen, Harry A. '66
Holm, John D. '62
Kaiser, Gary L. '70
Magney, Mark C. '79
Maus, Brian W. '81
O'Leary, Stephen H. '69
Tran, Binh Van '89
MS A Barnett, Kerney L. '71
Benton, USAF Ret., William '71
Hilkert, P.E., James M. '71
Hodge, B. Keith '65
Holeman, James M W '81
Kaiser, C. Hayden '52
Lucas, Jerry L. '72
Reynolds, Billy I. '58
Tisdale, Stanley R. '78
Ware, Marcus W. '69
MS B Gray, James M. '88
Woody, Marvin D. '79
MO A Fitzgibbons, Thomas J. '87
Geers, Arthur E. '48
Gritzo, Ludwig A. '58
Hammar, Phillip C. '65
Kuehnel, Charles G. '62
Ott, Ronald J. '71
MO B Agnew Jr., Lewis E. '50
Bodenhamer, P.E., Steven D. '75
Buenemann Jr., Morris C. '82
Clemence, Samuel P. '62
Elfrink, P.E., Lindell H. '62
Ferrell, C. Stuart '64
Hahn, Gail L. '82
Helwig, Arthur W. '50
Horstmann, Paul W. '73
Leitterman, Dennis W. '76
McDaniels, John L. '60
Myers, Kenneth R. '72
Patterson, Michael A. '77
Roam, John H. '69
Scherrer, Paul K. '71
Stevens II, Oramel D. '72
Stevens, Robert E. '85
Thompson, George W. '53
Unnerstall, James A. '56
Voss, P.E., Thomas R. '69
Willoughby, P.E., Ronald D. '73
MO Γ Dyson, Peter Bernard '80
Galbierz, Robert W. '64
Goldring, Stanley '64
Paule, Donald W. '64
Shomber, Henry R. '78
Tilly, John V. '52
Weiss, Charles Alan '88
MT A Andersen, Viggo '51
Courville, George E. '59
Kolb, Robert C. '61
MT B Ahlgren, Kyle Duane '95
Einhorn, Elizabeth R. '86
NE A Claar, Stephen B. '73
Moore, Thomas P. '78
Schaufelberger, Don E. '49
Shanmugam, Alagappan '83
Watson, Gene D. '59
NV A Jones, Keith A. '85
NH A Amazeen, Bruce E. '65
Greene, Prescott '57
Hildreth, Howard R. '56
Lof, Richard J.A. '71
Noyes Jr., Bertram S. '66
Stephens, Jay E. '73
NJ A Allen, Samuel M. '70
Braxton, James S. '37
Carucci, Vincent A. '69
Greenip Jr., John F. '66
Iapicco, Jeffrey A. '77
Kimmich, Herbert L. '57
NJ B Babb, John E. '71
Capasso, Michael A. '82
Dola, Steven '55
Herrmann, Eric P. '69
Longo, Robert J. '75
McCord, William F. '64
Ross, Robert D. '48
Shelestak, Larry J. '75
Wasiewicz, Richard A. '69
NJ Γ Constantino, Stephen J. '79
Gittes, Marvin S. '63
Husson III, Matthew A. '66
Leach, Robert J. '82
Lenox, Stanley '44
McWilliams, John P. '65
Miller, Alex Andrew '00
Pinto, Richard C. '56
Rose, William '52
Spinnler, Gerard F. '75
Szebenyi, Thomas A. '69
Tabor, Vincent J. '75
Tubello, Jeffrey '76
Vandemeulebroeke, Leon C. '89
NJ Δ Brown, Geoffrey S. '83
† Gebhard Jr., Peter T.E. '39
Nash Jr., Raymond A. '60
Potts, Richard G. '64
Usas, Alan M. '71
Whitesides Jr., Lawson E. '68
NM A Aragon, Frank G. '77
James, Ph.D., Jonathan C. '97
Zimmerman, Ph.D., Roger M. '59
NM B Donnelly, Carolyn E. '01
Salas, Thomas M. '85
NM Γ Bakkom, Erik I. '97

Special Gifts

Special gifts were received in memory of James W. West, TX A '49, from his wife Patricia, Robert G. Friedman, OH A '44, from his wife Eugenie, and Walter Potoroka, MI B '43, from his wife Margo.

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Gollmer, Nicholas Alan '95
Spicer, Mark J. '84
NY A Au, Peter Yuk Tak '93
Blomberg, Richard D. '67
Breckenridge, John Robert '99
Paparis, Bill '75
Schreiner, Richard J. '48
Seckler, Howard N. '48
NY B Baleno, Anthony P. '66
Bolstad, Richard L. '80
Carpenter, Richard C. '51
Davidson, Fred T. '58
Doyle, Frederick J. '51
Eisaman, L. Coburn '45
Glaser, Anthony J. '51
Kaczmar, Michael J. '72
Leader, Jeffery J. '85
Nicholas, Thomas P. '80
Roberts, Christopher Alan '94
Schrank, Douglas A. '74
Walsh Jr., Gerald W. '44
NY Γ Antelman, M.D., Robert W. '73
Brenneman, Scott A. '83
Dupier, Dennis G. '61
Goldschmidt, David Joel '91
Hirschman, Gordon B. '78
Kunz, H. Russell '53
Lewandowski, Michael '96
Locher, John P. '56
Mucher, Craig A. '82
Natale, Michael R. '02
Niederer, Melvin M. '82
Place, Harry G. '51
Schrier, Steven B. '82
Segal, Joshua L. '68
Stevens, Richard K. '64
Veldman, P.E., John P. '70
Wadsworth Jr., Winthrop '76
Weigle, Robert E. '51
Yaros, Steven F. '63
Zmroczek, Leon A. '78
NY Δ Carino, Nicholas J. '69
Frederick, Thomas R. '87
Goldstein, Steven M. '81
Goltz, Mark N. '72
Heineman, Duane T. '58
Johnson, William C. '54
Kahn, Mindy '89
Kneen, Phillip H. '58
Reth, Thomas B. '64
Roseman, Ann Lynn '81
Winkle, Roger A. '67
NY E Feldman, Robert E. '59
Grace, John T. '55
Hendrickson, John L. '71
Koehler, George R. '63
Lee, John H-J '70
Markatos, Louis G. '65
NY Z Cook, Robert J. '67
Corbin, Richard M. '57
NY H Brose, Richard F. '63
De Los Santos, Carlos A. '95
Del Mazo, Jorge R. '69
Giusti, Victor F. '41
Kleinman, Irving '49
Kushel, Glenn E. '68
Valeri, Peter R. '76
NY Θ Campana, Michael A. '94
Crompton, Kenneth H. '67
Dec, Eugene B. '72
Gray, George A. '43
Gronosky, Clifford F. '58
Jumps, Carl F. '50
Lawrence, Thomas F. '66
Newman, Mitchell J. '81
Thomas, John A. '86
Tracey, Michael S. '86
NY I Boehm, Robert A. '79
Hartmann, Hans G. '70
Hoffner, Jeffrey N. '71
Millman, David S. '72
Philogene, Kenneth '81
Teitelbaum, Howard A. '79
NY K Moskowitz, Ira '79
Muller-Girard, Otto T. '52
Shebert Jr., Leonard L. '84
Singer, Bart A. '82
NY Λ Kamme, Robert W. '85
Madia, Michael '81
Rigert, John A. '70
NY M Hansen, Jean G. '77
Salmon, Roger O. '66
Willis, Michael J. '82
NY N Aloysius, Ronald J. '85
Barnes, Robert E. '84
Buran, Frank '87
Feldman, Scott '75
Hammond, Paul G. '72
Humphrey, David K. '67
Kocher, Lawrence '67
Kuberka, Gregory '80
Mann, Michael '77
Morris, George C. '63
Nuding, Theodore G. '75
Pardini, Thomas J. '77
Stearns, Richard E. '67
Uhl, Thomas J. '84
NY Ξ Boyle, Charles J. '76
Defelice, Nicholas J. '77
Kiely, Robert John '51
Machuca, Luis A. '69
Raczko, Robert F. '79
Triano, Salvatore J. '85
NY O Blomberg, William J. '82
Doynow, Donald '75
Jankowski, Cecelia '81
Kadysiewski, Stephen J. '76
Lumish, Stan '78
NY Π Grosch, David A. '85
Hoelscher, James R. '71
NY P Abreo, Leslie Anthony '97
Wong, Wai Kin '85
NC A Allen, William D. '88
Bishop, Ernest A. '73
Clark, Jennifer A. '79
Cline, Arthur A. '49
Florence Jr., James S. '65
Franke, Deborah A.L. '85
Harrill, James W. '58
Hutcherson, Rodney N. '82
Mitchell, Glenwood J. '60
Morse, Charles Allan '89
Teague, Lisa J. '81
Trivette, Wendell A. '82
Wynegar, Kathleen S. '86
NC Γ Behnken, Kenneth C. '67
Murray Jr., Malcolm G. '52
Peters, William T. '59
NC Δ Clark, Michael J. '75
Gaither, Allen Wayne '96
NC E Darcey, Michael Edward '02
ND A Engbrecht, James R. '59
Fay, James M. '82
Sack, Larry E. '59
Wiechmann, David P. '85
ND B Jesh, Mark S. '86
Smutka, Joshua J. '06
OH A Allison, James F. '57
Hoh, Ka-Pi '84
Kimmel, Paul R. '69
Kownacki, Edward J. '67
Maneri, Remo R. '50
May, Ronald A. '83
Oblak, John M. '62
Reilly, James A. '39
Richenbacher, Wayne E. '75
Rodriguez, Ferdinand '50
Schuerger, Thomas R. '50
Zurilla, Ronald W. '61
OH B Bach, Wayne S. '72
Bobinger, Robert O. '69
Dartnall, R. Donald '47
Dobashi, Harry H. '68
Ferris, Michael J. '64
Hersman, Jill Ann '52
McCarthy, Martin D. '70
Pick, Gregory A. '84
Robinette, Lisa Marie '03
Steinkolk, Richard B. '55
Triplett, William J. '76
Zimmerman, Thomas A. '65
OH Γ Beitler, Richard S. '50
Booker, Stanley R. '58
Case, William F. '64
Edwards, Dale C. '61
Pladars, Valts '56
Risch, Gary A. '76
Secrist, George R. '48
Shade Jr., Willard N. '70
Spicer, John P. '96
Stumbaugh, Gary A. '66
OH Δ Davidson, Lee A. '65
Nussbaum, Lael E. '68
Wuerdeman, Robert C. '69
OH E Egger, Robert A. '85
Henfling, Richard N. '84
Pryatel, Thomas R. '88
Ross Sr., David E. '73
Seaman, Douglas D. '73
OH Z Babula, Maria '89
Busbey, Bruce C. '84
Dembrow, David A. '82
Johnston, David A. '79
Rober, Kenneth J. '68
Stepp, Edward E. '55
Trepinski, Charles P. '70
OH H Ball, USAF Ret., James A. '65
Ballenger Jr., Wesley A. '83
Campbell, USAF Ret., John J. '76
Clarke, DeFrance '81
Crowder Jr., George E. '77
Davie Jr., Robert N. '69
Freyer, Gustav J. '60
Gilbert, John E. '70
Menna, Richard J. '62
Morgan, Leonard W. '66
Niemeyer, Joseph B. '85
Settecerri, Thomas J. '78
Smith, Russell H. '68
OH Θ Decker, John W. '65
Kamowski, Dennis D. '73
Miller, Michael L. '78
Rall, Richard M. '56
Walsh, Michael A. '75
Wild, Joyce R. '69
OH I Barth, Herbert G. '61
Strausbaugh, Patrick D. '86
Walker, David W. '72
OH K Brattoli, Mark A. '79
Dudek, Scott A. '90
Lee, Sunggyu '74
Paridon, Charles A. '81
OH Λ Gwin, Russel W. '85
Hallochak, Andrew J. '77
Nicalek, Richard A. '76
Oakley, Robert R. '77
Saluke, John E. '79
Selak, August J. '79
Stiver, Alan W. '86
OK A Burton, Donald O. '71
Dotson, Neil A. '84
Duke, Chris '83
Dunn Jr., Robert O. '82
Patterson, John L. '85
OK B Hand, Ronald W. '72
Miller, Michael J. '81
Weston, Kenneth C. '55
OK Γ Dean, Philip M. '74
Morgan, Johnny J. '88
OR A Gens, Ralph S. '49
Wilson, Robert E. '55
Wilt, Jay N. '74
PA A Bakis, Charles E. '81
Clegg Jr., Lee M. '59
Edwards, Alfred B. '71
Goldsborough, John P. '56
Greer, Carl C. '62
Haas, Joseph W. '90
Haist, Randall M. '80
Malkemes, Kenneth L. '83
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Wentzel, Alan R. '75
PA B Booser Jr., John C. '56
Carretti, Katherine G. S. '84
Crecraft, Harold E. '60
Gibson, John P. '64
Meader, Erik John '90
Meckley III, Daniel G. '47
Pasko, Thomas J. '59
† Paul, Ph.D., Frank W. '60
Replogle, Joe O. '52
Ripsom, George A. '60
Smith, Donald D. '48
PA Γ Bolser, William C. '69
Campbell, Ronald C. '54
Jourdain, John M. '84
Kuhr, Ernestine M. '81
Marietta, William G. '68
Rouleau, Wilfred T. '51
Spector, Scott J. '74
Stem Jr., Theodore B. '75
PA Δ Baxley, John H. '88
McIlvain, Donald R. '52
Nackoney, Ogden G. '63
PA E Amman, Richard W. '64
Felsenheld Jr., Robert A. '58
Gentilucci, Joseph A. '53
Guest, Frederick C. '59
Hagadorn, Hubert W. '59
Hermann, Frank V. '59
Murgas, William J. '53
Nolan, Christopher W. '86
Raver, Roland '35
Steel, Henry W. '58
Yoder, Paul E. '49
PA Z Cipolla, John W. '65
Diener Jr., Henry C. '51
Hudak, Joseph D. '79
Johnson, Robert C. '70
Kirsch, Paul A. '75
Morris, Robert L. '55
Pechulis, Michael J. '97
Poplawski, Edward G. '80
Ricci, Anthony G. '60
Shaffer, David E. '78
Sheehan, John R. '62
PA Θ Braun, James F. '84
Caggiano, Nicholas J. '78
Dever, Patrick B. '94
Dugandzic, Joseph P. '83
Fozo, Geza '63
Grana, Peter N. '73
Latimer, Ph.D., Jose R. '77
Norris, Clinton J. '61
Orsatti, Louis G. '66
Pela, Karen C. '84
PA I Cristaldi, Lucian M. '72
Dehoff, Gregg A. '86
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Schoenberger, Lewis R. '84
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Taylor, Thomas R. '73
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Hurdis, David A. '62
Kolb, Robert A. '66
Lamoureux, Suzanne M. '82
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Lieberman, James '67
Silva, Ronald E. '74
Smith, Robert A. '83
Spink, Sydney A. '58
Verrier, Donald C. '54
Withrow, Gregory L. '80
SC A Brown Jr., Bevan W. '49
Drennan Jr., Robert F. '70
Exley Sr., Slade F. '72
Fowler, John W. '48
Prothro, Joseph E. '63
Siokos, George Z. '48
Snider, Eric H. '75
Wilson, Rick L. '81
SC B Fripp, Archibold L. '66
Haggerty, N. Kent '72
Lang, Christine P. '80
Shull Jr., Daniel S. '51
Walden, Gary R. '81
SC Γ Cochrane, Jerry W. '55
Fritzsche, Robert E. '59
Julich, Thomas F. '76
Kelly, Robert T. '86
Lightle, Jack T. '58
Marbois, Matthew C. '81
Watkins, Terry L. '73
SD A Brass, Lorin L. '75
Eisenbraun, Daniel D. '75
McCourtie, Bonnie R. '80
Rabenberg, Llewellyn K. '78
Shoup, Heather Zarie '95
SD B Johnson, Dean H. '81
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Conway, Tammy K. '82
Davis, Jack L. '59
Davis, Wayne T. '73
Dodge, Franklin T. '60
Eby, Robert S. '75
Ellis, Jeffrey T. '93
Evans, Colby R. '94
Fee, Gordon G. '56
Heathington, Kenneth W. '61
Hunt, Roy J. '67
Jennings-King, Sherry D. '93
Kee, Bennie F. '71
Miller, Freddy M. '79
Newton, Louis M. '49
Pawel, Richard E. '53
Rogers, Marvin D. '70
Romer, Michael C. '04
Rosenberg, David '53
Tarrant, Charles H. '57
Taylor, David R. '69
Whitehead, John C. '61
Zimmerman, James L. '58
TN B Cook, George E. '60
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Hancock, Mark R. '83
Kammerud, John E. '70
Petersen, Eric S. '84
Pulley, Debra D. '78
TN Γ Axley, Robert S. '89
Buell, Phillip Ray '95
Howey, James E. '68
Thompson Jr., W. William '68
TN Δ Luttmann, Mark J. '82
TN E Funderburk, Rodger M. '89
Nolte, Jennifer Vanderjagt '77
TN Z Wilson, Matthew W. '00
TX A Behrens, Paul D. '47
Boatright, Mody K. '56
Courtney Jr., Lonzo C. '58
Dodd, Donald A. '70
Dolezalek, Donald R. '65
Foerster, Paul A. '57
Fuller, William B. '82
Garrett, Darrel W. '70
Horton, Larry E. '83
Howerton, Lloyd F. '51
Huang, Lawrence P. '81
Hudson, Stephen H. '79
Kassler, Harlan Larry '91
Kopecky, Johnny A. '65
Kothmann, Richard E. '59
Matlock, John H. '67
Sorber, Charles A. '61
† West, James Moore '49
TX B Berthold, Kristopher D. '04
Boyd, Suzanna R. '81
Easterday, Mark L. '84
Evans III, Peter '80
Kunkel, George C. '54
Marasco, David F. '87
McNair, Michael K. '79
Nall, Albert A. '81
Soules, P.E., S.E., James G. '79
Upchurch, James A. '76
Valusek, John R. '70
TX Γ Avant, Richard L. '83
Fisher, John D. '70
Griswold, Ronald K. '71
Lesser, Herbert A. '60
Matheson, Lane Cardwell '84
Mohr, David N. '72
Sick Jr., William N. '58
Turner, James W. '76
Williamson, Kent A. '77
TX Δ Anderson, Byron H. '54
Balusek, David K. '82
Bohlmann Jr., Willy F. '50
Boortz, Marielle J. '77
Brittan, Charles L. '65
Chevalier, Mark T. '91
Coman, Paul Daniel '03
Ellison, P.E., Brian K. '97
Eng, Ronald W. '71
Fox Jr., Milden J. '49
Hanover, Joe G. '40
Kramm, Robert C. '81
Madeley, Hulon M. '58
Malone, William '59
Massett, Donald A. '70
McClellan III, W. Roy '74
McGinnis, Charles I. '49
Meloy, Charles A. '82
Miesen Jr., Robert J. '87
Paul, Thomas C. '62
Wilson Jr., Edmon D. '57
TX E Brown Jr., Thomas B. '72
Douglas, William J. '70
Ryan III, James J. '70
Triola, Larry C. '75
TX Z McCaleb, Jesse E. '64
Storey Jr., Arthur L. '65
TX H Benson, P.E., Marvin D. '79
Collins, Clyde W. '69
Potvin, Alfred R. '64
Schaeper, Wilfred H. '76
Southall, Hugh L. '68
Thompson, James A. '72
TX Θ Fong, Keith B. '88
Fong, Maria D. Chee '91
Trejo, Pablo Antonio '00
TX I Harris, E. Douglas '83
TX K Alexander, Craig S. '88
TX Λ Coon, John W. '91
Magee, Dan A. '66
Odom, Randall A. '57
UT A Gehmlich, Dietrich K. '53
UT B Paxton, Thornton S. '63
UT Γ Torgesen, Greg L. '80
VT A Bingel, Bernard J. '74
Cook, Barbara K. '84
Garno, Douglas T. '58
Goddard, Eric H. '86
Kellogg, David H. '62
Sleeper, Gregory D. '86
VT B Dekalb, Shawn W. '85
VA A Barnes, Lowell P. '67
Capon, Robert S. '80
Drewry, James E. '60
Forziati Jr., Kenneth T. '92
McGee, Jodi Bowers '93
Mizelle, Peter P. '60
Powell, Joseph B. '78
Reeside, William O. '77
Roesch III, Maurice A. '78
VA B Beard Jr., Frank H. '64
Brockenbrough, Thomas W. '42
Dawson, Herbert M. '61
Gibbins, Martin N. '78
Keckler, Claude R. '63
Lechner, Richard A. '59
Lester, Jason Edward '96
Powell, James D. '77
Ray II, Robert E. L. '74
Smith Jr., Sidney C. '63
VA Γ Mahaney, Ph.D., P.E., Jack M. '82
Sturm, Carroll C. '78
VA Δ Brenner, Joseph R. '55
Bunch Jr., Jennings B. '50
Flowers, Daniel F. '40
WA A Berry, Douglas W. '71
Brewer, Brian J. '82
Chandler, Alan S. '77
Chou, Chung-Kwang '75
Dean, Kenneth R. '49
Fosberg, Theodore M. '59
McNees, Jackson L. '68
Ng, Kim M. '84
Oiye, Martin Y. '76
Rising, Jerry J. '61
Steinhauer, Loren C. '66
Strickland, Elizabeth A. '77
WA B Aaserude, Robert G. '84
Brower, Michael R. '70
Finnell, Leonard W. '50
Hamrick, Douglas G. '90
Hartup Jr., John D. '50
Large, Robert W. '60
Nemitz, Rodney E. '86
WA Γ Healy, Timothy J. '58
Lock, Raymond T. '83
WA Δ Burton, Brian C. '97
Campion, Paula JoAnne '00
WV A Boggs, Mark S. '80
Deakins, Ralph R. '58
Farnsworth, David L. '68
Griffith, Robert R. '49
Pennline, Dennis E. '73
Schuler, Arthur K. '71
Zimmerman Jr., Albert R. '58
WV B Farmer, Harry C. '70
WI A Anderson, Kathryn Ann '88
Antolovich, Stephen D. '62
Burstein, Victor S. '40
Fuchiek, Robert J. '50
Holzman, Perry A. '85
Keck, Paul D. '75
Martell, Donald L. '60
Meister, James R. '78
Rozek, John S. '52
Wiesen, Ernest J. '59
WI B Bauer, Kurt W. '51
Derra, Kenneth W. '90
Kormanik Jr., Nicholas J. '62
Kriofsky, Thomas A. '60
Marcouiller, Roger A. '60
Penlesky, Richard J. '73
Piacsek-Ropella, Kristina M. '85
Simon, James B. '65
Smith, John G. '87
White, Peter E. '62
WI Γ Jendrzejek, Gary S. '75
Merkel, Brian J. '81
Paczesny, Wayne J. '83
Stachowicz, Robert W. '70
WI E Langel, Daniel E. '91
WY A Dwan, Terrence E. '68
Riley, Robert H. '82
Scharton, Craig A. '85
Scott, Barbara J. '73
Simon, Ronald W. '81

FOUNDER'S CLUB

AL A Essing, John E. '67
Hardy, Joseph F. '74
Romine Jr., J. D. '50
Shivers, Charles H. '75
Walkley, Kenneth B. '71
AL B Andrzejewski, Joseph R. '90
Grider, Kelly V. '58
Searcy, John S. '49
AL Γ Guest, James Mark '89
AL Δ Conway, Timothy J. '87
Selby, Michael W. '96
AL E Zozulin, Alexander J. '91
AZ A Fellner, Kenneth M. '84
Kamel, Hussein A. '55
Magariel, Kerry E. '06
Martinjak, Frank R. '72
Spagon, Patrick D. '68
AZ B Beemer, Jeffrey B. '80
Roberts, Jackson H. '69
AR A Brady, Mark J. '83
Moody, Charles R. '58
Ryles, Gary W. '67
CA A Fuller Jr., Clarence C. '48
Lee, Chilton '65
Morihiro, Steve '79
CA B Sabersky, Rolf H. '42
Scandella, Carl J. '66
CA Γ Sharp, Eugene D. '54
Tedrow, James A. '70
Young, Frank S. '55
CA Δ Braxton, Eugene G. '58
Bullock, Thomas E. '58
Burks, Robert A. '56
Delvin, Sandra A. '76
Froehlich, Carl H. '74
Gillman, Lyle '74
Itamura, John M. '85
Knopp, Gordon L. '55
Koppany, Charles R. '63
Lawson, William E. '62
Moretti, Vincent C. '78
Roum, James H. '80
Yamashiro, Keith K. '79
CA E Argabrite, A. Hugh '53
Lund, Russell A. '77
Miller, Richard E. '87
Parker, Paul W. '62
Satorius, Edgar H. '70
Ssutu, Louis '65
Wagner, William R. '58
Washburn, Dale F. '57
CA Z Bauerle, Richard D. '59
Blaney, Timothy J. '86
McGuire, John P. '58
Tapay, Martin H. '78
Vincze, Arpad '62
CA H Bautista, Anthony H. '94
Costa, Michael '88
Hong, Chi-Seng Michael '84
Thurston, Jeannie L. '77
CA Θ Chelapati, Chunduri V. '54
Hill, Jo Ann L. '87
Hoekstra, Gerben N. '66
Kolderup, Nils P. '60
Mevers, Maryann '57

FOUNDER'S CLUB, CONTINUED

Tran, Giang T. '82
Vanwagoner, William T. '85
CA K Moncsko, George E. '68
CA Λ Holden, Brian D. '81
Reese, Armin C. W. '74
Reynolds, Hugh M. '69
CA N Batelaan, Paul D. '64
Caballero, Luis A. '85
Darlington, William E. '66
Rheinhardt, Mark E. '84
Sink, John D. '80
CA Ξ Ashbaugh, Bradley K. '91
Baxley, Paul A. '81
Dykmans, Max R. '71
CA Π Nakauchi, Edward M. '69
Spinney, Van W. '67
CA P Costello, Vincent J. '08
Sullivan, C. Bart '86
Wells, Toby Eugene '94
CA T Tabar, Anton '81
CA Y Cooper, Kenneth E. '84
Landis, George F. '88
CA Φ Bobbitt, Kelle Allen '92
CO A Gibbs, Frank E. '84
Gibbs, Julie F. '80
Wilson, Donald E. '58
CO B Akers, David A. '78
Castleman, Curtis H. '67
Chapra, Cynthia Kiessig '90
Chmelka, Floyd A. '59
Kristenson, Charles G. '61
Madeson, Richard '81
Primeaux, Paul R. '67
Trimbell, Thomas S. '70
CO Γ Conway, Kent W. '52
CT A Gerson, Gordon '58
CT B Berson, P.E., Bernard R. '57
Bosco, Cosimo J. '51
Greene Jr., Joseph F. '53
Jacoby, Ronald '87
Kramer, Steven M. '79
Perreault, Gregory J. '84
White, William R. '65
CT Γ Griffin, Michael J. '82
DE A Neimeyer, Terry F. '77
Sowiak, Milton M. '57
Titi, Gerard W. '79
DC A Amisial, Wilfrid J. '71
Carter, Charles P. '57
DC B Kriston, Charles M. '76
DC Γ Lintner, William A. '82
Wilhelm, Eugene B. '86
FL A Browell, Edward V. '68
Caraway, Sean Lee '93
Dosev, Cristov '84
Higgins, Adam S. '03
Hoxie, Chris L. '75
Rauth, P.E., Terry Jean B. '77
Tinsley, William C. '77
Vernetson, William G. '72
Wabbersen Jr., William G. '90
York, Dennis J. '76
FL B Holmes, Martin E. '82
Kirkpatrick Jr., William R. '78
FL Γ Broyles, Richard W. '83
Glenn, Frederick '92
Phares, Harold P. '80
Suter, Bruce W. '72
FL Δ Bowman, Roger D. '79
Dobbins, Kathy Lynn '93
FL E Sinibaldi, John C. '85
FL Z Seip, Ralf '90
FL H Reinert, Richard D. '94
FL Θ Lund, Karen E. '98
GA A Akridge, James M. E. '59
Axon, Michael W. '90
Bodner, Douglas A. '87
Brush, Gary S. '80
Bunzl, Rudolph H. '43
Curry Jr., John C. '58
Glover, Edmund C. '60
Gumm, Milton S. '67
Hicks, John P. '81
Horne, Carey J. '70
Menges, Thomas A. '78
Ogilvie, John C. '48
Olive, Charles M. '70
Perkins, Frank A. '51
Petrie, Lester M. '59
Royer, Steven L. '88
Tundermann, John H. '63
Vesel, John Brian '99
Weathers, Anthony D. '84
Williamson, Michael F. '79
GA B Jones, David Neal '92
ID A Ahlschlager, Alan D. '87
IL A Bassler III, Robert E. '74
Baumgartner, Richard A. '69
Graham, Joseph G. '51
Highland, Steven D. '68
Kraft, Donald E. '52
Reichelt, Karl L. '68
Ritt, Jack A. '52
Stubenrauch, Carl F. '62
Tonelli, A. Duane '57
Wallace, John R. '61
Zuurbier, George W. '53
IL B Ducibella, Joseph C. '86
Gewartowski, James W. '52
Kohnen, Robert E. '59
Larson, Richard B. '44
Pasowicz, Ronald J. '77
IL Γ Ono, Craig M. '81
Rauh, Donald A. '70
Trueman, Richard E. '48
IL Δ Gilles, James E. '75
Kraatz, Roland L. '65
IL E Joseph, Howard L. '83
Mueth, Timothy Paul '89
IL Z Restis, Jude H. '89
IN A Arakawa, Wallace J. '57
Brosmer, Mark A. '81
Cunny, Robert W. '46
De Poy, Phil E. '57
Ehrlich, I. Robert '56
Ewart, Howard L. '58
Foss, John F. '61
Foster III, John I. '74
Haworth, Donald R. '52
Holwager, Thomas '57
Hounshell, William H. '65
Kawaguchi, Ray S. '69
Levine, Jerrold L. '61
Meyer, David G. '73
Monical, R. Duane '48
Morgan, Rachel Diane '90
Mucha, Ph.D., Thomas J. '60
Murphy, Thomas F. '70
Myers, John E. '58
Newby, Karl E. '82
O'Day, Daniel J. '46
Rayshich, Alexander '48
Rieter, Robert F. '65
Rude, Ronald G. '63
Seely, Richard E. '39
Ward, John B. '58
Waterman, Joseph R. '52
Wisthuff, Scott D. '78
Zygmunt, Roger W. '74
IN B Galler, Stephen F. '05
IN Γ Geer, Ivan Daniel '94
Harvey, Francis J. '65
Jenkins, Mark D. '81
Kuehn, Nicholas H. '63
Pieronek, Catherine F. '84
Planeaux, James B. '82
IN Δ DeNiro, Dennis '72
Heideprieim, Heide E. '68
Herkamp, Nathan D. '69
Zendzian, Daniel D. '95
IN E Ali, Afzal '78
IA A Ackley, Mark W. '72
Bentzinger, Harlan A. '44
Blank, William A. '51
Houston, M. Dean '52
Koester, David J. '79
Lochner, Chad M. '96
McGinnis, Bryan J. '63
Mohr, Richard L. '67
Norris, David B. '94
Oguntimein, Gbekeloluwa B. '74
Rodman, Leonard C. '71
IA B Cole, John V. '43
McSwiggin, Thomas G. '61
Mitchell, David J. '94
Sears, Larry M. '61
Weber, Steven W. '71
KS A Bradley, P.E., Richard L. '59
Gerren, Donna Sue '90
Hayman, Layton W. '59
Herzmark, P.E., Leonard E. '71
Robertson, Edward J. '69
Struble, Philip W. '79
Taylor, James T. '52
KS B Shields, Suzanne L. '83
KS Γ Cutler, Verne C. '50
Drumm, Robin D. '79
Marietta, Kala J. '75
Miller, Laurence F. '64
Walker Jr., Hugh S. '87
KY A Click, Randall R. '00
Gaffin, William O. '51
Goerz, Jerry W. '75
Long, Robert R. '84
Walker, Roger D. '70
Webster, John R. '57
Wolf, Jack E. '68
KY B Cooper, Brian E. '88
Leep, Herman R. '63
LA A Arman, Ara '55
Crawford Jr., Richard H. '82
Ducote, Robert P. '77
Miller Jr., Frank C. '62
Rider Jr., Milton J. '65
LA Γ Barron, Tim C. '81
Hammons, Robert W. '78
Hulett, Rachel Anne '07
Raabe, Mark Todd '90
LA Δ Falterman Jr., Gerald J. '89
ME A Gagnon, John R. '62
Hackett, John A. '59
Larson, Anton W. '50
Longley, John M. '51
Smith, Edwin B. '50
Whitten, Donald L. '57
Winslow, Arthur C. '79
MD A Aaron, Nelson H. '80
Belaga, Myron W. '50
Burroughs, Matthew O. '63
Dietrich, Andrew M. '64
Horowitz, Harvey A. '63
Loran, Jordan Richard '89
Wills, James E. '76
Windham, Robert C. '74
Witten, Louis '41
MD B Amtmann, Louis G. '66
Baranowsky II, Patrick W. '90
Birkmire, John C. '95
Darwin, Robert L. '62
Horner, Matthew Lewis '01
Lenhoff, Carl E. '65
Richman, Howard R. '91
Starosta, Lauren E. '03
Taylor, Patrick J. '03
Tighe, John R. '82
Tracy, Anita L. '89
White, Anthony A. '95
MD Γ Hauge, USN Ret., Todd A. '83
MA A Ahern, Michael F. '78
Andel, Robert M. '73
Auclair, Ph.D., Jared R. '01
Brown, Mark W. '82
Cannon, Lewis S. '82
Hunter, Nickie '93
Irwin, Michael J. '75
Marceaccio, Mario J. '80
Proulx, Thomas J. '92
Rotelli, Maryanne L. '88
MA B Adams, Robert W. '64
Anslow, Robert E. '54
Colavita, M. Mark '81
Coxeter, George W. '55
Halstead, Robert H. '75
Hui, Anthony Y. '00
Johnson, Timothy L. '68
Keast, David N. '53
Liepins, Atis A. '57
Manganaro, James L. '61
Mleziva, Matt L. '65
Niessen, Charles W. '62
Rogers, Peter T. '82
Shields, James D. '72
Silber, Sidney '39
Smith, Thomas L. '67
Thaller, David Ben '93
Wasem, Ondria J. '85
Weinberg, Marc S. '70
MA Δ Blesso, Thomas N. '73
Dibeneditto, Joseph P. '71
Manoogian, David V. '64
Wren Jr., Paul I. '57
MA E Le Rette, William E. '92
Loto, Thomas A. '93
Perkins, George C. '64
Root, Christopher E. '82
Thompson, John W. '72
Vesce, Paul J. '64
MA Z Barbish, Kimberly Joyce '89
Cooper, Perry A. '62
Cramer, Robert A. '80
Dance, Francis J. '76
Miller Jr., Melton M. '55
Ohnesorge, Thomas E. '59
Tan, Edwin J. '94
Whitney, Paul V. '59
MA H Garde, Sharon I. '86
Walsh, Edmund J. '83
MA Θ Craven, McCharles A. '91
Moran, James E. '83
MA I Jefferson, Michael S. '90
Villamaino, Mark J. '75
Walczak, Raymond '74
MI A Amar, Jack J. '73
Beck, Maureen E. '03
Leipprandt, Bradley S. '86
Lowry, Peter A. '60
Montague, Richard W. '48
Patterson, Garvin W. '69
Thelen, Stanley Paul '83
Trecka, William R. '57
Wang, Peggy P C '77
MI B Anderson, William H. '57
Bekins, Randell L. '80
Braem, Murray P. G. '80
Glidden, Harry J. '65
Klein, Raymond J. '84
Kuhn, Jonathan L. '92
Phillips, Gerald R. '70
Pirkl, John F. '62
Sorenson, James E. '60
Stone, David G. '69
MI Γ Atkinson, David E. '60
Boeve, Norman V. '63
Brunais, Ellsworth G. '52
Collar, Robert S. '50
Eichhorn, Jacob '46
Gerdes, Walter '58
Goodenough, Richard D. '74
Harris, Frederick A. '64
Hodge, William H. '57
Jackson, Richard H. '64
Jackson, William L. '70
Lambert, Thomas J. '77
Lasher, Ph.D., William C. '76
Lawser, John J. '63
Leibold, Robert A. '84
MacDermott, William N. '49
Malloch, Charles D. '57
Reid, John B. '81
Sagaser, Donald D. '48
Simons, Robert A. '48
Stoughton, Herbert W. '73
Tuttle, Alyson M. '98
Vaughn, Wayne A. '73
Wilkes, James O. '54
Williams, Dean S. '61
Youse, Rex J. '57
MI Δ Williams, William B. '55
MI E Billion, Godwin P. '75
Lapchak, Markian '73
Miesiak, Stephen J. '84
Paulson, James M. '47
Sieg, Mary H. '77
Smith, Glenn D. '62
Yarne, Victor C. '68
Yee, Kingman E. '77
MI Z Cookman, Jordan C. '94
Erickson, Adam A. '88
Miller, Gene H. '67
Sitko, James R. '70
Tidrow, Raymond A. '65
Treharne, William D. '89
MI H Cole Jr., James J. '78
MI Θ Long, Michael C. '84
Messer, Bryan J. '98
Stade, Phyllis R. '83
MI I Kantrow, Maryann '88
Maue, Susanne C. '92
MN A Brasket, Richard G. '58
Christianson, Clinton C. '51
Hess, Craig A. '72
Johnson, Lowell G. '69
Olson, Gary E. '64
Oss, Donald G. '58
Sandell Jr., Nils R. '70
MS A Clements, N. Scott '96
Dabney, Emily C. '88
Hotard, Daniel G. '76
Johnson, Billy H. '67
King, Richard Paul '02
Moffett, James K. '84
MS B King, Jessica Ruth Drewrey '03
MO A Amigoni Jr., Alex J. '66
Friemel, Paul R. '66
Gillum, Marvis N. '61
Hardin, John W. '87
McKiernan, John W. '47
Miller, Raymond B. '53
Richmond, Deborah V. K. '70
Rudy, William A. '81
MO B Berkey, Vernon G. '50
Bondurant, David W. '71
Hall, Johnnie E. '59
Hardebeck, Harry E. '57
Luetjen, Hulen H. '50
Saperstein, Lee Waldo '64
Steele, James D. '66
Stopkey, Waldemar D. '52
Van Dover, Richard B. '67
MO Γ Apanel, Anna M. '80
Lingren, Terry D. '80
Swallow, Louis J. '54
Weber, Walter H. '48
Williamson, Ronald A. '65
MT A Brin, Beth L. '79
Delaney, Robert C. '88
Jeffries, William R. '42
Jellison, Gabe Lee '98
Kujawa, Stephan T. '73
Peck Jr., Delbert E. '77
Roberts, Wallace M. '60
Spildie, Eugene N. '55
MT B Erickson, Elizabeth Jeffery '93
Jackson, Darron B. '86
Lindgren, Elizabeth D. '01
NE A Iwan, Russel R. '81
NV A Day, Jorgi M. '92
Ericksen, Spencer Lee '99
NH A Bickford, M. Dudley '59
Plamondon, Maynard A. '62
NJ A Amato, Corrado '76
Barrese, Anthony L. '70
Dudis, Joseph '64
Tripka, Steven J. '66
Wolf, P.E., Joseph A. '55
NJ B Dell, Curtis G. '48
Emmons, Harry L. '40
Feder, Gerald L. '86
Futchko, Frederick '55
Lack, Barry R. '78
Masaryk, Joseph S. '67
Richards, John R. '76
Rocca, Jeffrey J. '78
Sharma, Bhavender P. '69
Thompson, Peter D. '78
Viechnicki, Dennis '62
Young, Clifford N. '83
NJ Γ Albanes, John J. '50
Andrus, James '02
Balma, Peter M. '75
Davis, Louise F. '56
Gumann, Ronald J. '76
Hampel, Daniel '53
Kasuba, Peter F. '65
Labos, William J. '73
Praschak, Joseph J. '73
Reznak, Frederick J. '69
Thompson, Susan M. '92
Zarra, Saverio J. '48
NJ Δ Bennett, Karl E. '76
Cole, Peter P. '72
Peters III, P.E., Fredus N. '54
Shaw, Michael M. '82
NM A Smith, B. Wayne '88
Woodward Jr., Clinton B. '84
NY A Chaudhry, Sohail S. '74
Gaines, Allan M. '57
NY B Borst, Kenneth J. '49
Engel, P.E., Howard D. '50
Mossman, Allen L. '49
Placentra, Nicholas J. '79
Poole, David R. '69
Tucci, Patrick A. '72
NY Γ Campbell, Charles T. '51
Capek, Thomas G. '86
Davis, Walter M. '47
Hughes, Donald J. '50
Kaplan, Steven H. '67
Levy, Michael D. '89
Marchetti, Richard J. '99
Obernesser, M. Edwin '59
Opsahl, Richard B. '53
Reilly, William J. '50
Schoen, Edward A. '69
Schrader, Frank W. '66
NY Δ Benedek, Roy '66
Benedict, David C. '48
Blanche, Carl R. '43
Hui, Eric C. '90
Lampell, David M. '73
Logan, Joseph S. '56
NY E Barto, Thomas P. '70
Browning, Charles H. '63
Ferraglio, Robert C. '74
Jesaitis, Algirdas J. '67
Messina, Anthony F. '55
NY Z Fontaine, Arthur '63
Gold, Harris '58
Gucker, George C. '54
Seider, Warren D. '62
NY H Atzenbeck, Charles R. '60
Diamond, Joseph E. '56
Gilmore, Jerold P. '56
Oslon, Arthur '52
Peacock, Michael A. '86
Shakun, Melvin F. '50
Sugin, P.E., Leonard '55
Ucci, Ph.D., Donald R. '79
Wolf, Murray '48
NY Θ Bunker, Wayne A. '82
Harris, Everette C. '76
Quay, Jeffrey R. '85
St Louis, John G. '74
Thiemann, Peter E. '79
Wawrzynek, Ronald S. '85
Ziki, P.E., Ann L. '86
NY I Charleson, Carl R. '87
Garrison, Walter E. '48
Lerner, Steven L. '75
Rott, August K. '65
NY K Brusil, Paul J. '68
Leidig, Carl F. '85
Saucke, Alfred W. '60
NY Λ Chipolone, Michael D. '54
Glazar, Arthur J. '60
Schirripa, Robert R. '70
NY M Charlton, John W. '62
Di Cerbo, Jennifer Claire '91
NY N Bender, David J. '64
Notaro, Frank J. '85
NY Ξ Costello, Joseph J. '70
Ehler IV, Frederick G. '86
Frawley, Robert J. '68
Kovac, Charles V. '51
Perrotta, Thomas '82
Rodriguez, Ernesto '85
NY O Korpi, Emery H. '76
Lamberg, Michael J. '83
NY Π Knudsen, Walter K. '85
NY P Hoffman, Mark E. '98
NY Σ Smith, Jason S. '95
NY T Torres, Peter '02
Venable, Richard R. '95
NC A Castellow, Donald C. '75
Farthing, P.E., E.H. Glenn '43
Hagarty, Edward P. '77
Helms, Chester E. '74
Jensen, Donald Nick '87
Olds II, John R. '87
Palmer III, Jacob A. '69
NC Γ Maher, Steven T. '80
NC Δ Dempsey, Gary L. '82
Wilson Jr., H. Ray '89
NC E Blunk, Thomas R. '92
ND A Crowder, Harry R. '60
Gerogeorge, John G. '85
Herther, Terry D. '60
Myrdal, Robert W. '51
Nelson, Lyle D. '58
Reifschneider, Paul H. '80
Schaible, Brian W. '84
Seppanen, John L. '86
OH A Ehlert, Donald A. '84
Holloway, Walter M. '67
Knuth, Donald E. '60
Koch, Ph.D., Carl C. '59
Molitors, Robert W. '77
Seegel, Beryl S. '48
Welch, Charles P. '49
OH B Avellano, Michael A. '85
Henderson, H.T. '58
Lockard, Chad W. '01
Mayer, Robert L. '69
Miller, C. Donald '53
Oliver, Fred W. '65
Steiger, Gene P. '57
Williams, Kenneth E. '68
OH Γ Choyke, Wolfgang J. '48
Del Tosto Jr., Joseph J. '87
Del Tosto, Judith A. '87
Fosdick, Lee B. '48
Miller, Richard H. '51
Mohr, John G. '63
Olszewski, Keith J. '75
Price, Theodore W. '59
Weber, Robert F. '61
Zupancic, Michael A. '87
OH Δ Miller, Rodger K. '65
OH E Boulter, Brian T. '91
Cibulskas, Cinda L. '79
Courey, Karim J. '86
Dirks, Douglas A. '83
Gruszka, William '75
Kuczmarski, Maria Ann '84
Lemmers, Robert E. '82
OH Z Enderlen, Jeffrey R. '80
Hazeltine, Nelson '63
Kristie, Frank M. '72
Lackey, Donald R. '51
McDonough, John E.-A. '04
OH H Bailey, William F. '76
Hartman, Dean H. '99
Houpis, Constantine H. '47
Isett, John B. '78
McKenzie Jr., Leslie E. '77
Palazotto, Anthony N. '55
Piske Jr., Andreus A. '61
OH Θ Centers, Robert E. '70
Mikalauskas, George A. '86
Trovato, Joseph A. '71
Unverferth, R. Steven '74
Ward, James '85
OH I Bennett, Dan A. '73
Clement, Ryan S. '96
Kohli, Raymond R. '51
OH K Adams, Daniel J. '78
OH Λ Cailor, Randall F. '85
George, Thomas E. '87
OH M Clement, Susanna Seitz '96
Neely, Matthew M. '91
OK A Brown, Leslie W. '70
Cameron, Miller A. '47
Kahler, Jon P. '70
Shoebotham, Thomes B. '56
Swihart Jr., John D. '59
OK B Baker, William D. '94
Bostick, Robert Neil '00
Janowski, Susan T. '80
McConnell, Chuck G. '65
OK Γ Congram, Anthony R. '81
Hanes, Larry L. '76
Krause, Lester E. '56
OR A Miller, Mark Wade '89
OR Γ Chaaya, Daoud Salim '01
PA A Breingan, William D. '51
Brunt, Thomas B. '62
Donley, Shawn T. '71
Durdock, Robert C. '57
Flaherty, Robert E. '68
Hacik, John '50
Ho, Jasper '77
McMichael, Francis C. '58
Megerle, William G. '86
Miller, William M. '73
Muller, Eduardo E. '87
Shapiro, Michael H. '70
Wismer, David A. '59
Zacharias Jr., Edwin H. '66
PA B Bova, Francesco A. '05
Bridge, David L. '71
Burg, Stoddard S. '51
Cady, Philip D. '56
Deluca, Robert M. '70
Fairchild, Cindy P. '82
Fairchild, James W. '81
Good, Michael L. '78
Graham, Paul W. L. '61
Irwin, Thomas J. '70
Matlack, James L. '84
Orosz, Matthew P. '02
Pickenheim, Timothy R. '90
Ruth, Donald L. '70
Strickler, Daniel B. '57
Wanenchak, Michael J. '69
PA Γ De Paul, Louis A. '73

FOUNDER'S CLUB, CONTINUED

Flaminio, Herman '62
Moore, Bruce E. '81
Pyle Jr., George M. '51
Wierzbicki, Jeannette M. '80
PA Δ Cebula, David P. '87
Lang, David R. '85
Long, Tian Ching '95
Patrick, Herbert '70
PA E Cimei, A. Kevin '84
Cottrell, Martin M. '67
Drosdick, Joseph W. '55
Greco, John F. '67
Hartman Jr., Harold F. '56
Huber, Joseph F. '68
Johnson, P.E., David B. '83
Manoway, Dina M. '83
Ott, Timothy R. '86
Santo, William J. '53
Schenck, Arthur J. '73
Skvoretz, David M. '95
Stibitz, Mark C. '87
PA Z Angilletta, Gerald V. '79
Browne, Joseph D. '60
Citron, Paul '69
Cohen, Samuel M. '78
Daly, Thomas P. '85
De Maio, Michael '76
Fox, Ronald N. '69
Kuntz, Jason Paul '95
Okada, Richard F. '54
Robinson, William A. '62
Wagner, William A. '89
PA H Cooper, Robert H. '53
Hackman, Timothy B. '68
Waldner, Harold E. '58
PA Θ Ballay, Stephen J. '64
Capuzzi, Angelo M. '71
Capuzzi, Lynda A. '71
Dreiss, Steven A. '83
Hinkle, John L. '60
Ryan III, Arthur P. '65
PA I Eveler, Nathan Troy '07
Stout, Robert M. '83
PA K Fink, Laurence I. '76
PA Λ Anselm, Gregory A. '81
Hovanec, Andrew S. '58
PR A Archilla, Joaquin '68

Bird, Hector M. '79
Cancio, Hugo M. '74
Jimenez-Quinones, Pedro '52
RI A Garrett, Scott L. '57
RI B Castro, Mark Y. '83
Cheever, Paul R. '52
Knickle, Harold N. '62
SC A Bryant, Paul Clifton '97
Freeman, Benjamin J. '77
Gramling, Jeffrey J. '85
Harley, John P. '78
Jensen, Charles B. '84
Kragas, Tor K. '79
McMullan, Richard J. '91
Rolfe, Ronald D. '83
SC B Boozer III, John F. '76
Davis, Charles M. '58
Hendricks, Irvine H. '62
Lesto, Kenneth R. '58
Pendley, Howard A. '93
SC Γ Beckman, Michael A. '93
Bridis, Theodore W. '67
Hinson, Mary E. '08
Jones, Bernard L. '50
Latham, Donald C. '55
Lightle, Ted L. '58
Lucas, William R. '84
SD A Eidsness, Karen H. '83
Kroetch, Christopher A. '06
SD B Lundquist, Charles A. '49
TN A Dobrodziej, Kristen Lynn '08
Duckworth, Holly A. '86
Exum, Joe H. '52
Fugatt, Ronald N. '65
Hodgdon, Richard L. '76
Hutsell, Wilbur R. '68
Lotts, Adolphus L. '55
Lundy, Ted S. '54
Masengill, Kimberly Lynn '88
McConnell Jr., Oaklie K. '51
Ottinger III, Aurelious J. '87
Rochat, Raymond A. '57
Sewell, John I. '54
Spruiell, Joe E. '58
Trivelpiece, Alvin W. '53
Utsman, Forrest Mckae '95
Warren, Donald E. '71

Weathersby, William E. '51
Wheatley, Hubert C. '70
TN B Abrams, Karen '86
Casson, Leonard W. '81
Cummings, Becky O. '76
Hall, Steve D. '84
Lippert, Michael J. '86
Miller, Charles Alan '99
Morton, Wayne K. '63
Noreen, Thomas R. '84
TN Γ Clark, Tony Lee '89
Elliott Jr., Walter L. '71
McDonald, Gary H. '77
Murphy, Fred A. '71
Tipps, Richard D. '69
TN Δ Gillespie, Clarence E. '65
TN E Dodson, Gregory A. '77
TN Z Foster, Edwin P. '64
Keck, Christopher C. '95
TX A Chen, Annie Y. '89
Dougherty, Patrick C. '56
Gloyna, Earnest F. '46
Krieg, Raymond D. '60
Laucius, Regina M. '80
Lewis, Kari Ann '95
Wales, Robert C. '65
TX B Atwood, Martin P. '76
English, Luci Ann '86
Fulton, William D. '80
Moss, Michael W. '83
Willhelm, Debbie J. '84
TX Γ Jackman, Alan P. '64
TX Δ Alexander, Grover L. '55
Fly, Melton L. '56
Foster, Scott A. '84
Foxworth, Charles D. '55
Gibbs, Sam G. '54
Oliver, Howard R. '49
Pechacek, Ronald D. '78
Perkins, Thomas K. '52
Szymczak, Edward J. '61
Tipton, Dewey R. '64
Vaden III, Frank S. '56
Willis, Giles W. '60
Wornat, Richard O. '49
TX E Damoff, Howard A. '84
Ford, Samuel '64

Klos, William A. '63
TX Z Mars Jr., James F. '72
Zwillenberg, Gordon D. '79
TX H Clute, Gregory S. '85
Godwin, Albert E. '84
Johnson, Ph.D., P.E., Richard '63
Loper, Thomas L. '81
McBay, Michael R. '73
Shirazi, Behrooz A. '80
Springer, William T. '75
TX Θ Klancher, Michael J. '80
Schubert, Brian L. '71
TX K Jolley, Lawyer C. '79
UT A Jarrell, Reese P. '79
Kelley, Brenton C. '89
Milligan, Thomas A. '95
Stewart, William V. '60
UT B Bingham, Kevin D. '84
Dickson, Lloyd B. '63
Larsen, Bradford W. '88
Moser, David R. '77
Thompson, James R. '76
UT Γ Anderson, Matthew O. '93
Esplin, Robert B. '04
Martineau, Robert T. '79
VT B Svrcek, Steven P. '77
VA A Abraham, Ryan Thomas '09
Ginn, F. Lester '72
Laramay, Lawrence J. '76
Loucks, USN Ret., Steven J. '64
McGhee, Kenneth H. '64
McNair, Grayson E. '62
Stansell, Thomas A. '57
Sussman, Theodore D. '81
VA B Boward, Jill Johnson '87
Detterman, Robert L. '53
Dunkley, Barry T. '71
Fortune Jr., Horace J. '63
Fox, Charles W. '59
Griffith, Dennis G. '68
Howell, Paul V. '89
Meith, Robert M. '57
Parsons, Jerome S. '66
Reading, Christopher R. '00
VA Γ Lashomb, Susan M. '83
Rausch, Leonard E. '80
VA Δ † Soucek, Leo E. '49

Watling, Edward T. '49
WA A Brown, David R. '44
Haug, Eric V. '76
Miller, Steven C. '72
Perrault, William R. '59
Schwartz, Rick A. '70
Semke, Leon K. '58
Tanemura, Steve K. '84
Wilkins, Lynn A. '76
WA B Bates, James M. '74
Nelson, Bruce E. '54
Rosenfelt, P.E., Todd L. '84
Tan, Ghee Peng '92
Wahl, David J. '62
WA Γ Brooks, Forest C. '70
WV A King, Staci Renee '96
Palmer, Charles B. '69
Sneckenberger, John E. '64
WV B Capozzoli, Brent S. '84
Harding, Thomas W. '86
Lorkowski, Timothy W. '93
WI A Bertz, Ralph H. '49
Bligard, Erling J. '48
Cleasby, John L. '50
Cook, Dennis C. '62
Cress, David R. '63
Flakas, Gerald K. '66
Froh, David '74
Gorowsky, Blake C. '07
Horn, Robert W. '68
Jens, Barry L. '64
Severson, Roger E. '76
Thompson, Kenneth G. '77
WI B Barone, Frank J. '62
Bell Jr., Robert B. '61
Black, Jennifer A. '01
Fedler, Richard E. '65
Fons, Richard J. '79
Morris, Leslie R. '78
Sommerville, Martin G. '94
Splinter, August M. '42
WI Γ Beisner, Richard C. '74
Figurski, Mark A. '83
Lesar, Jeffrey A. '86
WI Δ Gerloff, James R. '00
Palmer, Mark W. '90

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AL A Buehrig, Lavonna S. '94
Davis, Glendon S. '00
Holloway Jr., Coley Myer '94
Lunsford, Joseph R. '65
Melton, James B. '77
Murray, Scott B. '69
Raney, Sonya Marie '94
AL B Davis, M.D., George V. '59
Dodgen, Hugh E. '62
Elmore, Gregory David '97
Garrison, Rasa E. '80
Massett, Joseph L. '58
Sas, Martin S. '73
AL Γ Peters, Kenneth C. '80
Smitherman, Christopher B. '07
AL Δ Boggs, Wade D. '85
Hall, Scott Lee '90
Hoagland, Lynda M. '87
AL E Robertson, Bryan R. '03
AK A Lauber, P.E., Samuel C. '00
AZ A Chadik, Paul A. '84
Fish, James J. '50
Hartwein, Kenneth J. '53
Isaacs, Leslie T. '50
McLennan, Clyde J. '66
Sisson, David J. '65
Whitlock, Charles N. '79
AZ B Gembarowski, Charles J. '74
Ivan, William Thomas '92
Smith, Kathryn Anne '84
AZ Γ Hemer, Michael S. '93
AR A Finley, Roland L. '52
Garrison, Thomas F. '05
Johnson, Mark C. '84
McKinnie, Jane L. '84
Morris, Stacey O. '73
Mourot, Jordan B. '05
Shook, William E. '50
Walton, Trent A. '81
Whitson, James E. '80
CA A Chang, Benjamin C. '88
Divine, P.E., James R. '61
Gurin, Ilya V. '07
Sedighi, S. Christina '09
Selna, Michael W. '70
Silva, Christopher P. '82
Wragg, Christopher J. '89
CA B Broido, Michael D. '70
Fleming, John E. '46
Tolomiczenko, Ph.D., George S. '84
CA Γ Ackerman, John M. '41
Karpiel Jr., Edward James '01
CA Δ Amanatullah, Derek '98
Fung, Danny H. '87
Low, Jim M. '83
Peterson, Clarence E. '53
Walker, Bruce R. '54
CA E Brady, Dale D. '56
Fong, Andy J. '99
Hinchey, John D. '65
Peterseil, Gary D. '84
CA H Walsh, James E. '59
CA Θ Carpenter, Victorina Marie '07
Flores, Pete A. '93
Meza, Rocio Ivette '06
Nierman, Patricia K. '85
Schumaker, Carol J. '52
CA I Doria, Robert Carl '89
Gong, Howard '82
Hovland, Larry E. '72
Nishioka, David K. '84

Villa, Warlito P. '97
CA K Bretz, John Charles '89
CA Λ D'Albora, Emanuel G. '77
Grathwell, Travis J. '06
Hamilton, Shawn M. '96
CA M Calia, Kristin D. '95
Short, Sandra L. '92
Waller III, Donald B.R. '96
CA N Baker Jr., Arthur W. '66
Melton, Richard D. '72
Miller, James A. '73
Nguyen, Mai '79
Reynolds, Shannon L. '78
CA Ξ Peterson, John A. '93
CA Π Chhouk, Bounmy N. '92
CA Y Fischer, William A. '06
CA Ψ Schroeter, Everett S. '02
CA AΓ Rubick, Jondavid H. '08
CO A Benjes III, Skip H. '87
Benjes, Stephanie E. '87
Gilfillan, Ginger Marie '10
Goss, Christoph M. '97
CO B Backer, Tor O. '65
Carlock, Paul G. '72
Chavez, Greg T. '87
Eichelberger, William H. '43
Fett, Darrell L. '57
Marlowe, William R. '63
Riedesel, Philip E. '57
Showalter, Emmet M. '59
Stone, Michael A. '88
CO Γ Ton, Scott M. '74
CO Δ Bernhardt, Kenneth W. '80
De Crescentis, Joseph M. '92
Middlekauff, Stephen A. '09
CO Z Barlow, Douglas N. '78
Kirk, Andrew W. '09
Teigeler, Andrew Karl '07
CT Λ Cooper, Richard C. '63
Greiner, William E. '66
CT B Brailey, John P. '55
Greenberg, Randall L. '92
Leheny, Robert F. '60
Peterson, Brian P. '76
CT Γ Silver, Jonathan C. '08
DC B Blair, Erin E. '06
Moeller, Mitchell G. '85
DC Γ Rone, William S. '10
Stepnowski III, Stanley V. '96
FL A Coots, Katrina Lee '11
Geiger, John R. '77
Kiersz, Donna F. '80
Kunz, Aaron D. '06
Lee, Terrie M. '83
Smith, Daniel J. '87
FL B Berman, Gerald A. '55
Stewart, Charles M. '69
FL Γ Basta, James J. '85
Clausen, William E. '75
Lamaack, David B. '92
Molloy, Mark Patrick '05
FL Δ Raudenbush, Edward R. '84
Whitehouse, Gary E. '60
FL E Burford, Jon Kelly '05
Carlsson, Leif A. '80
FL H Deschryver, Anna May '09
Lamb, James Meigs '93
FL Θ Blake, Gregory Lee '96
Suarez, Eduardo M. '90
Viamontes, Eliecer '05
GA A Batts, Warren L. '61

Busbin, Steven J. '83
Cleveland, Paul H. '82
Greer Jr., Lovie P. '42
Jaklitsch, P.E., James J. '80
Priest, Anthony J. '88
Rawlings, Kenneth '69
IL A Adkisson, Robert A. '49
Frank, Timothy Eric '03
Jansen, Mark A. '85
Koob, Michael J. '76
Logan, George H. '37
Maguire, John A. '79
Messner, Laura E. '10
Messner, Mark C. '10
Steinkamp, Diane Merna '96
Stevens, Robert A. '81
Toepfer, Richard E. '56
Williamson, Maurice M. '49
Yarborough, Keith A. '55
IL B Burnley, Robert Todd '89
Dober, Edward J. '53
Kozlik, John F. '59
Nelson, John D. '60
Rosen, Edward M. '52
Saathoff, William M. '85
Staschke, Ralph A. '50
Taylor, P.E., Robert S. '57
Todd, Daniel R. '86
IL Γ Cantwell Jr., Edward N. '49
Lai, Bonnie E. '05
McLean, William N. '50
Sasaki, Masahiro '91
IL Δ Dahm, Robert D. '85
Yerby, P.E., Joel T. '56
IL E Barnes, William Gerard '00
Gates, Andrew Robert '06
Roth, Christopher A. '86
IL Z Cunningham, Matthew W. '03
Kamm, Steven Joseph '89
Lai, Katarzyna A. '91
Navarro, Robert W. '87
IN A Ayers, Peter G. '66
Baas, James E. '68
Boyden, Michael S. '81
Brown, Robert M. '54
Gilbert, Barry K. '65
Harrer, Robert D. '70
Hodson, Charles H. '56
Jochem, Stephen K. '73
Lafuse, Harry G. '58
Lott, Charles P. '48
McCurdy, Robert F. '56
McLean, Douglas H. '59
Miller, James R. '86
Morgan, David J. '60
Nichols, Anne Abell '85
Peter, David L. '85
Schaaf Jr., William E. '52
Schmidt, Steven R. '79
Sorkin, Charles E. '80
Stepanek, William D. '56
Tarjan, Peter P. '59
Travis, John C. '47
Walker, Neil R. '69
Wolber, Raymond W. '80
Wunder, Jack S. '69
IN B Gilbert, Ph.D., Kevin W. '92
King, Fred S. '71
Rolenc, Christan E. '94
Roll, P.E., Richard R. '81
IN Γ Beltsar, Olga Aleksandrovna '11

Durr, Christopher J. '10
Hudson, Matthew T. '08
Mercurio, James M. '92
Springer, Denis E. '67
Walters, Mary A.M. '86
IN Δ Bolur, Adam Reza '02
Kretzmann, John A. '73
Lyons, David W. '71
Tindall, Paul B. '68
IN E Hosack, Mack B. D. '88
IA A Adams, Clark F. '58
Borthwick, William A. '60
Eybers, Lance C. '81
Gallagher, Richard F. '59
Hoper, John H. '62
Jain, Samir '91
Sessler Jr., Albert L. '50
Tekippe, George L. '69
IA B Gerks, Irvin F. '60
Hofer, Larry D. '79
Kinney, Larry L. '64
Nollsch, Duane A. '47
KS A Barr, Deborah A. '81
Hartman, Richard H. '63
Holmberg, Joyce D. '51
Nelson, John A. '50
† Wells, Douglas L. '85
Wildin, Maurice W. '58
Winter, Ralph O. '49
KS B Brimmer, David L. '71
Lemon, Kimber Ann '09
Schneidewind, Deanna C. '99
Wentz Jr., William H. '55
KS Γ Berry, Michael W. '80
Sprouse, Mary P. '08
Stoll, Samson O. '78
Wagner, Don L. '61
KY A Buemi Jr., Joseph M. '74
Calasanz, Leandro E. '77
Heaberlin, James L. '56
Regan, Terry M. '57
Slade, Susan R. '82
Thompson, Paul Y. '58
Tosti, Beth Lorraine '00
KY B Carlson, John R. '04
Fleischer, Donald M. '79
Koerber, Kenneth L. '57
Kulaga, James M. '86
Tockstein, Carl D. '74
LA A Bergeron Jr., Sam W. '56
Eidt Jr., Clarence M. '56
Evans, Alfred W. '51
Keating, Teresa A. '97
Knighten, James L. '65
Moreau, Kenneth '85
LA B Blust, Henry L. '50
LA Γ Cochran, Gregory G. '81
Lazenby, Jerry G. '65
Risley, Martin C. '66
LA Δ Gautreaux, Craig A. '79
Sibille, Mark S. '80
LA E Diliberto, Marcella Dianne '03
ME A Elwell, John R. '50
Goodwin, Alice Margaret '00
Healy, Edwin D. '59
Whitney, P.E., Lynnette Ann '99
MD A Ulanowicz, Robert E. '64
MD B Brundrett, Charles P. '66
Kociscin, Joseph J. '59
McCoy, Charles M. '68
Pendorf, Paul W. '62

Sternstein, Sanford S. '58
Tracey, Lynn J. '86
MD Γ Ernst, Charles M. '61
Weinert Jr., William E. '83
MA A Breed, Allen '46
Carlson, Ronald A. '60
Ekstrom, Leland P. '42
Membrino, Michael Anthony '92
Scholand, Ph.D., Andrew J. '89
Wyczalek, Floyd A. '46
MA B Bulzacchelli, John F. '88
Dessner, Herbert '52
Hagerman Jr., Oliver S. '49
Hansell, Herbert J. '46
Kim, Gina '02
Micks, Ashley Elizabeth '09
Plotnick, Stanley K. '64
Sawyer Jr., Horace A. '50
Scoppettuolo, Lisa Anne '02
Sedor, Gerald '70
Tarpgaard, Peter T. '68
Whitney, Alan R. '66
MA Δ Darnell, Stephen R. '89
Day, Anthony F. '65
Nygaard, Lloyd P. '71
Serota, Steven '82
Walsh, James Ralph '90
MA E Campinell, Brian F. '86
Donahue, Joel A. '79
James, Douglas A. '68
Lundquist IV, Ray A. '82
Marzetta, Aldo L. '68
McKeon, Stephen J. '95
Truxel, George H. '68
Tsang, Janis Chan '87
Tsang, Paul Tze L. '84
MA Z Eck, Calvert F. '60
Hawryliw Jr., Michael '65
Jeanes, P.E., David C. '73
Liberty Jr., Harold J. '59
Piaget, Jeffrey S. '87
Tebo, David L. '88
MA Θ Aste, Stephen R. '99
McNally, Michael W. '85
MA I Allard, Timothy R. '08
Bieksha, Gregory J. '94
MI A Christenson, Carl E. '49
Suchyta, Paul J. '08
MI B Gosling, Christopher D. '79
Holley, Donald L. '53
Hudson, Roger D. '62
Knutilla, Robert L. '51
Kuchta, Samuel W. '48
McKindles, Gerald T. '50
† Potoroka, Walter '43
MI Γ Ackenhusen, John W. '50
Allard Jr., Lawrence F. '77
Asmus, Frederick J. '53
Dunlap, Roger '56
Geck, Paul E. '67
Harris, Peter V. '58
Hubbell, Thomas W. '71
Sherman, Steven R. '92
Smith Jr., William B. '47
Striffler, Charles D. '61
MI Δ Basso, Peter J. '59
Cerquone, Peter F. '61
Goryca, Jill Elizabeth '11
Klaes, Leo J. '55
Kurajian, George M. '48
Scheller, Robert W. '49

DONORS, CONTINUED

MI E Klotz, James C. '01
Kosmowski, Daniel A. '04
Nizko, Henry S. '53
MI Z Dagli, Ajay Dinesh '07
Holland, Gerald W. '62
Jester Jr., Herbert G. '51
Slagh, Douglas J. '78
MI H Hitzelberger, Michael R. '00
Lindeman, William J. '92
Tyrer, Kenneth R. '01
MI Θ Maki, Jean C. '85
MI I Davis, Wayne L. '86
Gurriere, Crystal Lynn '06
Schuster, Mike E. '96
MI K Folkert, Karalyn Faith '03
Vosters, Gregory M. '09
MN A Barrows, Kenneth C. '56
Boller, Robert A. '45
Jung, Paul '98
Lemke, John D. '88
Osen, John W. '81
Vejtasa, Stanley A. '65
MS A Warren, James T. '60
Young, Matthew J. '11
MO A Bowlin, Joshua Clay '04
Philipp, Cynthia C. '80
Potter, Charles J. '71
Tillman Jr., George E. '64
Vetter, Louis H. '62
MO B Brunkhart, Gerald E. '61
Bush, Duane B. '69
Crafton, James W. '65
Fallert, David M. '68
Hatfield, Jerry G. '69
Hendrickson, Richard C. '53
Jinkerson, Kenneth R. '75
LaBundy, Jeffrey J. '07
Loos II, Louis G. '84
Lytle Jr., Glenn A. '66
Ryerse, Tashya Lynn '91
White, Kimberly Elizabeth '94
Willyard, Donald L. '62
Wolff, Ph.D., Thomas F. '70
MO Γ Favre, Mark E. '98
Kline, Samuel A. '94
MO Δ Blancett, John M.L. '92
MT A Kleinfolder, Earl O. '53
Morse, Mark H. '83
Quist, Carl D. '76
Thompson, Philip L. '68
MT B Finlayson, Donald W. '00
NE A Cox, John D. '85
Frenzel, Gary G. '59
Muhleisen, Danell D. '86
NV A Martinovich, Christopher C. '09
Smith, P.E., Mark P. '85
NV B Silva, Richard A. '04
NH A Einstein, Thomas H. '54
NJ A Chen, P.E., Kevin E. '06
Di Palma, Vincent A. '71
Francis, Christopher S. '11
Goller, Karl R. '52
Maroulis, Alexandros '04
Menafra, Domenic B. '04
Newton, Thomas J. '58
Smith, Alexander Paul '07
Wetter, Charles H. '51
NJ B Conklin, Donald J. '72
Davis, Tyson N. '03
Hagerman, Janet S. '82
Holls, Robert E. '62
Horowitz, Daniel Austin '99
Ortiz, Mary T. '81
Rayski, Thomas A. '92
Rogers, Lemuel A. '06
NJ Γ Daniello, George T. '68
Gomez Jr., Ernest '71
Heuer, Ava R. '72
McDermott, Kevin J. '65
Pisz, Frank A. '71
Podesfinski, Raymond A. '73
Vergara, Cynthia '04
Walters, Brian D. '67
NJ Δ Adrignolo III, Anthony John '89
Bosworth, Bryan Travis '09
Kurzweil, Philippe J. '08
NM A Dietzman, William B. '71
NM B Bryant, Frank T. '80
Lacatena, Stephen J. '86
NM Γ Kilmer, Sarah Mae '11
NY A Spring, Peter G. '68
Volek, Thomas K. '76
NY B Andrews, David R. '45
Bernard, Jeffrey L. '80
Geary, David F. '62
Holman, Roland H. '58
Leader, Margaret E. '85
Rzepka, William '64
Sahm III, William H. '64
NY Γ Caulfield, Kristen Amann '03
Collins, Donald F. '09
Goodman, Edwin F. '41
Haslett, Robert A. '58
Manning, Robert W. '69
Peltz, Adrienne Nicole '07
Petsche, Steven J. '07
Terry, Deniz K. '85
NY Δ Chu, Kenneth Yeng-Kang '11
Hiehle, John F. '83
Kijak, Michele B. '90
Law, John S. '79
Sawchuk, John A. '71
Suss, Eric B. '86
Woronowicz, Michael S. '85
NY E Brolin, Stephen J. '57
De Santo, Daniel F. '52
Hayden, Steven Z. '73
Reber, Raymond A. '63
Refowitz, Robert M. '67
NY Z Keating, Kenneth B. '53
Levine, Howard S. '63
Suhocki, Vincent P. '67
NY H Badalamenti, Salvatore '75
Kahn, Robert E. '60
Kitson, Robert M. '71
Marino, Anthony L. '77
Palazzo, Cosimo J. '60
Shinners, Stanley M. '54
NY Θ Adair, James L. '83
Adams, Susan P. '83
Atkinson, William C. '70
Ford, Ph.D., Ralph M. '87
Godlove, Katie Ann '02
Jerabeck, Valerie B. '76
Saviz, Camilla M. '87
Timm, Richard L. '76
NY I Brand, Alfred H. '67
Capuzzi, A. Michael '01
Englard, Avi '10
Le Mee, Jean '59
Lipnick, David '60
Schulman, Richard J. '67
Simms, Richard '59
Sullivan, Roger K. '63
Uhl, P.E., Wilfred O. '49
Wilkowski, Stephen J. '80
NY A Traina, Edward P. '62
NY M Neville, James M. '92
NY N Fligner, Mark '77
Irwin, Christopher J. '92
Lavitz, Martin S. '78
Markunas, Justin K. '01
Michalek, Kenneth P. '83
Miller Jr., Donald B. '90
Roe, Kevin P. '94
Watkins, Matthew Ace '05
NY Ξ Cassidy, Richard James '07
D'Angelo III, Louis A. '71
Drewitz, Edwin W. '77
McKenna, John D. '61
Mohan, Anne Elizabeth '09
Mohan, Marguerite Anne '04
Radzivila, Raymond '49
NY Π Langkamp, Richard B. '83
NC A Chern, Rey Torn '83
Ellington, Barry T. '86
Fales Jr., Carl L. '61
Fox, Bruce M. '76
Freeze, John M. '85
Kamprath, John M. '82
Koeppel, Alison Parpal '08
Meredith Jr., James O. '72
Miller, David K. '65
Noble, Robert T. '69
Poindexter, Richard C. '64
Skipper, Lee Roy '82
NC Γ Lemel, Page Ives '84
NC Δ Holshouser, Thomas E. '86
Porter, Joseph S. '79
NC E Meyers, Carolyn W. '68
ND A Bolmgren, Lester N. '55
Connelly, Donald P. '64
Dieser, Mark '84
Horlacher Jr., Alfred E. '75
Kallis, Adrian G. '88
Mack, Thomas W. '57
Marczuk, Michael '56
Nickel, Donavon D. '52
Sauber, James G. '58
Schoot, Peter A. '85
Sletten, Harold L. '48
Sprynczynatyk, David A. '72
ND B Mann, Michael David '81
Snortland, Robert K. '57
OH A Bauer, Wolfgang F. '59
Contenza, Michael D. '78
Dunker, Philip Alan '07
Erdelsky, Philip J. '66
Hilberman, Dan '63
Lesco, Daniel J. '62
Mehlhorn, Rolf J. '62
Ontko, Robert J. '11
Proctor, David G. '52
Rush, David H. '51
Triznadel, Norman T. '60
OH B Abromowitz, Daniel Jason '05
Anderson, Jeffrey A. '76
Boldman, Donald R. '58
Chalk, David L. '62
Curless, Richard A. '68
Guckian, John E. '77
Jubin, Eric Michael '95
Knapp, Gregory W. '81
Rust, Ralph J. '83
Seifert, David A. '63
OH Γ Boggs, Kelly Jean '95
Brown, Shaun P. '86
Captor, R. Nick '81
Hall, Susan Q. '84
Hashmi, Ahsan Abbas '00
Knicely, David R. '61
Luth, Harold J. '64
Seipel, Frank E. '93
Stanforth, Michael T. '79
OH Δ Buda, Steven M. '88
Lippian, Joseph M. '71
Reese II, Jack R. '91
Shearer, Richard P. '68
OH E Eberlin, Fred E. '57
Gajzer, Attila Imre '95
Handschuh, Robert F. '82
Shaniuk, Thomas J. '85
Vary, Alex '58
OH Z Gillfillan, Dana C. '84
Musch, Kenneth W. '70
Schroeder, Carlton C. '66
Sleiman, Sleiman S. '09
Walker, Russell A. '92
OH H Boeckman, John G. '84
Carlson, Lonnie '07
Christian Jr., Thomas F. '68
Dizek, Stephen G. '65
Ethridge, Ronald A. '78
Morrow Jr., Robert B. '63
Ratner, George H. '70
Roodhouse, David A. '85
Wilson, Jeffery A. '88
OH Θ Keller, Robert L. '63
Mysona, Ronald J. '82
Rose, Thomas J. '56
Trogus, Frank J. '69
OH I Drouhard, Todd A. '98
Homan, Gregg G. '86
Redick, Merritt D. '59
Rowland, Benjamin C. '06
Stiles, Justin Austin '06
Ward, P.E., Robert L. '88
OH K Schneider, Ronald E. '75
OH Λ Missik-Gaffney, Lisa Marie '96
Reedy, Patrick J. '84
Repko, Raymond '77
Ries, Cynthia Ann '87
Sarantopoulos, Athanasios D. '86
Worst, Arthur Harold '11
Ziemianski, John J. '82
OH M Dermis, Thomas F. '87
Kucera, Jeffrey D. '12
OK A Alvis, Robert L. '60
Feldman, William J. '38
Green, Jack H. '50
Greenberg, Charles M. '66
Marks, Fred M. '38
OK B McKinley, Gordon S. '90
Strawser, Donald E. '71
OK Γ Stamatakis, Penelope '80
Teague, Keith A. '79
OR A Anderle, Christopher J. '87
Devlin, Joseph T. '50
Marquis, Malcolm '53
Pittman, Leonard D. '68
PA A Abbot, James L. '50
Barnett, Robert C. '64
Emmons, Larrimore B. '57
Lamparter, Robert W. '72
Lucadamo, Gene A. '71
Matukonis, Edward S. '73
Miltenberger, Robert S. '44
Moore, Robert W. '53
Polyniak, Gregory J. '95
PA B Belesky, Robert M. '78
Chatcavage, Edward F. '80
Coyne Jr., Harold J. '63
Harper, Kenneth L. '74
Harvey, P.E., John W. '95
Hemler, Robert J. '70
Hilbush, Mark R. '80
Klingeman, Roger L. '57
Livingston, Jason S. '00
McCully, Shannon Aileen '96
Patterson, David A. '88
PA Γ Carter, Woodward C. '56
Mullen, Thomas E. '82
Schneider, Christopher M. '06
Seaverson, Erin R. '00
Trautman Jr., Deforest L. '42
PA Δ Kaskin, Jonathan D. '71
Lucas, Jay P. '69
Rockoff, Ph.D., Todd E. '85
Schorr, Craig T. '90
Silnutzer, Norman R. '67
Swerdlow, Richard '60
Till, P.E., Walter J. '52
PA E Baldoni Jr., Eugene '49
Bogden, Kenneth M. '69
Frabizzio, Michael A. '96
Gatt Jr., Charles J. '85
Johnson, Floyd C. '49
Kressler, Durwood R. '51
Pudleiner, James D. '76
PA Z Borig, Walter A. '49
Cheever, William H. '56
Daniels, Richard E. '69
Markau, David B. '84
O'Rourke, John F. '73
Serafino, Vincent J. '64
Shaffer III, Thomas H. '68
Sheckler, Addison C. '47
Wagman, Sander R. '61
PA H Cook, David Michael '04
Russell, J. Frank '74
Sweetman, Denman J. '60
Valickus, Joseph P. '09
Villforth, Richard '50
Wallace, Richard E. '82
PA Θ Murray, Donald J. '62
Sawyer, Stephen G. '65
PA I Geveke, P.E., Dave J. '80
Meixner, Henry M. '67
PA Λ Becse, Robert E. '90
Garofolo, James D. '05
Leptinsky, Mark E. '87
Loehlein, Werner C. '74
PR A Burgos-Rubio, Concepcion N. '89
Martinez, Jonathan A. '07
RI A Gamache, Richard E. '81
SC A Brown, P.E., David A. '66
McCoy, William R. '62
SC Γ Baciocco Jr., Albert J.. '53
New, I. Ben '56
Tomasik, Donald M. '77
Varner Jr., Royal W. '56
SD A Biberdorf, Bernard A. '50
Whites, Keith W. '86
SD B Brost, Bart D. '97
Johnson, Stewart W. '56
TN A Dickerson, Will K. '56
Godsey, A. Roy '43
Irwin, S. Ronald '64
King, Gregory T. '93
Lambert, William M. '91
Stone Jr., Dewitt B. '62
Valk, Anthony '86
Vannatta, Troy W. '89
Whaley, Christopher L. '94
Wilmoth, Kenneth O. '63
Wunderlich, P.E., Walter O. '56
TN B Merse, Cynthia Lauren '03
Turner, A. Edward '69
TN Γ Moyers, Robert Lewis '05
TN Δ Klein, Sally Anne '89
Reves, Benjamin Taylor '05
TN E Kee, Paula Anita '84
TN Z McGlumphy, Jonathan David '02
TX A Goldsmith, Clifford R. '52
Meza, Fernando P. '56
Moguel, Walter L. '93
Pofahl, Eugene F. '51
Pritchard, Andrew Stephen '11
Smith Jr., Horace V. '64
Thomas, Kurt O. '79
Tseng, Shiaw C. '86
Wilson, Arthur E. '65
TX B Albritton, Patrick Michael '96
Anderson, Roger K. '60
George, P.E., William K. '99
Hansen, Gracie Arlene '04
TX Γ Droste, Carl S. '61
Horch, Robert Adam '04
Horwitz, Michael E. '57
Johnson, Colleen Bea '97
Kane, George V. '48
Miller, Brian Charles '94
Ricken, Ph.D., Mathias Guenter '04
Scheevel, Mark R. '78
TX Δ Bair, Sally W. '81
Casco, Andres Enrique '99
Kelling, Ronald D. '80
Langford, Thomas R. '81
McFaul, Julie Elizabeth '97
McIver, Jes D. '51
Muchinsky, Mark L. '88
Newsome Sr., Robert Reese '90
Rothermel, Jeffrey Todd '94
Selensky, Fred M. '71
TX E Coneway Jr., P.E., Charles R. '73
Nieto, Shayler '63
Parmely, Marjorie A. '75
Schroeder, Steven R. '70
TX Z Acosta, Ritchie Anthony '10
Chavez, Rufus '59
TX H Fernandez, Marcos D. '85
Oden, Michael W. '83
Srinivasan, Anand '11
TX Θ Haktanir, Servet A. '76
TX I Hajdu, Allyson A. '86
Lewis, Gloria L. '96
Smith, Jason Andrew '10
TX K Marsh, Patrinia Gabriella '09
TX Λ Hinojosa, Juan J. '84
UT A Reid, David L. '51
UT B Alley, Lynn D. '81
Ashby, Delroy '64
Boulter, Robert E. '62
Hilton, Ronald N. '80
UT Γ Harshbarger, Roger K. '82
VT A Billheimer, Robert A. '70
Lara, Nelson R. '73
VT B Pyper, Gordon R. '48
Van Domelen, John F. '64
VA A Averso, Martha J. '81
Griffith, Douglas G. '61
Gritton, Charles W K '76
McGrady, Joseph A. '72
Meade, John Garvey '95
Myers, Griffin Kyle '00
VA B Evans, Richard O. '74
Jackson, Ray A. '50
Koelling, Henry R. '65
Obrien Jr., Walter F. '60
Ricketts, Garland B. '66
Ryan, John D. '66
Shaffer, James A. '49
Spangler, Edward G. '79
Tipton Jr., Thomas E. '67
VA Γ Fries, Bradley F. '87
Harris, Arlene Whitson '92
Pronko, Mark S. '81
VA Δ Carr, Dale A. '77
WA A Brannian, James B. '83
Johnson, Brian E. '83
Laakso, Melvin T. '70
WA B Craven, Carl N. '82
Franson, Jeffrey Richard '90
Gimera, Michael '89
Johnson, Scott C. '73
Rhoads, Rusty Gene '97
WA Γ Wong, Tommy S. H. '06
WV A Means, Kenneth Harvey '63
Webb, Gary E. '70
WI A Anderson Jr., George J. '48
Carroll, Richard D. '71
Guelker, Marshall F. '61
Legault, Kathryn A. '85
Nesbitt, John D. '82
Thompson, Diane M. '79
Thompson, William A. '78
Washechek, Howard C. '50
Wendte, James C. '59
Wetzel, Roland H. '44
Wilcox, Ross P. '67
WI B Hinterlong, Diane S. '85
Hughes Jr., John J. '54
Novak, David A. '77
Rupert, John R. '92
Sullivan, Raymond J. '47
Varish Jr., George P. '51
Wielebski, Rachel A. '98
WI Δ Prescher, Matthew John '04
WY A Morales Jr., David '84
Rasmusson, William L. '74
Reese, David L. '81

ONE CHAPTER PETITION FOR 2013 CONVENTION

The Engineering Honor Society at the University of Texas–Pan American submitted a petition for a collegiate chapter of Tau Beta Pi which will be presented to the 2013 Convention in Ames, IA, this October.

The Engineering Honor Society has operated at University of Texas–Pan American since 1997, when its first members joined. Refocusing on becoming a Tau Beta Pi chapter in 2007, EHS has become an active part of the engineering school at UTPA. This effort resulted in the submission of a preliminary petition for a new chapter in November 2012. Following approval by the Executive Council for an inspection, a committee of five Association officials and four representatives from two chapters visited in February 2013. The committee recommended granting a charter.

UTPA began in 1927 as Edinburg College. Making the transition to a four-year college in 1952, it became Pan American College. In 1989, the college merged into the University of Texas system and adopted its current name. The enrollment of 19,000 will be increasing to 28,000 when the proposed merger with UT Brownsville is completed.

The college of engineering and computer science, established in 1991, has 1,424 undergraduates in five engineering departments. Civil, computer, electrical, manufacturing, and mechanical are ABET/EAC accredited. The school has grown steadily and has the third largest enrollment of Hispanic engineering students in the US. In 2010-11, the school awarded 116 engineering degrees.

Many undergraduates participate in research and are involved in projects including HESTEC (Hispanic, Engineering, Science & Technology). Students are actively involved in professional societies including IEEE, ASME, SME, SAE, and SCE.

The petition has the support of the administrative officials and faculty of the institution and will go to the 2013 Convention with Council approval.

GREATER INTEREST IN GOVERNMENT MICHIGAN KAPPA PROJECT

Michigan Kappa Chapter members from Western Michigan University are shown standing beside a wheelchair ramp they constructed for a family in the southwest of the state.

Former chapter president Andrew Peruski initiated this project by securing a 2011 Greater Interest in Government (GIG) Award from ΤΒΠ Headquarters.

The project was coordinated by Chapter Student Officer Thomas R. Wheeler, engineering faculty member and Chief Advisor Damon A. Miller, Ph.D. and David Orchanian from the college of health and human services, who used his contacts to locate a family in need of a ramp.

The twenty-eight foot ramp and a set of stairs were completed in a single day of construction by chapter members with the invaluable assistance of carpenter Dennis Uhlir.

The project was supported by a hydraulic post-hole digger loaned by Neil's Hardware in Mattawan, MI, vehicles from the WMU college of engineering and applied sciences, and by the local township and building inspector, who provided a free inspection.

—Damon A. Miller, Ph.D., *KY B '89, Chief Advisor*

SOUTH PACIFIC WAR RING NOW BEARS BENT

George V. Kane, *Texas Gamma '48*, was an engineering officer on the U.S. Navy's largest troop transport ship, the *USS Admiral W.S. Benson*, in the South Pacific War. Kane used the ship's machine shop and a hand file to make the ring, pictured to the left, from a round bar of stainless steel and wore it undecorated. Kane returned to Houston after the war and resumed his engineering education at Rice University, being invited to join Tau Beta Pi. He considered adding the Bent to his ring, but did not do so before graduating. Kane worked as a production control engineer before starting an insurance agency with his father in 1951. He is now retired with three children, nine grandchildren and one great grandchild. After many years, he recently ordered a new Bent and attached it to the ring.

The Law of Thinking

WHITEWATER RAFTING was never high on my life's list of things to do, but when my wife and I were invited to join our daughter and her family for a day on the New River of West Virginia, we were off to the rapids. This was not one of those adventure tours that puts a crew of 20 in an inflatable raft the size of a semitrailer to plunge through waves that would get the serious attention of a destroyer escort. We rode in simple two-person inflatable kayaks, and the most significant rapids were rated class III.

Not that it was just a piece of cake. On one stretch of fast water, my granddaughter and I had an intimate and vigorous encounter with a submerged rock and found ourselves facing cross-river as we arrived at the big standing wave in the middle of the rapids. Bad position. The kayak flipped, and we got a dunking. There were no injuries (except to my pride), and we drifted into the next area of calm water and climbed into the boat.

Arriving in that section of flat water made me appreciate the fact that the New River changes its character from time to time as it follows the laws of physics that draw it ever downward. In some places, its waters converge and move rapidly forward. In others, they diverge and slow down and lap gently at the shores, which are broad and relatively placid. This convergent-divergent pattern, repeated throughout the river's course, led me to the discovery of Lyle's Law of Thinking: **Think like a river.**

What can a river teach us about thinking? First, consider the rapids. In general, when we are in a problem-solving mode our thinking is like the flow of water through the fast stretches—convergent and highly linear. The solution (i.e., THE solution) is somewhere ahead of us, and our job is to get there in the fastest way possible, with each step dictating, or at least suggesting, what the next step should be. We are in the rapids, moving with as much speed as we can muster, buffeted about a bit, but drawn ever forward by the principles of problem solving and the desire to reach the solution as soon as possible.

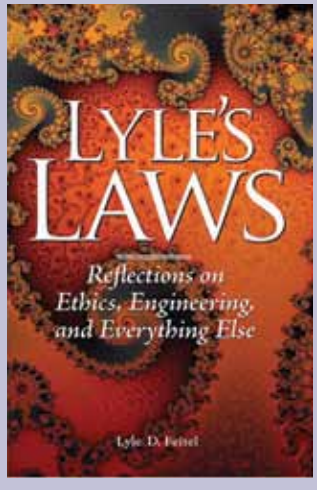
But wait. The river doesn't stay in the rapids forever. After a period of fast, convergent, sometimes turbulent progress, it slows, diverges, and eases along between the wider shores, considering, perhaps, how to proceed when it enters the next constriction. Indeed, rivers do sometimes find new paths out of these placid pools and stop following the channels previously pursued (witness the ox-bow lakes in many river valleys). We need to do the same in our thinking. We need to pause occasionally in our pursuit of a solution to let our thinking spread out, to

Lyle D. Feisel, Ph.D., P.E., is a former dean of engineering at SUNY Binghamton and recently served as the interim Executive Director of the American Society for Engineering Education (2010-11).

In 2002, he was asked to write a series of 40 articles for THE BENT of Tau Beta Pi. The "Lyle's Laws" articles have now been compiled into a single volume that has been published by Brooklyn River Press and is available through Amazon for $14.99 plus shipping. However, Lyle is making a special offer to anyone who would like to have an autographed copy of the book, and at the same time support Tau Beta Pi.

If you would like your own signed copy of Lyle's Laws, send $20.00 and a note mentioning Tau Beta Pi to:
Lyle D. Feisel
P. O. Box 839
St. Michaels, MD 21663

You will receive an autographed copy, and Tau Beta Pi will receive a $5.00 donation. Shipping and taxes are included. A caveat: Lyle travels a lot, so it may be several weeks before you receive your copy.



There has also been some interest in using Lyle's Laws in educational programs. Discount bulk orders are available for certain academic purposes; please contact Brooklyn River Press for further information. For a sample of Lyle's Laws, enjoy #5: "Lyle's Law of Thinking" from the Fall 2003 issue of THE BENT.

see if we have missed anything, to consider if it is really time to lock ourselves into this particular path, or if there might instead be a better, more creative way to accomplish our ends.

However, we don't have the luxury of staying in this relaxed, reflective mode for very long. An engineer's job is to solve problems, and that doesn't mean just reflecting on them or considering various alternatives. After an appropriate amount of divergent thinking, we have to enter the rapids again and speed things up and move once again as rapidly as possible toward a solution. The trick of thinking like a river is to have the discipline—To hesitate from time to time and say, "Now that I know where I am going, am I sure that's where I want to go?"—To slow down and allow the right side of our brain to take over for a while and be divergent and creative—To look for alternative solutions—To consider some of the consequences (environmental? social?) of the path we are pursuing. And then back to the rapids.

Of course, this metaphor eventually breaks down, as all metaphors must. Generally, as rivers approach their appointment with the sea, they slow and spread into a delta with no clear conclusion. Obviously, that is not a good model of thinking for engineers or anyone else. We dare not think like the Mississippi in its lower reaches. There are some good engineering rivers, however. Take the Niagara, for instance. It has its rapids and its cascades; it even has a major (how's that for an understatement?) waterfall and at least one whirlpool. It also has some wide spots where it moves with relative calm. Finally, it enters Lake Ontario in a clearly defined channel, having resolved all the uncertainty of its passage—a great model of a good thought process.

This is probably as good a time as any to introduce the reader to Lyle's Law of Laws: **The better the law, the more general its applicability.** I use this law to judge the quality of proposed laws and decide which one to write about. By this criterion, the Law of Thinking is outstanding. It certainly does not apply just to engineers. Indeed, while these paragraphs have been directed to those of us of the convergent persuasion to remind us to broaden our thinking from time to time, the law can as easily be used as an admonition to the right-brained among us that, eventually, convergence is necessary so that action can be taken.

And the law can be useful in many facets of our lives. We make various decisions as we speed through our days and weeks and months, and the quality of those decisions could undoubtedly be improved by thinking like a river. Take the time to ask whether your current decision is indeed the best, whether there are better alternatives and, indeed, WHY you have chosen that particular option.

Some say that a river is a living thing—even that it has a soul. I'm not sure I would go that far, but I do believe a river is a great model of how to think. If that means it is alive, so be it.

—**Lyle D. Feisel,** Ph.D., P.E., *Iowa Alpha '61*

IRA ROLLOVERS REINSTATED!

You senior Tau Bates can make tax-free donations to TBΠ for a limited time from your IRAs if you are **age 70½ or older**. A recent law allows tax-free charitable donations from an IRA under simple conditions! You must act before December 31, 2013.

This is good news for anyone contemplating making a major gift to TBΠ or another charity. Under the American Taxpayer Relief Act of 2012, any donor age 70½ or older may contribute up to $100,000 annually from an IRA account and avoid federal-tax consequences. The charitable gift amount will count against the donor's required minimum distribution (RMD).

When the amount withdrawn from the IRA account is paid directly to the charity, it is not counted as federally taxable income. However, because the gift would be excluded from income, it may not be included as a charitable deduction on a federal tax return. These rules will apply to gifts made through December 31, 2013.

For more information about how to help TBΠ, please call Pat McDaniel, Director of Development, at 800/828-2382 or visit *www.tbp.org/pages/giving*.

You should always consult a tax professional if you are thinking about making a major charitable gift or a gift under the new law.

ENGINEERING JOB BOARD

Over 5,000 jobs are currently available on Tau Beta Pi's job board! Our partnership with JobTarget allows members to post resumes, browse jobs, faculty positions, and internships, and employers may browse resumes.

New opportunities are posted each day and a full list of openings are available by visiting *tbp.org/memb/jobboard.cfm*.

POWERED BY JOBTARGET

TBΠ Directory

Executive Council

President Larry A. Simonson, Ph.D., P.E., *SD A '69*, SDSM&T Foundation, 306 E. St. Joseph St., Suite 200, Rapid City, SD 57701. *(larry@tbp.org)*

Vice President Solange C. Dao, P.E., *FL A '95*, 1110 E. Marks St., Orlando, FL 32803. *(solange@tbp.org)*

Councillor Jonathan F.K. Earle, Ph.D., P.E., *FL A '65*, 8516 SW 20th Lane, Gainesville, FL 32607. *(jonathan@tbp.org)*

Councillor Jason A. Huggins, P.E., *FL A '96*, 4701 Hickory Shores Blvd., Gulf Breeze, FL 32563. *(jason@tbp.org)*

Councillor Norman Pih, *TN A '82*, # 10, 811 W. Cherry Ave., Flagstaff, AZ 86001. *(norman@tbp.org)*

International Headquarters

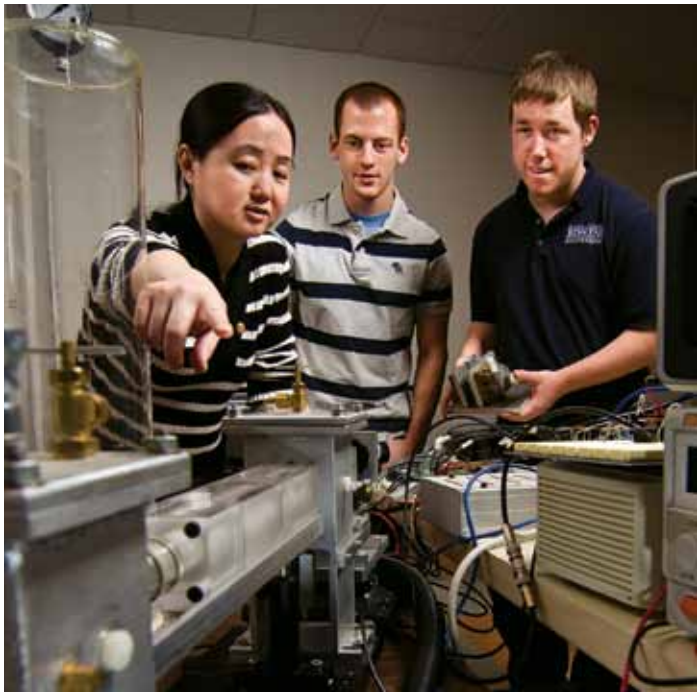
Executive Director Curtis D. Gomulinski, *MI E '01*, P.O. Box 2697, Knoxville, TN 37901-2697. (curt@tbp.org)

Asst. Sec.-Treas. Roger E. Hawks, *NY A '75*, P.O. Box 2697, Knoxville, TN 37901-2697. (roger@tbp.org)

Penn State Erie, The Behrend College

The first members of the Engineering Honor Society (EHS) at Penn State Erie, The Behrend College, are, by definition, among the best in their discipline: Only the top eighth of juniors and the top fifth of seniors are eligible.

They are expected to get even better. EHS members are required to tutor and do community service, and to be active at both social events and professional seminars.



"We want members of our society to constantly enhance their education beyond the formal classroom," explained **William C. Lasher,** Ph.D., *Michigan Gamma '76*, professor of mechanical engineering and Chief Advisor to the Engineering Honor Society.

The service requirement keeps students active on campus and in the community. EHS members lead tours of the school, one of the nation's largest undergraduate-only programs. They are active at the Engineering K-12 Outreach Center, which encourages younger students to pursue careers in science, technology, engineering, and math, and at FIRST Lego League competitions, where teams program robots to navigate custom obstacle courses.

Student interest in the honor society has been high since 2008, when a five-member planning committee began to write bylaws for the chapter, which was previously registered as Tau Beta Nu. Of the 35 students who were eligible that year, 27 joined.

"We see this as a key part of our maturation process," Lasher said. "Universities with programs much larger than ours have chapters on campus."

Penn State Behrend grew from the 400-acre Glenhill Farm, the country home of Ernst Behrend, founder of Hammermill Paper Company, and his wife, Mary. The property is near Erie, PA, a two hour drive from Cleveland, Pittsburgh, and Buffalo.

Ernst Behrend, a mechanical engineer and a member of the American Society of Mechanical Engineers, died in 1940. Eight years later, Mary Behrend donated the prop-

erty to Penn State, which was struggling to accommodate a record number of freshmen, many of them men who had just completed military service. The farmhouse became a dormitory. The barn was used for a biology lab. The dog kennel was converted to faculty housing.

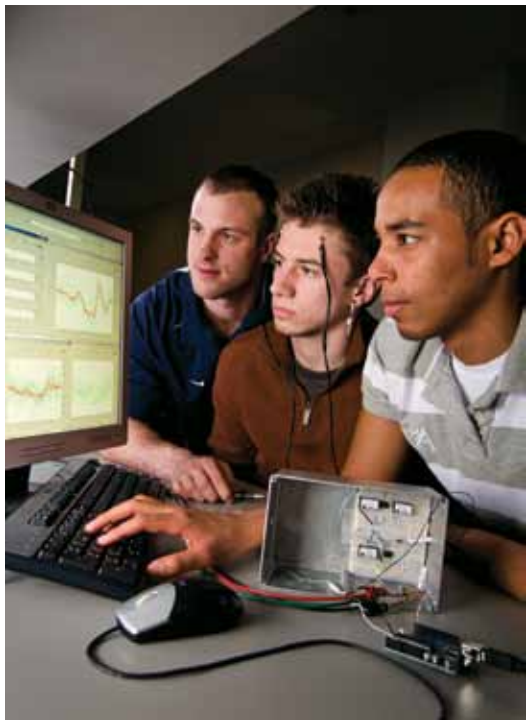
The college's original curriculum—English, French, biology, psychology, speech, drafting, and mathematics—was designed for freshmen, who would continue their studies at Penn State's larger State College campus. Engineering courses were added later, tailored to adult students working in Erie's paper, transportation, and electrical industries.

The technical program would be crucial to the college's early growth. In 1953, demand for graduate engineers led Penn State to offer two-year associate degrees in drafting, design technology, and electrical engineering technology at the Erie campus. It was the first time a Penn State degree could be earned outside of State College.

Within 10 years, enrollment at Penn State Behrend doubled. One of every three students was in the two-year engineering program.

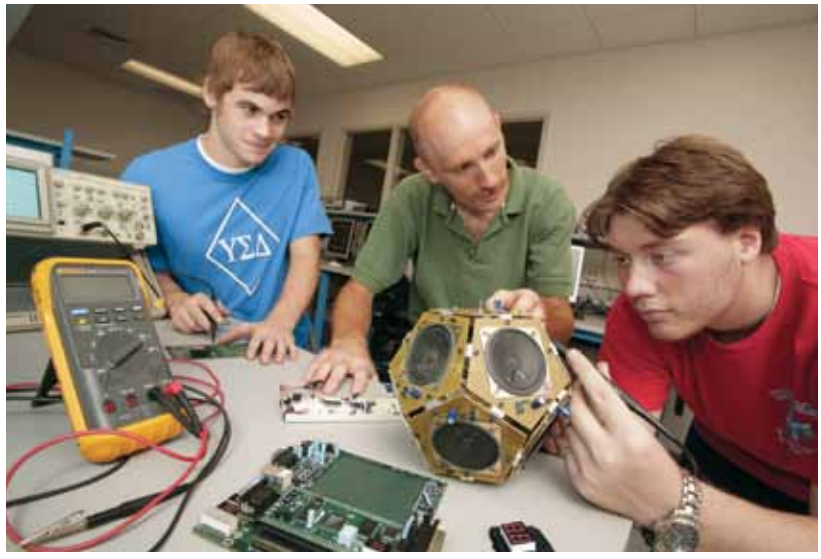
That growth continues today, in large part because of engineering. The school of engineering at Penn State Behrend is growing faster than any other at the college, with nine bachelor's and three associate degrees offered, along with a variety of minors and certificates.

The 1,300 students enrolled in the programs work closely with more than 50 full-time faculty members. The average size of a junior- or senior-level engineering class is just 17 students.



Engineering students at Penn State Behrend work closely with faculty members: The average junior- or senior-level class has just 17 students.

This article was prepared by Robb Frederick, Public Information Coordinator, Office of Marketing Communication, Penn State Erie, The Behrend College.



School Ranked

U.S. News & World Report has ranked the school among the Top 50 undergraduate engineering programs in the country, in part because of a commitment to research. Penn State Behrend funds more than $350,000 in undergraduate research every year. Industry partners include GE, Lord Corp., Northrop Grumman, and NASA.

Students have created a battery to power an AMSAT space satellite and a computer program that coordinates the work of an Ohio horse-rescue organization. A group in the interdisciplinary business with engineering studies major—a partnership with the college's Sam and Irene Black School of Business—has investigated the potential health benefits of anti-microbial Agion silver when it is applied to gas pumps and door handles.

In 2012, a Penn State Behrend team won the Society of Automotive Engineers' international supermileage challenge. The team's carbon-fiber test car squeezed 1,485 miles from a single gallon of gas.

The car was assembled in a state-of-the-art engineering lab, a key feature of the $30 million, 160,000-square foot Jack Burke Research and Economic Development Center. The building also houses a 10,500-square foot plastics lab—the largest of its kind in the country—and a wind tunnel.

The $40 million Knowledge Park complex at Penn State Behrend provides an opportunity for even more student research. More than 500 people work in the complex, which was designed for technology companies. Student researchers are active at several of those work sites, including the new SKF Aerospace Innovation Center, where airline composites and sensor technologies are being tested.

The SKF partnership, which will involve $250,000 in funding during its first year, aligns with an "open lab" initiative at the college, where business leaders, faculty members, and students engage in research and development as teams.

"The open lab leverages the research expertise of our faculty, provides our students with valuable experience and employment on campus and supports corporate efforts to develop new products and a high-tech workforce," said **Ralph M. Ford,** Ph.D., *New York Theta '87,* director of the school of engineering at Penn State Behrend and associate dean for industry and external relations.

The success of those students can be measured in several ways. But one number stands out, both for new students and alumni across the world: More than 95 percent of the students in the school of engineering at Penn State Behrend are employed in their field within a year of graduation.

Photos by Wayne Hollendonner

The College of New Jersey

A PRIMARILY UNDERGRADUATE institution, The College of New Jersey (TCNJ) is a selective, comprehensive public institution that has earned national recognition for its commitment to excellence. Founded in 1855, the home of New Jersey Zeta has worked to be an exemplar of the best in public higher education and is acknowledged as one of the top comprehensive colleges in the nation. Set on 289 tree-lined acres in Ewing Township, it currently is ranked in the 75 "Most Competitive" schools of the nation by *Barron's Profiles of American Colleges* and is rated the No. 1 public institution in the northern region of the country by *U.S. News & World Report*. The college was named the No. 10 value in public higher education by *The Princeton Review*.

A strong liberal arts core enhances TCNJ's professional degrees and forms the foundation for a wealth of degree programs offered through its seven schools—arts and communication; business; humanities and social sciences; education; science; nursing, health and exercise science; and engineering.

Study Abroad

It offers an honors program and extensive opportunities to study abroad. The award-winning First-Year Experience and freshman orientation programs have helped make its retention and graduation rates among the highest in the country. The college has approximately 6300 undergraduate students.

The engineering programs are relatively young with the first engineering degree offered in 1993, but

they can trace their roots back to technical drawing classes for teachers in the mid–19th century when the college was called The New Jersey State Normal School. In fact, the school of engineering continues the tradition of teacher preparation, offering three education degrees, including an innovative integrative science, technology, engineering, and math education (i-STEM Education) degree. Together with four engineering departments offering six degree programs, the school spans the engineering education pipeline K-16+.

The programs have seen vibrant growth over the past decade as additional degrees have been added. The school now offers degrees in biomedical, civil, computer, electrical and mechanical engineering, as well as an engineering science degree with a concentration in management. It is home for about 550 undergraduate students who are actively engaged across the campus in the arts, music, athletics, and many more extracurricular activities.

TCNJ engineering students have a strong tradition of entering national and regional design competitions. They have recently competed in IEEE's Solar Splash and MicroMouse competitions, SAE's Mini Baja and Aero Design contests, ASCE's Steel Bridge and Concrete Canoe competitions, Electrathon America Vehicle Design competition, and ASME's Human Powered Vehicle Challenge. TCNJ also placed first at the recent ASME national student design competition: *H2Go: The Untapped Energy Source.*

Research Opportunities

Beyond traditional design competitions, students present their work at a variety of technical conferences each year including the annual fall meeting of the Biomedical Engineering Society, The Northeast Bioengineering Conference, Orthopedic Research Society conference, the ASME International Mechanical Engineering Congress and Exposition, the International Microwave Symposium, and the IEEE-Robotics and Automation Society International Conference on Humanoid Robotics.

Undergraduate research opportunities are spread across TCNJ. Whether it is through the Mentored Undergraduate Summer Experience (MUSE), or a senior design project, or simply working with a faculty member, students achieve in their research activities, winning prizes and recognition for innovative designs and research, and co-authoring publications.

Students and faculty take deep pride in the profession. The college requires that all engineering students take the F.E. exam prior to graduation, setting them on a path toward professional licensure. The exam performance achieved pass rates averaging above 80% in recent years; TCNJ engineers achieved an 88% pass rate for the April 2012 exam. Also, each spring prior to graduation, all engineering students are inducted into the Order of the Engineer, giving a culminating emphasis of the importance of the profession as they go out into the workforce or on to graduate or professional studies.

The school hosts many student chapters of professional engineering organizations with all clubs actively engaged in the profession, the community, the school and college. They believe Tau Beta Pi is a wonderful addition.

The future of the school of engineering is very bright, and it is well on the way to becoming more nationally known for producing excellent engineers working for the betterment of mankind through responsible technological advances.

This article was prepared by Manish Paliwal, Ph.D., *NJ Δ '03,* Chief Advisor to NJ *Z* and associate professor of mechanical engineering, The College of New Jersey, and Steven Schreiner, Ph.D., P.E., MA *I* '86, Advisor to NJ *Z* and dean of the school of engineering.

Saint Louis University

Saint Louis University is a Catholic, Jesuit institution that values academic excellence, life-changing research, compassionate health care, and a strong commitment to faith and service. Founded in 1818, the university fosters the intellectual and character development of nearly 14,000 students on campuses in St. Louis, MO, and Madrid, Spain. Building on a legacy of nearly 200 years, SLU continues to move forward with an unwavering commitment to a higher purpose and greater good.

Today, it boasts ten colleges, including Parks College of Engineering, Aviation and Technology. Parks College was founded in 1927 by Oliver "Lafe" Parks as a school for training pilots. At that time, located in Cahokia, IL, Parks was the first federally approved school of aeronautics, receiving Air Agency Certificate #1. In 1934, Parks College began offering an aeronautical engineering program in addition to the aviation program. During the World War II era, the college and its subsidiaries were responsible for training one of every 10 Army Air Corps pilots, plus thousands of aircraft mechanics.

After the war, Oliver Parks realized that future aviation leaders would need a more well-rounded education, and the way forward was to seek affiliation with a major university. In 1946, he donated Parks College to Saint Louis University. During the 1950s, it maintained its reputation as a leader. In fact, it was dubbed the "Harvard of the air." In 1977, the bachelor's program in aerospace engineering received its premier accreditation from ABET.

The 1980s saw a new electrical engineering program begin in 1987 and receive ABET accreditation in 1989.To broaden its educational offerings, Parks College started a program in mechanical engineering in 1995. This was ABET accredited in 1997. The decline in enrollment in this period also led the administration to move Parks College to the university's main Frost campus in Midtown St. Louis. This allowed all students the benefits of living and learning together on one campus.

Through a generous $4 million donation from the McDonnell Douglas Foundation, Parks moved to the main campus in time for the fall semester in 1997 to McDonnell Douglas Hall. The physical integration also brought integration of thought. With the proximity of Saint Louis University's

medical school and the growing interest in the field of biomedical engineering, Parks created a new degree program in biomedical engineering in 1997 and this was ABET accredited in 2001. The biomedical program grew rapidly, and quickly required additional space. Therefore, SLU invested in a building across the street, fitting it for four additional teaching labs and six additional research labs.

Since 2006, SLU's Parks College has continued to grow and has introduced two additional programs in engineering physics and civil engineering. In fact, civil engineering graduated its first class in May 2013. In 2010, Parks also began offering graduate-level programs both at the masters and doctoral levels.

Today, Parks College continues its worldwide reputation for exemplary aviation and engineering programs through a variety of undergraduate and graduate disciplines.

Hands-on Learning

The college is recognized for its focus on hands-on learning both in formal lab courses and in student groups that compete at local, regional and national levels. These contests and research opportunities are often through the many professional organizations in which Parks students choose to participate, such as the Biomedical Engineering Society, the Institute of Electrical and Electronics Engineers, the American Society of Mechanical Engineers, American Institute of Aeronautics and Astronautics, American Society of Civil Engineers, and the Society of Women Engineers.

Parks College students are actively engaged with both industry and academia. They have the opportunity to participate in a variety of co-ops, internships, volunteerism, and part-time jobs. The college hosts a summer research experience (SURE) program for 15 students who work with faculty on cutting edge research projects. Parks undergraduates have been highly successful in contributing to research and many have presentedwork at national conferences.

The motto of Parks College—"where leaders are formed"—continues with its graduates shining as leaders.They include Gene Kranz (mission controller, *Apollo 13*), Kelly Beck (flight director, *STS 117* mission), William Carrier and Keith Leverkuhn (vice presidents at The Boeing Company).

PHOTOS: Lower left: Students engaging in research in the space systems research laboratory. Above: Civil engineering students working in the concrete and materials laboratory. Below:: A view of McDonnell Douglas Hall.

This article is by courtesy of Parks College of Engineering, Aviation and Technology. Collage picture: Nikole Frietsch, Graphic designer, SLU. Other photographs courtesy of St. Louis University

CHAPTER ETERNAL

The condensed style of these notices of death is made necessary by Tau Beta Pi's large membership and space limitations in The Bent. *You may email or write the Editor for further facts concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Association members, with appropriate details.*

AL B '38 **Masters, R. Wayne;** no details.
'48 **Patton Jr., Edmond L.;** March 19, 2010.
AR A '52 **Thomas Jr., Elijah L.;** October 4, 2012.
AZ A '54 **Collins, Claro V.;** no details.
AZ B '49 **Ordway, William A.;** April 11, 2012.
CA A '58 **Zaft Jr., Alfred G.;** March 23, 2013.
'74 **Gardner, Norman G.;** April 30, 2001.
CA B '45 **Bade, William G.;** August 10, 2012.
CA Γ '47 **Cutting, Charles L.;** February 5, 2013.
CA E '50 **Simpson, Sherwood L.;** February 26, 2013.
CA Ξ '82 **Schlotte, James F.;** February 5, 2007.
CO B '42 **Gilbert, Everett;** February 2, 2013.
'55 **Hirtle, Thomas W.;** March 1, 2013.
CO Γ '54 **Arras, Heino;** February 18, 2013.
CO Δ '58 **Winn, C. Byron;** October 2012.
CT A '49 **Lockery, Harry E.;** June 19, 2012.
CT B '56 **Cameron, Donald W.;** October 27, 2008.
'73 **Schmitz, Lizabeth M.;** December 24, 2012.
'85 **Leonard, John A.;** October 20, 2012.
DC A '41 **Jones Jr., Elmer D.;** January 1, 2013.
DC Γ '62 **Natof, Stuart L.;** no details.
FL Γ '75 **Sanchez, Phillip L.;** November 12, 2001.
'83 **Colvin, Randy L.;** January 6, 2010.
GA A '34 **Honnell, Martial A.;** no details.
'46 **Newell Jr., Oswald;** April 1, 2013.
IL A '37 **Skinner, Harry E.;** June 8, 2007.
'37 **Snyder, John A.;** August 8, 2000.
'44 **Beckett, Royce E.;** July 10, 2012.
'51 **Wright, Theodore O.;** March 16, 2008.
IL B '50 **Neiditch, Julian;** September 25, 2012.
'52 **Lang, James John;** July 21, 2012.
'64 **Goldstein, Charles D.;** March 17, 2013.
IL Γ '40 **Brown, George M.;** December 19, 2012.
'46 **Petersen Sr., Conrad W.;** February 14, 2013.
IL Δ '66 **Seckler, James G.;** October 5, 2011.
'73 **Bilgutay, Nihat M.;** no details.
IN A '38 **Stevens, Robert F.;** February 20, 2008.
'38 **Waling, Joseph L.;** December 10, 1996.
'42 **Booher, Richard E.;** November 26, 2011.
'42 **Byer, Arley Wilson;** August 1, 2011.
'45 **Keebler, James C.;** March 15, 2013.
'48 **Mannfeld, Robert L.;** February 4, 2013.
'50 **Wark Jr., Kenneth;** March 3, 2013.
'53 **Jefferson, Thomas B.;** August 25, 2012.
'55 **Cooper, Arnold C.;** no details.
'59 **Ritchey, James F.;** January 28, 2013.
IN B '57 **Derry, John H.;** July 6, 2012.
IA A '43 **Boerner, A. Richard;** June 19, 2012.
'43 **Jepson, Carl H.;** March 21, 2013.
'47 **Johnson Jr., Aldie E.;** no details.
'57 **Struss, Roland G.;** August 17, 2012.
'58 **Conley, Bobby E.;** October 1, 2007.
KS A '38 **Wienecke, Emil A.;** July 1, 2008.
'42 **Carson, William D.;** March 2012.
'45 **Black, Charles T.;** January 22, 2013.
'45 **Hoefer, William G.;** March 4, 2013.
'48 **Wagner, Raymond T.;** January 7, 2013.
'50 **Coe, Clyde L.;** February 12, 2013.
'57 **Chimenti, Edward T.;** March 4, 2012.
'85 **Wells, Douglas L.;** March 19, 2013.
KY A '63 **Payne, Marshall L.;** January 30, 2013.
KY B '39 **Tepe, John B.;** July 26, 2011.
'49 **Seelbach, Louis;** no details.
LA A '36 **Fush, Walter H.;** 2013.
'43 **Bujol, Robert J.;** February 16, 2011.
LA Γ '40 **Johnson Jr., Milton R.;** July 27, 2012.
ME A '27 **Guilfoyle, Patrick J.;** no details.
'33 **Wilson, John F.;** June 30, 2002.
'40 **Gross, Stephen K.;** February 1, 2013.
'50 **Meserve, Albert R.;** June 2012.
'52 **Chapman, Ben R.;** March 12, 2013.
'62 **Whitney, Allison I.;** March 10, 2007.
'65 **Garfield, Henry G.;** November 9, 2012.
MD B '40 **Beckmann, Robert B.;** December 7, 2001.
'47 **Crom, Theodore R.;** January 18, 2008.
'48 **Hello, Bastian;** February 2011.
MD E '11 **Green, Dayvon M.;** February 12, 2013.
MA A '38 **Burg, Frederick J.;** January 9, 2013.
MA B '38 **Sullivan, Paul J.;** February 14, 2007.
'40 **Penn, Franklin E.;** December 15, 2012.
'48 **Macht, Philip R.;** November 14, 2011.
'50 **Brown, Barton;** August 4, 1995.
'53 **Hall, Eugene R.;** December 18, 2001.
MA Δ '37 **Stewart, Richard W.;** September 8, 2011.
MA E '51 **Zmuda, Eugene J.;** no details.
MI A '50 **Schmidt, Alexander H.;** March 17, 2013.
'81 **Forsell, Lynn J.;** no details.
'82 **Hoshal, Scott Alan;** no details.
MI B '34 **Lippert, William L.;** November 14, 2003.
'34 **Westwater Sr., James;** March 3, 2013. [Centenarian 90]
'43 **Potoroka, Walter;** November 29, 2012.
'52 **Klatt, James M.;** April 4, 2012.
'55 **Chiang, Edward C.;** September 18, 2009.
MI Γ '33 **Haefele, Donald James;** no details.
'35 **Batten, Frederick W.;** no details.
'38 **Oliver, John;** September 27, 2010.
'49 **Buning, Harm;** no details.
'60 **Hoopes, Charles C.;** no details.
'64 **Krumpen Jr., Robert P.;** September 28, 2011.
MI Δ '47 **Krause, Robert Paul;** no details.
'75 **Bertsch, John E.;** no details.
MI E '38 **Wyckoff, Paul W.;** no details.
MN A '44 **Anderson, Walter L.;** January 10, 2013.
MS A '54 **Wall, Lloyd D.;** December 14, 2012.
MO A '50 **Moffett, Harlan G.;** March 8, 2013.
MO B '48 **Keeley, Gilbert S.;** February 17, 2013.
'51 **Kolb, Eugene F.;** April 12, 2013.
'60 **Justus, Jimmie J.;** September 22, 2012.
MO Γ '44 **Ryckman, Devere W.;** no details.
NE A '49 **Ekstrand, James G.;** January 10, 2013.
NJ A '38 **Fuller, William R.;** no details.
'38 **Wolff, Paul A.;** September 16, 2008.

'44 **Petschek, Charles I.;** January 7, 2013.
'44 **Runyon, John P.;** February 16, 2013.
NJ B '49 **Wingerter, Donald B.;** January 21, 2013.
'50 **Isak Sr., Conrad John;** April 10, 2013.
'69 **Curran, Patrick M.;** October 27, 2012.
NJ Γ '37 **Kleinman, Joseph M.;** no details.
'39 **Nycz, Joseph C.;** May 2, 2012.
'47 **Pravda, Milton F.;** February 29, 2012.
'50 **Lawit, Robert L.;** January 9, 2013.
'65 **Salem, Andrew G.;** January 31, 2013.
NJ Δ '39 **Gebhard Jr., Peter T.E.;** August 28, 2012.
NYA '33 **Queneau, Paul E.;** March 31, 2012. [Centenarian 84]
NYB '43 **McCormick, Paul Y.;** 2013.
'50 **Bartlett, Edward E.;** March 22, 2007.
'84 **Brown, Willis A.;** November 2012.
NYΓ '44 **Kitzen, Maurice R.;** no details.
'49 **Dehnkamp, Gilbert C.;** January 27, 2013.
'51 **Fulton, John W.;** October 19, 2012.
'52 **Curtiss Jr., Howard C.;** September 20, 2012.
'57 **Abel, Jacob M.;** March 8, 1996.
'57 **Varner Jr., Andrew B.;** December 4, 2012.
'60 **Raymond, William J.;** December 26, 2012.
NYΔ '49 **Peek Jr., Charles A.;** February 19, 2013.
'53 **Boehringer, John R.;** March 5, 2013.
'77 **Alliet, Christopher A.;** July 24, 1999.
'77 **Schappell, Stephen J.;** December 10, 1994.
'89 **Peters, Lance Edward;** no details.
NYE '53 **Boyhan, John W.;** August 31, 2012.
'55 **Stoloff, Norman S.;** February 21, 2013.
'56 **Fein, Arthur;** June 13, 2009.
'56 **Meltz, Gerald;** June 9, 2010.
NYH '50 **Brewster, Harold M.;** January 31, 2013.
'64 **Hoet, Peter J.;** no details.
NYΘ '51 **Bates, Arthur R.;** July 20, 2012.
'93 **Rivet, William A.;** August 23, 2012.
NYK '37 **Givens, Miles P.;** January 11, 2013.
NYΛ '49 **Pikulik, Alexander;** July 2012.
NYM '46 **Feigenbaum, Donald S.;** March 5, 2013.
'53 **Haag, Fred George;** April 18, 2013.
NYΞ '38 **Wagner, Francis V.;** April 15, 2009.
NYΠ '80 **Newhouse, Mark A.;** September 11, 2012.
NCA '51 **McKeel Jr., James T.;** January 29, 2013.
'60 **Gregg, Roger Allen;** April 6, 2013.
NCΓ '43 **Hatley, Marvin T.;** February 27, 2013.
'49 **Keith Jr., Hudie C.;** December 6, 2012.
'66 **Wilkes, Kenneth E.;** March 13, 2013.
NCE '73 **Whitsett, Reginald C.;** no details.
OHA '44 **Friedman, Robert G.;** March 18, 2013.
OHB '38 **Van Valkenburgh, Hugh;** October 24, 2009.
OHΓ '38 **Warren, Claude E.;** January 10, 2009.
'38 **Wolfe, Robert G.;** November 6, 2000.
'40 **Fodor Jr., Paul A.;** March 16, 2009.
'40 **Jacoby, Henry J.;** September 15, 2004.
'40 **White, Don H.;** no details.
OHE '58 **Hancock, John;** October 7, 2011.
OKA '47 **Reedy, Jesse H.;** October 5, 2007.
'48 **Triffet, Terry;** no details.
OKB '57 **Melton, M. Shannon;** January 23, 2011.
OKΓ '50 **Cooper, George T.;** October 20, 2012.
ORA '38 **Landwehr, Lloyd M.;** November 3, 2000.
'50 **Beals, Ethan L.;** January 29, 2013.
PA A '34 **Fortmann Jr., Bernhard G.;** June 4, 2012.
'44 **Hittinger, William C.;** March 17, 2013.
'56 **Veinott Jr., Arthur F.;** December 12, 2012.
PA B '38 **Villforth Jr., Fred J.;** August 15, 2010.
'43 **Markel, Richard F.;** July 7, 2012.
'47 **Schneider, Gordon B.;** no details.
'52 **Makofski, Robert A.;** December 25, 2012.
'60 **Paul, Frank W.;** April 2, 2013.
PA Γ '39 **Harvey, Edward D.;** no details.
'43 **Lambing, Charles S.;** June 18, 2000.
'50 **Shaffer, Douglas H.;** January 5, 2013.
PA Δ '59 **Graham, William R.;** July 15, 2009.
'61 **Kapps, Charles A.;** February 10, 2013.
PA E '38 **Maxfield, Edwin D.;** October 17, 2002.
'44 **Brauburger Sr., Robert A.;** December 1, 2010.
'72 **Delong, Frederick C.;** March 14, 2013.
PA Z '38 **Shaw, Milton C.;** September 7, 2006.
PA H '51 **Snyder Jr., Joseph H.;** December 12, 2011.
RI B '38 **Woodbury, Harry G.;** March 24, 1997.
'65 **Lazar, Robert S.;** November 24, 2012.
'75 **Niles Jr., Harry A.;** August 14, 2012.
SC A '35 **Allison, Arthur W.;** March 17, 2013. [Centenarian 92]
'42 **Ballard, Henry G.;** no details.
'50 **Long, Cephus W.;** March 1, 2013.
SC Γ '45 **Brill, Yvonne C.;** March 27, 2013.
SD A '34 **Belzer II, Emiel E.;** March 13, 2013. [Centenarian 89]
TNA '36 **Brackney, Howard W.;** no details.
'43 **Bender, Myer;** March 25, 2013.
'48 **Whatley, Marvin E.;** January 30, 2013.
'54 **Evans, Lewis;** December 31, 2012.
TNB '50 **Womack, Joseph;** December 1, 2012.
TNΓ '58 **Hejazi, Hasan A.;** May 12, 2009.
TNE '51 **Schellhardt, Richard H.;** July 21, 2012.
TXA '38 **Fisher, Gordon H.;** no details.
'38 **Walker, Charles A.;** April 12, 2000.
'41 **Lipstate Jr., Philip H.;** April 4, 2013.
'48 **Morris Jr., Troy B.;** February 20, 2013.
'49 **West, James M.;** January 25, 2013.
'50 **Joseph, Joe G.;** October 23, 2012.
'50 **Platz, James B.;** March 15, 2013.
'57 **Cry, George W.;** April 15, 2013.
'69 **Glasscock, Maynard S.;** March 7, 2013.
TXB '62 **Smith, Jimmy H.;** June 11, 2012.
TXΓ '43 **Walker, James B.;** April 9, 2013.
TXΔ '34 **Herzik Jr., Gus R.;** March 4, 2013.
'37 **Calhoun Jr., John C.;** November 29, 2012.
'48 **Herndon, Daniel C.;** no details.
'49 **Behrens, Hugh C.;** February 2010.
'50 **Miller, Clifford A.;** December 22, 2012.
UTA '40 **Ogilvie Sr., Kendal M.;** June 9, 2012.
'40 **Wall, Ernest F.;** February 13, 2013.
VTA '38 **Tuthill, Arthur F.;** June 20, 2010.
VAA '33 **Williams, John R.;** April 27, 2012.
VAB '47 **Sharp, Benjamin T.;** February 1, 2013.
'50 **Hierholzer, Frank J.;** July 17, 2012.
'54 **McCoy, Richard L.;** March 25, 2013.
'56 **Callaway, Eugene D.;** December 3, 2011.
WAA '49 **Braman Jr., James D.;** May 9, 2009.
WAB '38 **Weiner, Lewis;** no details.
WIA '37 **Vater, Gerhard A.;** March 15, 2002.
'54 **Rabe, Allen E.;** March 16, 2013.
WIB '50 **Glowienka, Clement B.;** February 17, 2013.
'50 **Kane, Padraic F.;** March 19, 2011.
'51 **Straka Sr., Richard B.;** August 6, 2012.

SPOTLIGHT

Online Courses
The University of California's top two faculty leaders have criticized legislation to allow students bumped from overcrowded core courses at state schools to instead take online courses from other colleges or private companies, reports *The Los Angeles Times*.

Robert L. Powell, Ph.D., *California Lambda '72*, and William Jacob, chairman and vice chairman of the UC system's faculty senate, wrote to colleagues: "The clear self-interest of for-profit corporations in promoting the privatization of public higher education through this legislation is dismaying."

The *Times* added, "Powell, a chemical engineering professor at UC Davis, and Jacob, a mathematics professor at UC Santa Barbara, rejected that plan as an assault on the power of UC's academic senate to determine whether transfer courses cover the right material with the same rigor as UC courses do."

•*The Chronicle of Higher Education* asked: "How can a nonprofit organization that gives away courses bring in enough revenue to at least cover its costs?"

According to Anant Agarwal, president of edX, the organization "offers its university affiliates a choice of two partnership models. Both models give universities the opportunity to make money from their edX MOOCs—but only after edX gets paid."

The first "essentially allows a participating university to use edX's platform as a free learning-management system for a course on the condition that part of any revenue generated by the course flow to edX." The second "casts the organization in the role of consultant and design partner, offering 'production assistance' to universities for their MOOCs."

Grads In Demand
Demand for technical talent remains high, and this has been positive for new engineering graduates.

Six majors are among the top 10 with the highest average starting salaries, said a National Association of Colleges and Employers report.

Top Paying Majors for New College Graduates in 2012:

Computer Engineering	$70,400
Chemical Engineering	$66,400
Computer Science	$64,400
Aerospace Engineering	$64,000
Mechanical Engineering	$62,900
Electrical Engineering	$62,300
Civil Engineering	$57,600
Finance	$57,300
Construction	$56,600
Information Sciences/Systems	$56,100

Faculty Salaries
ASEE collected salary data from 139 public and private engineering institutions for the 2011-2012 academic year. These top nine average salaries for tenured/tenure-track faculty are based on a nine-month equivalent and do not include administrative supplements.

Departments	Assistant	Associate	Full
Biomedical	$86,024	$101,475	$147,207
Metallurgical & Materials	$86,722	$98,912	$145,077
Computer Science (in engineering)	$89,261	$101,267	$137,533
Petroleum	$84,972	$106,048	$134,337
Chemical	$84,799	$96,237	$136,856
Engineering Science/Physics	$88,193	$100,496	$133,296
Aerospace	$82,443	$98,314	$136,500
Nuclear	$85,871	$101,383	$133,766
Electrical & Computer	$85,678	$96,742	$129,595

Future Experience
The bulk of the gas and oil industry's senior engineers are retiring or nearing retirement, leaving its future in the hands of the less experienced, reports *The Houston Chronicle*.

International Alliance Group manager of contractor services Jake Randall said, "There is a significant gap in the level of experience for engineers." This gap in mid-level engineers is blamed on the 1980s collapse of gas and oil prices that sent junior engineers elsewhere.

PEOPLE

Jean-Lou A. Chameau, Ph.D., *Georgia Alpha '77*, who has served since 2006 as president of the California Institute of Technology, has been appointed as president of Saudi Arabia's King Abdullah University of Science and Technology. KAUST was founded as a graduate research university in 2007, with the goal of advancing the oil-rich kingdom in the global world of science.

Robert L. Clark Jr., Ph.D., *Virginia Beta '87*, has been named senior vice president for research at the University of Rochester, and has been appointed to a second, five-year term as dean of the school of engineering and applied sciences. He had been serving as a vice president in an interim role. Clark joined Rochester in 2008 from Duke University.

James C. Conwell, Ph.D., P.E., *Tennessee Alpha '83*, has become president of The Rose-Hulman Institute of Technology. He most recently served as vice president of Jacobs Engineering Group, a

major provider of engineering and technical services. Conwell earlier taught undergraduate engineering at Vanderbilt University, Louisiana State University, and Grove City College.

Michael B. Bragg, Ph.D., *Illinois Alpha '76,* professor and interim dean of the college of engineering at the University of Illinois at Urbana-Champaign, has been named as engineering dean of the University of Washington. An aeronautical engineer by training, Bragg's primary area of research is aircraft icing where he is an international expert.

Michael S. Branicky, Sc.D., P.E., *Ohio Alpha '87,* is the new engineering dean at The University of Kansas. He was a professor and chair in the department of electrical engineering and computer science at Case Western Reserve University. Branicky is a past program manager at the National Science Foundation and served more recently as an external expert to NSF for the National Robotics Initiative.

FACILITIES

University of Pittsburgh has announced an agreement with Sichuan University in China to start a joint engineering program for undergraduate students and research.

Faculty from the two schools will staff the Sichuan University Pittsburgh Institute, in Sichuan, which expects to enroll its first 100 students in the Fall of 2014. The Chinese college will invest nearly $40 million in a building for the institute.

Within seven years of launch, Pittsburgh expects the institute will reach its maximum enrollment of 1,600. Students will take their first two years of courses at Sichuan learning Pittsburgh curriculum. They will then have the option of transferring to the Oakland campus. The institute will offer degrees in industrial engineering, mechanical engineering and materials science and engineering.

"This partnership will enable students to be much better prepared for practicing their profession globally," said engineering dean **Gerald D. Holder,** Ph.D., *Pennsylvania Lambda '73.* "The large number of American companies that do work in China or sell products there will benefit from the intercultural education that the joint institute provides."

University of Illinois' college of engineering is receiving a $100 million gift, reports the *Chicago Sun-Times.* The gift is the largest the engineering school has ever received and comes from the Grainger Foundation, a private foundation and a longtime supporter of the university.

The *Chicago Tribune* added: "The latest gift will provide scholarships to hundreds of engineering students a year, ranging from a few thousand dollars to full tuition scholarships. Undergraduate tuition to the engineering school is more than $16,000 a year."

The gift also will help the university lure the best engineering faculty from around the world as it looks to hire 130 to 150 new faculty members in the next five years. About $40 million will fund endowed chairs and professors.

Bioengineering and 'big data' are two areas targeted to receive significant resources for new faculty positions and research support.

University of Pennsylvania electrical and systems engineering seniors saw a hole in their department's curriculum. So, they designed a course to fill it. The *Daily Pennsylvanian* reports that for the past few years, ESE freshmen could not take an introductory course about their major until their second semester.

Last spring, a small group of juniors and seniors in the department designed a syllabus for an introductory ESE course for first semester freshmen. The resulting course was *Electrical and Systems Engineering 111—Atoms, Bits and Information: Introduction to Electrical and Systems Engineering.*

"We didn't have anything right off the bat [to show] what electrical and systems engineering is to get people excited about the discipline. That was something we felt was missing in the curriculum," said **Nicholas J. Howarth,** *Pennsylvania Delta '13,* an engineering senior and the lead coordinator of the course. Howarth was part of the small grassroots movement of juniors and seniors who designed an initial syllabus and pitched it to the department.

Harvard University plans to move a 'substantial majority' of its school of engineering and applied sciences from the main campus in Cambridge to its expanding campus in Allston, said university president Drew G. Faust.

University officials said the school would relocate to the planned science center complex, which is expected to be completed by 2017. Work on the massive building was put on hold about three years ago, but the university plans to resume construction there next year.

Harvard owns about 350 acres in Allston. The sciences building is planned for between 500,000 and 600,000 square feet, and will include laboratories, research facilities and classrooms.

Brain Ticklers

RESULTS FROM WINTER

Perfect

*Bohdan, Timothy E.	IN	Γ	'85
*Gerken, Gary M.	CA	H	'11
*Schmidt, V. Hugo	WA	B	'51
Slegel, Timothy J.	PA	A	'80
* Strong, Michael D.	PA	A	'84
* Voellinger, Edward J.	Non-member		

Other

Alexander, Jay A.	IL	Γ	'86
Aron, Gert	IA	B	'58
Bertrand, Richard M.	WI	B	'73
*Couillard, J. Gregory	IL	A	'89
Egenriether, Brian J.	SC	Γ	'10
* Griggs Jr., James L.	OH	A	'56
Handley, Vernon K.	GA	A	'86
Jones, Donlan F.	CA	Z	'52
Jones, John F.	WI	A	'59
Lalinsky, Mark A.	MI	Γ	'77
Marks, Lawrence B.	NY	I	'81
Marks, Noah H.	PA	K	'11
Marks, Benjamin	Son of member		
* Prince, Lawrence R.	CT	B	'91
Quintana, Juan S.	OH	Θ	'62
Rentz, Peter E.	IN	A	'55
Richards, John R.	NJ	B	'76
* Spong, Robert N.	UT	A	'58
* Stribling, Jeffrey R.	CA	A	'92
Summerfield, Steven L.	MO	Γ	'85
Sutor, David C.	Son of member		
* Thaller, David B.	MA	B	'93
Vinoski, Stephen B.	TN	Δ	'85

* Denotes correct bonus solution

WINTER REVIEW

Problems No. 2 (soap bubbles) and No. 3 (three coins) were the most missed regular problems. For problem No. 4, we gave credit for the answer: The number of odd divisors including N but excluding 1.

Our solution to problem No. 3 of (1, 5, 22) is optimum if change is made from the largest coin first, then the middle denomination, and then the smallest (makes life easiest for the store clerk). However, as several readers pointed out, if one allows for the possibility of mixed combinations of the two largest coins to reduce the number of pennies needed, one gets (1, 12, 19) which has a smaller average. We accepted either answer.

SPRING SOLUTIONS

Readers' entries for the Spring problems will be acknowledged in the Fall BENT. Meanwhile, here are the answers:

1 Ten lights are lit. A light changes status for each divisor of its number. If the number of divisors is odd, the light will be lit, if even, it will be off. The equation for the number of divisors of $N = p_1^a p_2^b \ldots p_n^m$ is $(1+a)(1+b)\ldots(1+m)$. This will be odd only if $a, b, \ldots$, m are even, that is, if N is a square. Therefore, only lights 1, 4, 9, 16, 25, 36, 49, 64, 81 and 100 will be lit.

2 The correct order is **DAEFCB.** There are C(6, 2) = 15 different two-letter combinations, and thus 15 questions, where $C(n, m)$ is the combinations of n objects taken m at a time. Consider the questions in the order: A<B, A<C, A<D, A<E, A<F, B<C, B<D, B<E, B<F, C<D, C<E, C<F, D<E, D<F, E<F, where < means "comes before," reading from left to right. Then, the seven students gave the following answers:

Name	Guess	Answers
Greg	BCDAEF	NNNYY-YYYY-YYY-YY-Y
Hal	DAEFBC	YYNYY-YNNN-NNN-YY-Y
Ivan	ABEFDC	YYYYY-YYYY-NNN-NN-Y
Jill	BCFDEA	NNNNN-YYYY-YYY-YN-N
Kate	AEBDFC	YYYYY-YYNY-NNN-NY-Y
Lila	CFEABD	YNYNN-NYNN-YYY-NN-N
Mel	DCAEFB	YNNYY-NNNN-NYY-YY-Y

Since each student got a different non-zero even number correct, their scores must have been 2, 4, 6, 8, 10, 12, and 14. Examining the table carefully, we see that Hal and Jill agree on only three questions, so one of them must have 2 correct and the other 14 correct, which means that one of their guesses is within one transposition of being correct. Assume it is Hal's, and try switching B and C to get DAEFCB which gives YYNYY-NNNN-NNN-YY-Y. Comparing this to the results in the table, we get for the number of matches: G-6, H-14, I-8, J-2, K-10, L-4, M-12. If you try other combinations, you will find that none give the specified breakdown of correct answers.

3 The probability that a twelve-wafer roll will have at least one wafer of each of the eight flavors is **0.09331**. The number of different 12-wafer rolls is 8^{12} = 68,719,476,736; in general, the number of rolls with n flavors missing is $C(8, 8\text{-}n)(8\text{-}n)^{12}$, so we have:

No. missing flavors	Possibilities
1	110,730,297,608
2	60,949,905,408
3	13,671,875,000
4	1,174,405,120
5	29,760,696
6	114,688
7	8

The probability that at least 1 flavor is missing is:
$P = (1/8^{12})\sum_{n=1}^{7}(-1)^{n+1}C(8, 8\text{-}n)(8\text{-}n)^{12}$
=62,307,508,096 / 68,719,476,736 = 0.90669, and the probability that all 8 flavors are present is 1-P = 0.09331.

4 There are **35,890** different paths from A to S. Consider cell S, and let T_i be the total number of paths from A to i. Now, there are two ways to reach S: through Q and through R, so the total number of paths from A to S includes $T_Q + T_R$, but this is not all the paths from A to S, because it does not include any paths with an R-Q step. However, a little thought will show that each path from A to P leads to a path to S by appending -R-Q-S. Thus, the total number of paths from A to S is $T_S = T_R + T_Q + T_P$, or in general, $T_{i+1} = T_i + T_{i-1} + T_{i-2}$. Starting with $T_A = 1$, $T_B = 1$, and $T_C = 2$, we get $T_D = 4$, $T_E = 7$, $T_F = 13$, …, $T_S = 35{,}890$. Alternatively, you can solve for systems of 1, 2, 3, 4, 5, etc. cells by inspection, and the above pattern will quickly reveal itself.

5 The three digits are **1, 7,** and **8**. There are C(9, 3) = 84 possible choices of three different non-zero digits, not too many to list. Any three-digit integer divisible by the product of two small primes or a small square is not a semiprime. Using certain well-known relationships, we can quickly eliminate by inspection most possibilities. If the last two digits of a number are divisible by 4, the number is also; thus, any choice that contains two digits that form a number divisible by 4 can be eliminated [45 cases]. If the sum of the

digits is divisible by 9, so is the number [5 cases]. Any choice that includes 5 and 2 or 7 has a permutation divisible by 25 [6 cases]. Any choice that has a digit sum divisible by 3 and an even digit will have a permutation divisible by 6 [6 cases], and a digit sum divisible by 3 plus a 5 has a permutation divisible by 15 [1 case]. Finally, using a factor table, one can quickly eliminate 19 more cases because one permutation is prime. This leaves only two possibilities—(1, 5, 8) and (1, 7, 8). The first of these is eliminated because 518 =2×7×37, so the answer is (1, 7, 8). The six semiprimes are: 178 = 2×89; 187 = 11×17; 718 = 2×359; 781 = 11×71; 817 = 19×93; and 871 = 13×67.

Bonus Al's age is **49**, and he guessed Beth's age as 50; Carl's age is **47**, and he guessed Beth's age as 48; Dawn's age is **78**; and Beth's age is **68**. The logic for this solution is as follows. A asked B, "Is your age a multiple of 17?" B must have said no. A then asked, "Is your age a multiple of 3?" Again, B must have said no. A then asked, "Is your age a prime number?" (It would make no sense for A to ask this question if B had answered yes to either or both questions 1 and 2.) B's answer could be either yes or no. A then asked, "Are you older than I am?" Again the answer could be yes or no. Finally, A asked, "Have you had your 51st birthday?" At this point, A thinks he can deduce B's age. What combination of answers to the five questions would make this possible? Consider NNNYN; then if A were 49, and B was older than A but less than 51, that would make B 50 which would be A's guess, but A is wrong. C would use the above logic to deduce A's age as 49, which is stated to be correct. C realizes that B does not always tell the truth and postulates that she alternately tells the truth and lies. Thus, her answers could be (1) FTFTF or (2) TFTFT. Consider case (1). Then, instead of the answers to the five questions being NNNYN, they should have been YNYYY, but Q1 and Q3 can't both be true, so case (2) must hold. Then, the answers should have been NYNNN. This means that B's age is not a multiple of 17, is a multiple of 3, and is not prime, and that B is younger than A and younger than 51 but older than C whose age is a prime number. The only prime number less than 51 that would let C deduce B's age is 47. If C's age is 47, then he would guess B's age as 48, but this is also wrong. Finally, we come to D. From C we deduce that two of B's answers are false, but which two? Not 2 and 4 as C assumes. Since D's age is a multiple of 13, it must be 26, 39, 52, 65, 78, or 91. Assume that the false answers are 1 and 5. Then, the correct answers are YNNYY. So B's age is a multiple of 17, not a multiple of 3, older than 51, and younger than D. B's age is then 68 or 85, and D's age is 78 or 91 or 104. But if D's age is 91 or 104, he wouldn't know if B's age was 68 or 85. Since he knows B's age, D must be 78 and B is 68.

Computer Bonus You can stay afloat indefinitely by the loop: 101→1701/3→567→7567/7→1081→10817/29→373→3737/37→101. This is only one of several possible loops. You originally have four choices: 7101, 1701, 1071, and 1017. 1701 gives the above loop: 7107/3→2367, but 2367 gives only primes for all four possibilities, so you sink. Using condensed notation(where the boldface **7**'s are the inserts), 1017 leads to: 101**7**/3→**7**339/41→179**7**/3→599**7**/3→**17**999/41→43**7**9/29→**17**51/17→**17**03/13→131**7**/3→43**7**9, which loops back to 439; 1071 also forms a loop.

NEW SUMMER PROBLEMS

1 What conclusions (about shingles, happiness, Klingon, Ph.D. candidate, mom, and mixed dominance) can be drawn from these eight premises?

1. Everyone who works in the Reliable Data Dump has shingles.
2. All hippies are unhappy.
3. No one whose mother is, or has been a shaman suffers simultaneously from shingles and mixed dominance.
4. Christopf L. Biggleswade works in the Reliable Data Dump.
5. All hippies are fluent in Klingon.
6. Christopf L. Biggleswade is a hippy.
7. Everyone fluent in Klingon is a candidate for the Ph.D. degree, or else his mother is, or has been, a shaman.
8. No one who is unhappy can be a candidate for the Ph.D.

—Professor H. Webb

2 You have an eight-pint jug full of wine and want to give exactly half to your friend. However, all you have is a three-pint jug and a five-pint jug, both empty. How do you arrive at four pints in each of the five-pint and eight-pint jugs by just pouring wine from one jug to another (in the minimum number of pours)? Show your answer as the state of each jug after each pour.

—Master Book of Mathematical Recreations by Fred Schuh

3 A, B, C and D all played each other once at soccer. Some of the figures in the table of results (in which they are not necessarily arranged in the order of points scored) are given below.

	Played	Won	Lost	Drawn	Goals For	Goals Against
A	3					5
B	3	3			4	
C	3					
D	3			1	0	3

With the additional information that the match between A and C was a draw (3-3) and that A scored more than 5 goals altogether, please fill in the table, and provide the scores of each game.

—Brain Puzzler's Delight by E.R. Emmet

4 Find 10 primes in arithmetic progression, that is find an expression of the form $a + nb$, which generates primes for values of n from 0 through 9 inclusive. We want the expression where $a + 9b$ is the smallest.

—Penguin Dictionary of Curious and Interesting Numbers by David Wells

5 Solve the following cryptic addition problem with the largest TIGER.

```
  BEAVER
+ TIGER
--------
  RABBIT
```

Usual rules: Base ten, no leading zeros, different letters are different digits, same letter is same digit throughout.

—150 Puzzles in Crypt-Arithmetic by Maxey Brooke

BONUS There are three pegs located on the circumference of a circle: peg A is at 12 o'clock; peg B is at 4 o'clock; and peg C is at 8 o'clock. Initially, there are N disks (all different sizes) on peg A, stacked in size from largest at the

bottom to smallest at the top. Find the minimum number of moves to transfer all of the disks to peg *B*, one at a time, never having a larger disk on top of a smaller one. Only clockwise moves (to adjacent peg) are permitted. Also, what is the minimum number of moves to transfer all the disks to peg *C* (from peg *A*) with the same rules? We want direct (not recursive) formulas. As a check, fill in the following:

N 0 1 2 3 4 5 6 7 8 9
B 0 1 5
C 0 2

where, *N* is the number of disks on the *A* peg, *B* is the number of moves to move those *N* disks to the *B* peg, and *C* is the number of moves to move those *N* disks to the *C* peg (from the *A* peg).

—Allan Gottlieb's Puzzle Corner in *Technology Review*

COMPUTER BONUS A bingo card consists of a 5 x 5 grid with numbers in each cell, except the center, which is marked FREE. The five columns are labeled B, I, N, G, and O. Column B consists of five different numbers in the range 1 through 15, column I of five different numbers from 16 through 30, N of four numbers between 31 and 45, G of five numbers between 46 and 60, and O of five numbers between 61 and 75. The caller has 75 balls, numbered 1 to 75, and randomly calls numbers (without replacement) until someone calls "Bingo." Bingo is scored by getting five numbers (or four numbers and the FREE cell) in a row, vertically, horizontally, or two main diagonals. What is the expected number of calls to get Bingo on an arbitrarily selected Bingo card?

—**H.G. McIlvried III** *PA Γ '53*

Postal mail your answers to any or all of the Brain Ticklers to **Curt Gomulinski, Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697,** or email to *BrainTicklers@tbp.org* as plain text (no HTML, no attachments). The cutoff date for entries to the Summer column is the appearance of the Fall BENT during early October. The method of solution is not necessary, unless you think it will be of interest to the judges. We also welcome any interesting new problems that may be suitable for use in the column. The Computer Bonus is not graded. Curt will forward your entries to the judges, who are: **H.G. McIlvried III** *PA Γ '53;* **D.A. Dechman,** *TX A '57*; **J.C. Rasbold**, *OH A '83;* and the columnist for this issue,

F.J. Tydeman, *CA Δ '73*

ROLL OUT THE BARREL ... WIN A T-SHIRT

Send us your witty caption for this photo from our archives, and if it is judged one of the best, you will win a TBP t-shirt. It shows Robert C. "Red" Matthews, second left, who went on to be Secretary-Treasurer, and other Illinois Alpha Class of 1902 members taking part in pre-initiation activities (my, how times have changed!) on the University of Illinois at Urbana-Champaign campus in 1901. Email entries to *tbp@tbp.org* or mail them to Headquarters by August 21.

Executive Council Meetings

(Continued from page 7)

events to have been successful and that they should be continued at the conferences in 2014.

Engineering Futures Facilitators R. Della Rovere, F.A. Leon, C.G. Gorzkowski, Czebatul, J.M. Nolan, J.R. Luchini, L.A. Matta, N.F. Gray, K. Schroeder Samuels, G.J. Morales, and R.W. Pierce were re-appointed for 2013-16, and Y.C. Chang was re-appointed for 2013-14. Wayne B. Paugh, Esq., *FL Γ'93;* Stewart R. Baskin, *FL E'13;* and Vanessa A. Scagliati, *FL Θ'09*, as of July 1, were appointed as Engineering Futures Facilitators through June 2016.

M.M. Youssef, Ph.D., *VA Γ'04*, and A.M. Richards, Ph.D., *WA B'99*, were appointed to the Advisor Recruitment and Development Committee to terms ending May 2014 and June 2015, respectively.

Councillor J.F.K. Earle reviewed a summary of the MindSET sessions conducted since August 2012 and presented an action plan to implement the teacher training component of the program. The proposal and funding were approved with a completion date of May 2014.

Councillor Pih discussed the progress of the inaugural Young Engineers Organization in New York City. The Council expressed its continued support for the group and authorized Executive Director Gomulinski to provide the requested Headquarters assistance during this pilot year of the program.

A chapter proposal for a Greater Interest in Government project grant was declined because it did not meet the guidelines. The Council accepted the explanations from three chapters that held unapproved initiations and agreed to waive the fines.

A new member benefit that provides numerous discounts and rewards was examined by the Council. Additional information about the benefit was requested, and action was tabled pending further review.

Executive Director Gomulinski presented an update on Headquarters staffing; several temporary employees and students have been hired for the spring and summer to support initiatives in digitizing Headquarters records; and the postings for the permanent full-time Major Gifts Officer and volunteer Director of Alumni Affairs were reviewed and accepted with minor adjustments.

The costs of the 2015 Convention bid were discussed, and the invitation of the MA A, Δ, and E and RI A and B Chapters to host the Convention in Providence, RI, was accepted. Plans to hold professional development sessions at the 2013 Convention in Ames, IA, were approved.

Mr. Gomulinski reviewed the status of the 2013 Alumni Giving Program; the reports from Major Gifts Officer S.D. Jennings-King were discussed; a proposal to conduct audits for 2013-15 was accepted; and a proposal to raise the initiation fee will be presented to the 2013 Convention. Several proposed changes to the Constitution and Bylaws were reviewed. The Council requested additional information be presented at the June Executive Council meeting before sending them to the Convention for review and action.

Shale Gas Recovery 101

(Continued from page 27)

ally rare but abundant here" for agriculture, freshwater resources that attract fishermen and tourism, and unfragmented wildlife habitats that boast exemplary birdwatching and trophy hunting. "Economic activity related to natural endowments like agriculture and wildlife recreation *never* goes away, while economic activity such as oil and gas *always* goes away," he cautioned (the productivity of many shale gas wells declines by three-quarters in their first one to three years). "One is a golden goose, and the other is a one-time lottery winner… [I]t would be so foolish to unwittingly destroy our golden geese to buy a one-time lottery winner, especially because we can do both if we make the right choice for ourselves and our children." He invited mayors, landowners, oil and gas engineers, government officials, conservationists, and others to collaborate in thoughtful planning of ways to guide oil and gas development to minimize unconsidered negative long-term consequences.

"When the wells are no longer producing," Cochran asked, "what choice will we have made for our grandchildren?"

Selected References

Only major references central to this print article are cited below (copy and paste the URLs for best results). More text with numbered, footnoted references appears online at *http://www.trudyebell.com/Bell_ShaleGas101FrackingFracing_BentSu13_footnoted.php*

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About the Author

Trudy E. Bell, M.A., (*t.e.bell@ieee.org , www.trudyebell.com, @trudyebell*) is senior writer for the University of California High-Performance AstroComputing Center and a contributing editor for *Sky & Telescope* magazine. A former editor for *Scientific American* and *IEEE Spectrum* magazines, she has written a dozen books and nearly 500 articles. This is her 20th feature for The Bent.

Alabama Alpha

Robert A. Malseed, '77, has been honored by the American Institute of Aeronautics and Astronautics with a 2013 sustained service award. He is an associate AIAA fellow. Malseed served in the USAF as a missile technician and a weapon system analyst, and is a retired captain. After USAF retirement, he worked as a senior systems analyst and as a network administrator.

California Gamma

Allen L. Robinson, Ph.D., '90, has become head of mechanical engineering at Carnegie Mellon University. He had held a joint appointment with that department and the department of engineering and public policy for 14 years. Robinson's research examines the technical and policy issues related to energy and the environment.

Florida Theta

Salim Nasser, '02, has reinvented the wheel for wheelchairs by making them easier to propel with a rowing motion that uses bigger muscles. The concept has been commercialized through Rowheels, a company he co-founded. Nasser is a NASA mechanical engineer who has been in a wheelchair since an auto wreck when he was 20. He is working to improve the wheels with Georgia Institute of Technology's RERC/Wheeled Mobility lab and the Shepherd Center, a hospital in Atlanta, GA, that specializes in rehabilitation of people with back and brain injuries.

Illinois Beta

Edward M. Rosen, Ph.D., P.E., '52, has received the 2013 CACHE Award from the chemical engineering division of the American Society of Engineering Education. This was for significant contributions to development of computer aids for chemical engineering education. He retired from Monsanto Co. in 1994 and served as an ABET program evaluator from 1987 to 2009. He is a fellow of AIChE.

Indiana Delta

Kevin M. Ford, Ph.D., '07, has been named as one of the ten individuals 30 years of age or younger chosen by ASCE in its program New Faces of Civil Engineering. He is a transportation and traffic engineer at the Chantilly, VA, office of CH2M HILL. While working on a Pennsylvania DOT project to improve Interstate 95, the former ΤΒΠ Fellow developed an Excel-based tool to help allocate taxpayer funds while ensuring road safety.

Louisiana Alpha

Keith A. Comeaux, Ph.D., '89, was flight director for *Curiosity's* August 2012 entry, descent, and landing on Mars, and has been inducted into the Louisiana State University Alumni Association Hall of Distinction. He joined the NASA Jet Propulsion Laboratory in 2006 and has served as verification lead, test conductor, team chief, and mission manager in the seven years he's worked on the *Curiosity* robotic rover.

Louisiana Gamma

Nicholas K. Akins, P.E., '82, is president and chief executive officer of American Electric Power, a utility with customers in 11 states. He joined AEP as an electrical engineer in 1982. While leading the generation business unit as executive vice president, Akins oversaw technological advances to address climate change and a growing demand for power.

J. Derald Morgan, Ph.D., P.E., '61, has been honored with the 50 year veteran award by the Boy Scouts of America for leadership. He has served in many capacities, including den leader, scoutmaster, United Methodist men's scouting ministries coordinator, and district commissioner.

Maryland Beta

Alvin L. Bowles, P.E., '70, retired in February after 40 years with the Maryland Department of the Environment. A program manager, Bowles' career spanned the destruction of mustard gas agent at Aberdeen Proving Ground and the containment of chromium contamination at the former Allied Chemical Plant in Baltimore, as well as the statewide prevention of childhood lead poisoning.

Maryland Gamma

Joseph C. McGowan, Ph.D., P.E. '90, is marking the first anniversary of

McGowan Associates, Inc. specializing in applications of bioengineering. MA has been active in litigation consultation with McGowan serving as an injury cases expert witness. The firm also participates in development of magnetic resonance imaging (MRI) compatibility for implantable medical devices. McGowan is an advisor to Pennslyvania Zeta.

Missouri Alpha

Gregg D. Scheller, '79, is founder and chairman of Katalyst Surgical,

LLC, which provides products for ophthalmic surgery, and Kogent Surgical, LLC, which deals with neurosurgery. Both companies are in Chesterfield, MO. Scheller previously started two medical instrument companies. One of them, Synergetics, Inc., began in his garage in 1992, merged and grew to become Synergetics USA, Inc., with more than 400 employees in 85 countries and a market capitalization of $81 million.

Michigan Gamma

Thomas A. Mehlhorn, Ph.D., '74, is superintendent of the plasma physics division at the

Naval Research Laboratory, in Washington, DC. He previously spent more than 31 years as a researcher and manager at Sandia National Laboratories in Albuquerque, NM.

New York Eta

Richard F. Kane, '65, is of counsel at the Columbus, OH, office of attorneys Bricker & Eckler. He practices in the public finance group with an emphasis on public and private finance, and tax-exempt bond financings. Kane graduated J.D. from Capital University Law School in 1971.

New York Iota

Arianna Kalian, P.E., '88, is has been elected a member of the Connecticut Academy of Science and Engineering. She is a former Laureate and Fellow, and is currently vice president of engineering and operations at energy solutions provider ClearEdge Power, which recently acquired UTC Power.

Ohio Alpha

Frank N. Linsalata, '63, is chairman and founder of Linsalata Capital

Partners, of Mayfield Heights, OH. He is responsible for relationships with investors, overseeing fundraising, and leading strategic planning. He is an active deal partner, serves as chairman of U-Line Corporation, and is a director of Paradigm Packaging, Tranzonic Companies and Whitcraft Holdings. Linsalata is past chairman of the trustees of Case Western Reserve University and a trustee of NCH Health System of Naples, FL.

Tennessee Beta

Jill A. Jordan, P.E., '79, is an assistant city manager for Dallas, TX. Her

responsibilities include communications and information services, environmental quality, public works, customer services, and watershed management. Before moving to Dallas in 1982, Jordan was an environmental engineer with Energy Resources Co., Inc., in Cambridge, MA.

Texas Eta

Prattana Punnakitikashem, Ph.D., '03, is assistant professor of operations management at the Mahidol University college of management in Bangkok, Thailand. Her specializations are operations management, applied operations research in health care, and health care management.

Texas Kappa

Scarlet McDaniel-Talley, '83, is a senior manufacturing engineer at medical devices providers Helena Laboratories in Beaumont, TX.

Wisconsin Gamma

Andrew T. Hable, P.E., '07, has been named as one of the ten individuals

30 years of age or younger chosen by ASCE in its program New Faces of Civil Engineering. He is with AECOM in Chicago, and has worked on a variety of international projects. Hable served earlier as an environmental specialist with the Peace Corps, where he worked to implement a community's first safe drinking water system in rural Panama.

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Your fellow Tau Bates are interested in news about you. Send items about civic activities, honors won, weddings, births, promotions, changes in address, etc. to Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697 or to *alumnote@tbp.org*. Material for publication must be received for the **Spring** issue by February 1, **Summer** issue by May 1, **Fall** issue by August 1, and **Winter** issue by November 1. Include name, address, chapter, class year, and email address or phone number. Thank you!

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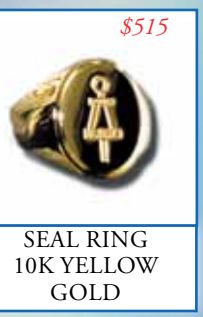

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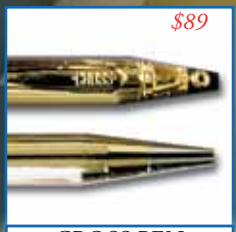

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Tau Beta Pi's Engineering Futures Program teaches students the special skills needed to create and run such effective teams, like resolving interpersonal problems, conducting effective meetings, and presenting results to stakeholders. Your chapter can schedule an Engineering Futures session by contacting *sherry@tbp.org*.

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