

# 2016 ANNUAL REPORT



*Connecting the World of Applied Geophysics*



# 2016 Annual Report of the Society of Exploration Geophysicists

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## John Bradford, president

To say that 2016 has been a challenging year for SEG would be an understatement. The sustained depression of the oil and gas markets has had a severe impact on our members and corporate partners. The downturn is of a scale that has not been seen for at least three decades. The oil and gas industry has seen hundreds of thousands of layoffs globally, many companies have gone out of business, and those that remain have seen revenues drop by 30–70%.

As illustrated in Figure 1, the industry-wide financial crisis that started in 2014 began to severely impact SEG's finances in September 2015 — about a one-year delay from the time that oil prices started to collapse. The dampened and phase-delayed response of SEG's finances is the typical response of professional associations to downturns in their respective industries. The delayed impact on revenues is indicative of the cyclic nature of primary revenue generators, such as SEG's Annual Meeting, relative to the budgeting cycle of corporate sponsors and exhibitors. As sources of revenue disappear or are reduced, SEG must tap cash reserves to meet expenses.

This, of course, is not sustainable, and significant changes in SEG's budget must be made in order to reach financial balance. From 2015 to 2016, SEG's budget decreased by

30%. This financial position unfortunately required a reduction in workforce of 33%. Although this was accompanied by process optimization and greater efficiency, it also resulted in the elimination, suspension, and scaling back of many SEG programs. We are anticipating the challenges to continue in 2017 and are working hard to ensure that SEG remains stable and sustainable for years to come.

Dorsey Morrow took his position as SEG's new executive director in June 2015. Immediately after Morrow started, we recognized the need for SEG to develop, implement, and articulate a strategy that would enable the organization to respond to a rapidly evolving profession. While this recognition did not occur in response to the downturn in the oil industry, the challenging financial times place a spotlight on SEG's past and current practices and how those might be improved. This year was an opportune time to evaluate the organization and make changes for the future.

To help with strategy development, we employed Diventa Consulting, which helped compile background information, constructed and conducted surveys with members and leadership, and facilitated face-to-face strategy sessions. In order to gain as broad a spectrum of input as possible into the creation of the strategy, I assembled a

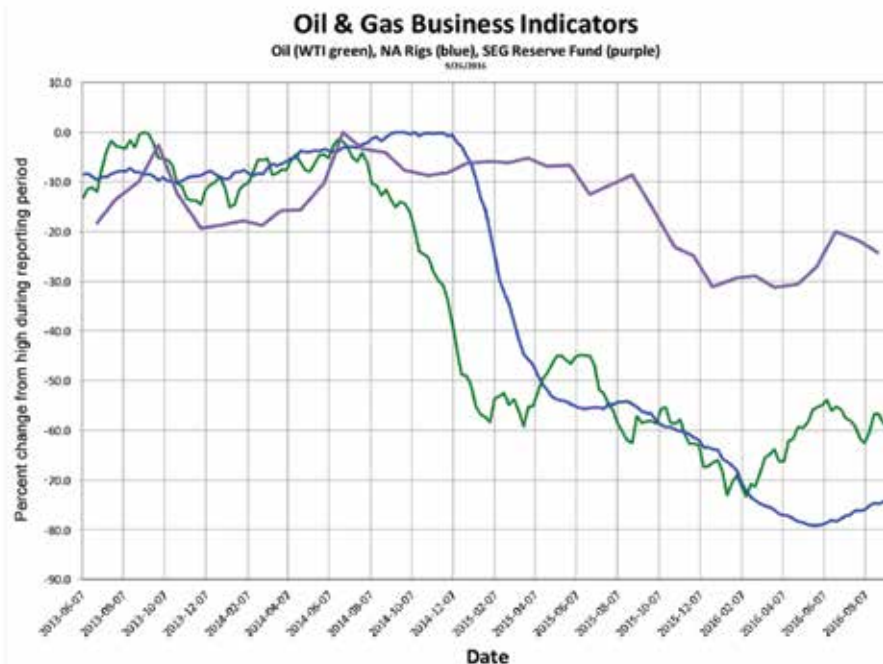


Figure 1. Percentage change in oil price, rig count, and SEG reserves relative to their high point, June 2013 to August 2016.

strategy task force that included a number of committee chairs along with board members and senior staff personnel. Our task was to detail current challenges that SEG faces, identify trends that are impacting the organization, and finally to identify opportunities for future growth of the Society.

SEG has a long history of providing a platform for exchange of state-of-the-art technical information about the science of applied geophysics. We do this through our journals, conferences, workshops, and meeting abstracts. These activities and programs form our core and, not surprisingly, this is what our members tell us they value most about SEG. Having fulfilled this mission for more than 85 years, SEG has built a reputation in the global geophysical community as the go-to source for the most up-to-date and technically advanced developments.

However, we live in a changing world, and the way in which we need to communicate and interact with our members is evolving. In particular, we see a number of challenges that we need to address if we are to remain relevant in the coming decades.

SEG depends almost entirely on the oil and gas industry for revenue to support programs and services. The cyclic

nature of the industry means that SEG’s ability to deliver programs and support its members presently follows the fortunes of the industry. To improve stability and sustainability, we need to broaden our base.

Associate and Active membership is gradually declining. This trend began before the industry downturn and is continuing. We need to do a better job of retaining members as they make the transition from student to professional.

Young professionals do not value professional societies in the same way that members of the older generations do. We need to demonstrate value and relevance if we are to grow our membership.

The strategy that the SEG Board of Directors approved in May 2016 is designed to value and build on SEG’s core of technical excellence while making the changes necessary to remain relevant. The key elements of the strategy are:

- Expand on our trusted legacy of sustaining and advancing the science of applied geophysics in resource extraction and management.
- Unlock the social contribution of geophysics applied to energy, water, and the environment.

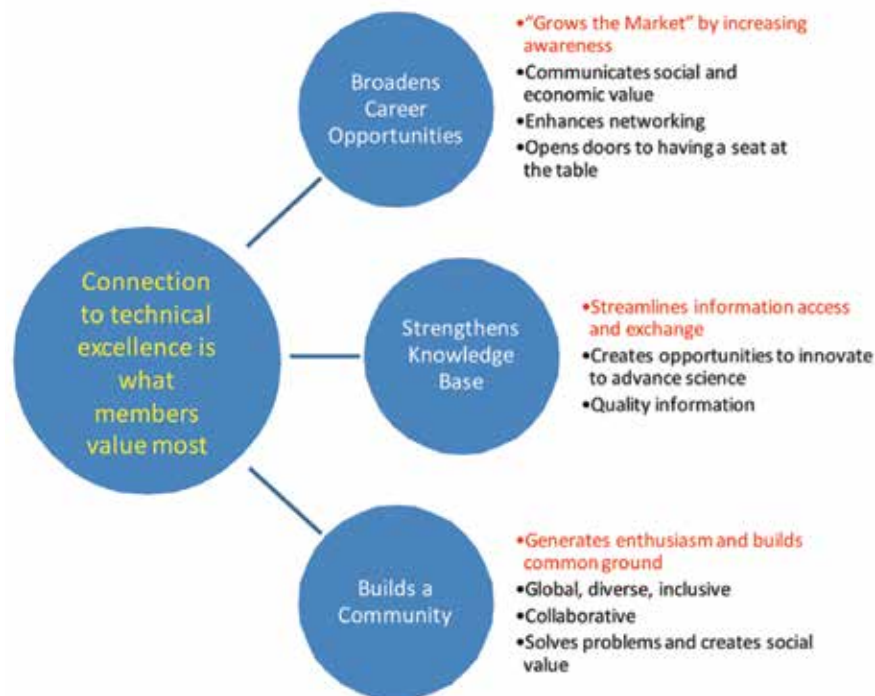


Figure 2. How individual members fit into SEG’s new strategy.

- Strengthen the marketplace for exchange of technical knowledge and products.
- Become the trusted “go-to” source for information about applied geophysics.
  - a) Connect the world of applied geophysics.
  - b) Connect geology and engineering to geophysics.
  - c) Show the world the power of applied geophysics.

Element 1 recognizes and respects our history. Element 2 is something that SEG and its members have always been engaged in but have not done a particularly good job of highlighting or communicating to the world outside of geophysics. Young professionals, millennials in particular, want to be engaged in activities in which they feel they are making an important contribution to society. SEG needs to promote and support this aspect of our profession. Element 3 recognizes that part of SEG’s mission is facilitating technical communication from research to practice, and to exchange of technical services. This aspect of our organization is most evident on the exhibit floor of our Annual Meeting, a first-class technical marketplace.

Element 4 is all about communication and broadening our base. Element 4a is our core mission, while Element 4b is necessary to support today’s integrated workflows and serves to broaden our base. Element 4c represents the biggest change to SEG in the new strategy. This element of the strategy is focused on communicating the contribution of geophysics to the public at large. It may be argued that, in general, applied geophysicists have done a poor job in the past of demonstrating and communicating our value to the broader public. In the coming decades, society is likely to depend more on the information we provide, and we need to do a better job of communicating our relevance. SEG is in a prime position to take a leading role in this communication effort.

What does SEG need to change to fulfill these strategic objectives? It begins at the Board of Directors level. We can use our cohesive and well-defined strategy to guide decision-making and exercise programmatic discipline. This is a necessary step in maintaining fiscal responsibility and financial sustainability. Second, we need to improve our communications capabilities. This includes both our ability to exchange information via virtual delivery and to build a strong conventional media presence outside the world of geophysics. And finally, at the staff level, we need to develop nimble processes so that we can more

effectively identify and take advantage of opportunities as they arise.

Finally, one might ask how do we as individual members fit into this new strategy? This is well summarized in Figure 2. In summary, the new strategy will strengthen the base of knowledge upon which members can draw, broaden career opportunities, and build a community that recognizes and values the social contribution of applied geophysics.

Of course strategy means nothing if it is not implemented effectively. At present, the SEG Board of Directors and staff are working on a tactical plan for strategy implementation, and some elements are already in place. Launched in May 2016 with a modern look and feel and with improved functionality, the new SEG brand and website are examples of the communications outreach effort. Look for more exciting developments as 2017 progresses!

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### **Bill Abriel, president-elect**

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During the SEG annual year from October 2015 to October 2016, it was my great pleasure to work with the SEG staff and the Board of Directors and to be in continuous contact with John Bradford as president and Chris Liner as past president. In addition to becoming familiar with the complexities of administering SEG, the president-elect is the Board of Directors’ liaison with the SEG Foundation and the three corporate affiliates: SEAM Corp., SEG Real Estate Corp., and SEG Global Inc.

The SEG Advanced Modeling Corporation (SEAM) is a research cooperative comprising companies involved in defining significant geophysical challenges that can be numerically defined and simulated. While past projects have focused on significant imaging challenges (subsalt, nonconventionals, foothills, and karst), the recent direction of the corporation is aimed at interpretation challenges such as pore-pressure analysis. This shift in focus is also demonstrated by the release of the SEAM 3D subsalt interpretation project now in the public domain and available to download worldwide at no cost. The latest project (pressure time lapse) broke ground in the simultaneous simulation of geology, geomechanics, reservoir fluid flow, and geophysics. This enables new projects to simulate reservoir monitoring, enhanced oil recovery, and even groundwater.

During 2015–2016, SEG Global was redefined to be the business support organization for the SEG China office in

Beijing. During this period, the China office was responsible for developing and delivering the appropriate courses, conferences, and gatherings to advance the art and science of geophysics within the country. The influence of the office continues to grow with each year, and the Dallas Annual Meeting in 2016 witnessed the largest submission of abstracts ever from China. SEG Global is also looking beyond performance and has provided further guidance on how best to achieve the financial metrics of the office.

SEG Real Estate holds and operates the SEG properties at the Cecil B. Green Geophysical Resource Center in Tulsa, Oklahoma. In August 2015, the newest office building was completed and opened to rental. The occupancy rates of these Class I facilities are very favorable for SEG and complement the open and cooperative working space taken by SEG itself.

The SEG Foundation encourages and supports scientific, educational, and charitable activities of benefit to geophysicists, through solicitation of contributions. Activities supported by contributions to the SEG Foundation are intended to supplement those supported by SEG's operating budget. Significant programs of the SEG Foundation for the period of 2015–2016 include multiple programs supporting students, regional and international lectures, online knowledge management, and social contributions such as Geoscientists *Without Borders*®.

In 2015, the SEG Board of Directors authorized the scoping of an international SEG certification, intended to provide a measure of professional capability in the field of applied geophysics. The SEG staff commissioned an international member survey, which reported significant majority support for certification as it was described. Support was especially strong among students and young professionals. Subsequently, a volunteer member task force was formed and several virtual meetings were held that reached consensus on the following recommendations which are now being pursued: (1) Investigate how certification best fits into the SEG strategy and portfolio of offerings; (2) clarify the description of certification in the currently mixed market of licenses, endorsements, noninternational certifications, diplomas, credentials, and accreditations; (3) offer the first SEG certification in oil and gas operations and plan for developing subsequent certifications in other fields of application (e.g., groundwater); (4) assemble experts to describe in detail the specific job tasks and responsibilities of a petroleum geophysicist; (5) formulate the description of a parallel program of education and learning that relates to building capability (e.g., training) for a geophysicist to reach the certification level; and

(6) secure funds from stakeholders as needed on a stage-by-stage basis to implement the certification program.

It has been my pleasure to serve as the president elect for 2015–2016. I hope that this will aid significantly in the execution of my presidency in the following year.

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### **Christopher Liner, past president**

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At the completion of the 2015 SEG Annual Meeting in New Orleans, I stepped into the role of SEG past president and my term ended at the 2016 Annual Meeting in Dallas. The exciting prospect of serving in SEG's highest office was tempered by the continuing hydrocarbon business crash of 2015.

My time on the SEG Board has been an excellent experience despite the business environment. Many old friendships were renewed and new ones made. The SEG Board is a volunteer group with amazing dedication of time and thought to managing and improving our society.

Throughout my year as past president, I continued to have weekly phone meetings with President John Bradford, President-elect Bill Abriel, and SEG Executive Director Dorsey Morrow. I also served as a member of the SEG committees for Awards and Nominations.

The downward pressure on all aspects of SEG business (meetings, training, publications, membership) forced this SEG leadership, including me, into many difficult discussions and decisions. The effect of this crash has been terrible for working geophysicists and accelerated “the great crew change;” but it also has taken a parallel toll on SEG staff, many being long-time career employees who dedicated much of their working life to the organization. Staff reduction decisions were always taken seriously and considered carefully. As SEG follows the industry out of this historic crash, it is a leaner, more agile organization positioned for success in a more competitive landscape. One final time, let me say clearly that I am thankful to the SEG membership who voted me into office. Serving you has been a high honor.

Back to the crash. I've been keeping tabs on the oil crash of 2015 since it began. My way of plotting the situation is to show North American oil price (green), gas price (red), and rig count on one graph, each curve normalized as a percentage of its maximum value in the time interval shown. The version current through 3 March 2017 labeled with my terms rolling through the office of SEG president is shown below. A wild ride, indeed.

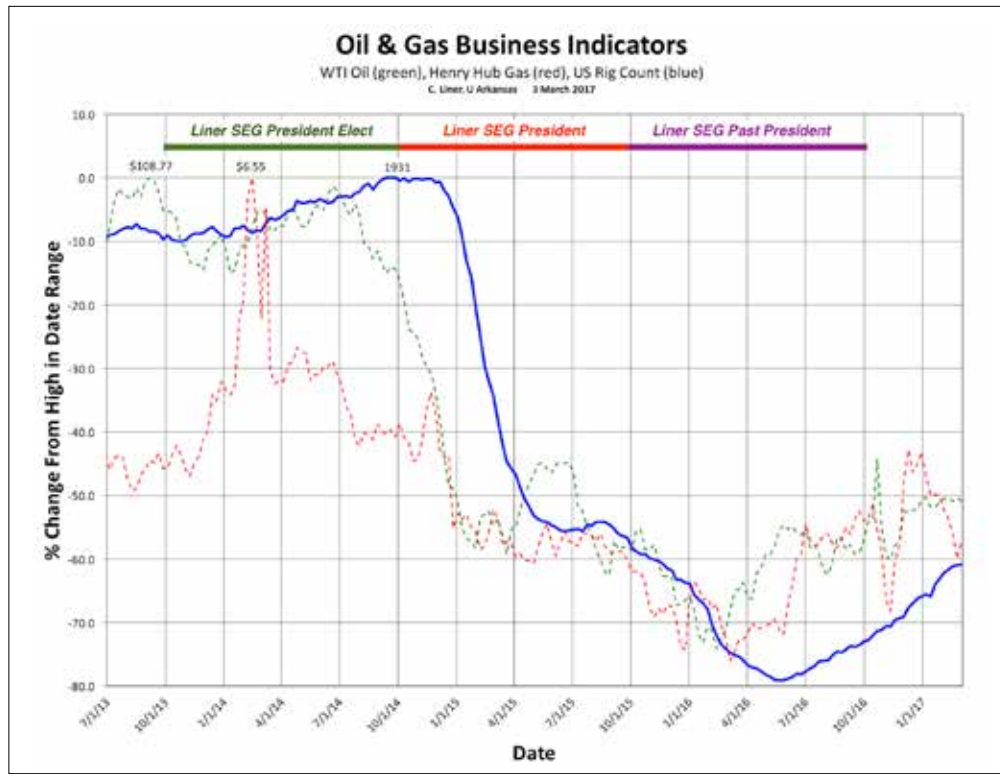


Figure 1. Percentage change in prices of oil and gas and rig count during Christopher Liner's term on the SEG Board of Directors.

## Eve Sprunt, first vice president

SEG members work in a wide range of geophysical applications, but the Society is still dependent on the oil industry for the majority of its revenue. There is about a one-year lag between when oil prices fall and a downturn in SEG revenue. After several years of sharply lower oil prices and drastically reduced spending for exploration, the SEG Board was faced with the challenge of reducing spending while better serving members.

Coupled with the economic challenge, SEG faces difficult decisions on how to adapt to demographic changes. While many SEG members still live and work in Houston, more and more members are located elsewhere around the world. As of 10 March 2017, more than 64% of members are from outside of the United States. Women comprise 16% of members with the balance consisting of 69% men and 15% whose gender is unknown.

As an SEG vice president, I had only two years on the board to try and make a difference. Perhaps my greatest accomplishment was successfully championing — on behalf of the SEG Women's Network Committee (WNC) — the

anti-harassment policy for SEG meetings and activities. Details of that policy can be found at <http://seg.org/Policies>. With an increasingly diverse membership, having and adhering to the anti-harassment policy is important so that all members feel that their opinions are valued, and that they can fully participate in all SEG activities.

Unfortunately, although the policy specifically includes as conduct prohibited at SEG events, "epithets, slurs, or negative stereotyping; threatening, intimidating, or hostile acts; denigrating jokes and display or circulation of written or graphic material that denigrates or shows hostility or aversion toward a particular group or an individual based on inclusion in a particular group," there was a public display of inappropriate behavior at an event associated with the 2016 Annual Meeting that did not result in disciplinary action. Hopefully in the future, SEG leaders will hold all members to the standards of the anti-harassment policy so that our society is truly welcoming to a wide range of people.

The other goal I set for myself was to secure voting rights for dues-paying members. Under the current SEG Bylaws, only Active Members, who now comprise

approximately 34% of the membership, can vote. Emeritus Members, who are over the age of 65, have been an Active or Associate Member for at least 30 years. Emeritus Members comprise 17% of the members who are eligible to vote, and their numbers may increase rapidly in the near future. Most of SEG's voting members are old men in the United States, who may have very different perspectives and priorities than the majority of the membership, who live elsewhere.

Associate Members, who comprise 27% of the membership, have no voting privileges, even though they pay the same dues as Active Members. Associate Members may not serve on the SEG Council or as officers or directors. Student members comprise 39% of all members, and approximately 78% of student members are outside of North America.

In board discussions, it became clear that people have different perspectives on what membership in SEG means. I do not think that SEG membership is a proxy for certification because no tests are required for SEG membership. However, some other SEG members do. Validation of technical skills by certification testing would be a valuable service that SEG could offer to members for a fee. Also, some members are concerned about a takeover of SEG by new members. In my opinion, that scenario is highly unlikely, because the Committee on Nominations serves as gatekeepers. These concerns resulted in a relatively complex proposed change to the Bylaws.

At its February 2016 meeting, the SEG Board approved a motion to request a "change in the Bylaws to change from two professional member types to one, which will be named 'Member.'" Every "Member," "except those in the student category, would be given the right to vote, to petition the board, and to run for any office after being a paid member for a minimum of two consecutive dues-renewal years."

To go into effect, the Bylaws change had to be ratified by two-thirds of the SEG Council at its meeting in October 2016. The chair of the Council, Lee Lawyer, was strongly opposed to the Bylaws revision and, from my perspective, did not handle the discussion of the proposal in a neutral manner. The proposal failed to receive the necessary votes to pass, so SEG remains a society with most of its members unable to vote, to petition the board, or to hold office.

I believe that leadership of the Society should be representative of its membership. In rapidly changing times with shifting demographics, I think that SEG must be more inclusive of its members worldwide. I hope that members of the SEG Council take the initiative to craft a simpler

Bylaws revision that enables all dues-paying members to vote and facilitates greater participation of members worldwide in SEG leadership.

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## **Jie Zhang, second vice president**

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I joined the SEG Board in 2015 and have learned a great deal about how SEG works since then. During 2015 and 2016, I participated in the quarterly Board meetings, and as a liaison, I coordinated with the Annual Meeting Steering Committee, the Technical Program Committee, the Committee on University and Student Programs, the Meetings Review and Planning Committee, the One-on-One Program Committee, and the SEG China office. SEG is a large organization with members in more than 128 countries. Coordinating with various committees to ensure serving our global members well is indeed a challenge.

However, the real challenge that we were facing in 2015–2016 was the impact of the industry downturn on our Society and its activities. We had to reduce the number of staff at SEG just like most of the companies in our industry, operate our programs at low cost, and even stop some of the programs that we can no longer financially afford. Our belief in SEG's global effort to promote geophysics and geophysics education was seriously challenged. Nevertheless, despite the continuing downturn, SEG, as a member-driven society, still offers remarkable services worldwide, and the Society is never short of hands because a large number of volunteers help to operate it.

During this difficult time, one of my efforts at SEG was to closely work with SEG China and try to help the office operate successfully. Undoubtedly, keeping our operation in China is critical because geophysics education in China continues to grow rapidly and a large number of future geophysicists will come from China. In terms of number of presentations at SEG annual meetings and article submissions to the SEG journal *GEOPHYSICS*, China and the United States are the two dominant countries.

Because SEG in Tulsa is tight on resources, the obvious question is whether SEG China can independently operate in China. The pace of moving the office toward financial "break-even" status must be accelerated. Working with Xianhuai Zhu, Alfred Liaw, Amelie Ma, and staff of SEG China, under the support of presidents John Bradford and Bill Abriel, we began to redesign the plan of SEG China, establish new QC standards, and closely watch the interest of our members in China and financial performance of each event as well. During

this period, workshops on gravity and electromagnetics, full-waveform inversion, deep-water exploration, rock physics and borehole geophysics, and high-performance computing, plus the SPG/SEG 2016 Conference all were successful in terms of attendance, effectiveness, and financial performance. More importantly, SEG China became more experienced and independent through organizing these events. SEG China now has a solid plan for 2017 and forward.

During this downturn, companies in our industry have gone through reorganizations and reforms and significantly changed the way they conduct oil and gas exploration. What does that mean to SEG? How can we better serve our members in the future? How can we help our industry reduce the cost and yet continue to improve business performance? Can SEG sustain if we continue to follow the traditional approach to operate? With these questions in mind, I began to search for answers from conferences and society activities in other industries in which I was involved. One of the rapidly growing events in biotech, medical, and IT conferences is the One-on-One Partnering Program, which allows a transparent marketplace for companies to access business contacts easily at low cost but with high efficiency. With support from Bradford, we formed a One-on-One Program Committee at SEG to study the feasibility of the program for SEG. For more than a year of effort in the committee, Maurice Nessim, Lee Bell, and Melanie McGuire made significant effort in this area. In Depth Geophysical Inc. and BGP offered their financial support to the program. Many company executives made commitments to participate in the program as well.

Time flies, and I feel that I have just begun to understand SEG. It is truly a great honor for me to work in this organization and learn a great deal from everyone around. I will continue to collaborate with our colleagues and hope to help SEG in whichever way I can.

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### **Alison Small, treasurer**

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The financial health of the SEG has been maintained over the last year during a difficult period within the key sector of the geophysical industry related to oil and gas exploration and development. Financial health was only achieved through the cooperative efforts of all stakeholders including staff, volunteers, management, executive leadership, subsidiaries, and the SEG Foundation to operate SEG in the most cost effective and efficient manner possible, as well as the membership to support and attend the Annual

Meeting. All are commended for their contributions to these efforts over the past year. Staff is recognized for its extraordinary effort in managing expenses in the face of decreased revenues. Financial stability would not have been maintained without this effort by staff. The finance team led the effort to provide timely financial information to staff, boards, committees, subsidiaries, and the SEG Foundation so that revenues could be monitored and expenses evaluated and adjusted on a constant basis throughout the year. SEG Chief Financial Officer Dana Falletti and her team provided this real-time information while still performing the regular duties of monitoring investments and preparing tax forms, and are appreciated for their efforts and dedication to the success of SEG. They were well supported by all departments in cutting costs without impacting quality of services delivered to our members.

In the tradition of the most recent annual reports, I will not comment on the particulars of the financial statement, as that is provided in the Consolidated Financial Report at the end of this report. Rather, I will discuss the impactful financial decisions that were made this year, budgeting for calendar year 2017, and SEG's future financial outlook.

This year saw the switch from a 1 July–30 June fiscal year financial reporting period to a calendar-year reporting period for SEG and its three consolidated subsidiaries. As such, audited consolidated financials cover an 18-month period from 1 July 2015 through 31 December 2016. SEG and all of its subsidiaries, as well as SEG Foundation, now report on a calendar-year basis. This change to calendar-year reporting is better aligned with SEG's and the subsidiaries' business cycles and has achieved the expected efficiencies. The SEG budget-building timeline and approvals of audited financial statements have been adjusted in accordance with SEG governance rules.

The calendar-year 2017 budget was approved in December 2016. All program and department budgets were presented fully burdened with both direct and indirect costs, so that each piece of SEG business could be examined with regard to the full cost of doing business, even though reimbursement of these indirect costs by the subsidiaries is being phased in over a five-year period. (See the 2015 SEG Annual Report for explanation of the indirect cost structure and formula.) The approved budget is net negative for both SEG and SEG consolidated, impacting reserves, with the acknowledgement that SEG must plan in 2017 for an achievable cash-basis net-zero budget in 2018.

The budgeting process highlighted the necessity to immediately examine all programs and aspects of SEG business for

sustainability as the oil and gas industry and its geophysical contractors — a key source of SEG and SEG Foundation revenue — are forecast to show little if any recovery or growth in the near future. SEG recovery lags industry recovery, which further exacerbates the financial impact of this situation. Long-term use of reserve funds to finance Society business is unacceptable, and prioritization of activities must be accelerated along with plans to rebuild the reserve as these funds are utilized. It is imperative that SEG immediately implement a strategic plan that does not continue to rely on a single industry and a small handful of events to fund its programs, meet the needs of its members, and continue to offer core geophysical publications and programs. Both short-term and long-term financial stability are reliant on swift action to move the organization in this direction.

Reserve and Investment Policies were reviewed and changes recommended. Careful planning and implementation will allow SEG to continue and grow its important service to the geophysical community. I thank you for electing me to serve as SEG Treasurer for the past two years and look forward to continued service as Finance Committee chair.

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### Mauricio Sacchi, editor

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This report summarizes the main activities pertaining to the journal *GEOPHYSICS* from 1 July 2015 through 31 December 2016.

The Editorial Board includes assistant editors, associate editors, guest editors, special editors, and department editors. A few associate editors were not able to continue with their duties, and they have requested to be replaced. In the last two years, we incorporated 14 new associate editors to replace associate editors who resigned and to support areas with a large number of submissions. Special attention also was paid to increase the number of special editors. Special editors are in charge of the final reading of manuscripts after composition. Special editors on innumerable occasions were able to capture inconsistencies and typos introduced during the external production stage.

The indefatigable dedication of assistant, associate, guest, and special editors, as well as *GEOPHYSICS*' staff, has resulted in the following performance numbers from 1 July 2015 to 30 June 2016. Time required to make a first decision on submitted manuscripts is 66 days; average time between acceptance and publication is 69 days; and number of submitted manuscripts is 599. China and the

United States continue to dominate the number of submissions. Articles from universities continue to rank first in number of submissions. Last, the 2015 impact factor for *GEOPHYSICS* is 2.017, highest in the journal's history. I stress that not all submitted papers are accepted for publication, as the acceptance ratio for 2016 is approximately 60%.

**GEOPHYSICS Reviewer of the Year Award.** The award honors a dedicated, constructive, and prolific reviewer. I would like to congratulate Steve Arcone and Alexey Stovas as recipients of the *GEOPHYSICS* Reviewer of the Year Award in 2015 and 2016, respectively. Their contributions to the quality of our journal are appreciated by all of the editorial team.

**Special sections.** We continue to promote grouping articles in thematic units. Members of our community can propose special sections to disseminate topics of current interest. The following special sections (guest editors in parentheses) were published in *GEOPHYSICS* during the reporting period:

- **Taking signal and noise to new dimensions** (Laurent Duval, Sergey Fomel, Mostafa Naghizadeh, and Mauricio Sacchi) appeared in the November–December 2015 issue.
- **Microseismic monitoring** (Vladimir Grechka, Brad Artman, Leo Eisner, Werner Heigl, and Stephen Wilson) appeared in the November–December 2015 issue.
- **Advancements in the measurement of the cryosphere using geophysics** (Andrew D. Parsekian, John Bradford, Georgios Tsoflias, Steven Arcone, and Bernd Kulesa) appeared in the January–February 2016 issue.
- **Nuclear magnetic resonance for near-surface applications** (Kristina Keating, Mike Müller-Petke, Ahmad A. Berhoozmand, Jean-François Girard, and Lin Jun) appeared in the July–August 2016 issue.

Calls for papers for four special sections have been announced for 2017.

It is a great and enjoyable experience to be the Editor-in-Chief (EIC) of *GEOPHYSICS*. I would not be able to complete my term without the tireless assistance of our team of editors and *GEOPHYSICS*' staff as well as a large number of competent referees.

**Table 1. Origin of papers submitted for publication in GEOPHYSICS by country 1 July 2015–30 June 2016.**

China . . . . .	213
USA . . . . .	185
Canada . . . . .	34
Norway . . . . .	28
Saudi Arabia . . . . .	27
Australia . . . . .	20
Brazil . . . . .	19
India . . . . .	17
UK and Northern Ireland . . . . .	16
France . . . . .	14
Iran, Islamic Republic of . . . . .	14
Switzerland . . . . .	13
Germany . . . . .	12
Italy . . . . .	10
Japan . . . . .	9
Korea, Republic of . . . . .	8
Netherlands . . . . .	7
Denmark . . . . .	5
Mexico . . . . .	4
Russian Federation . . . . .	3
Spain . . . . .	3
Thailand . . . . .	3
Argentina . . . . .	2
Belgium . . . . .	2
Israel . . . . .	2
Malaysia . . . . .	2
Nigeria . . . . .	2
Sweden . . . . .	2
Taiwan . . . . .	2
United Arab Emirates . . . . .	2
Czech Republic . . . . .	1
Egypt . . . . .	1
Hong Kong . . . . .	1
Hungary . . . . .	1
Indonesia . . . . .	1
Ireland . . . . .	1
Turkey . . . . .	1
Venezuela . . . . .	1
Vietnam . . . . .	1
<b>Total . . . . .</b>	<b>599</b>

**Table 2. Origin of papers submitted for publication in GEOPHYSICS by country 1 January 2016–31 December 2016.**

China . . . . .	225
USA . . . . .	170
Canada . . . . .	35
Norway . . . . .	33
Australia . . . . .	26
Brazil . . . . .	21
Iran, Islamic Republic of . . . . .	20
Saudi Arabia . . . . .	19
France . . . . .	16
UK and Northern Ireland . . . . .	16
Germany . . . . .	14
Italy . . . . .	12
Switzerland . . . . .	12
India . . . . .	11
Netherlands . . . . .	8
Egypt . . . . .	6
Korea, Republic of . . . . .	5
Denmark . . . . .	4
Japan . . . . .	4
Mexico . . . . .	4
Spain . . . . .	4
Argentina . . . . .	3
Belgium . . . . .	3
Czech Republic . . . . .	3
Nigeria . . . . .	3
Sweden . . . . .	3
Turkey . . . . .	3
Austria . . . . .	2
Israel . . . . .	2
Malaysia . . . . .	2
Pakistan . . . . .	2
Hong Kong . . . . .	1
Hungary . . . . .	1
Ireland . . . . .	1
Portugal . . . . .	1
Russian Federation . . . . .	1
Singapore . . . . .	1
Taiwan . . . . .	1
Thailand . . . . .	1
United Arab Emirates . . . . .	1
Vietnam . . . . .	1
<b>Total . . . . .</b>	<b>701</b>

**Table 3. Origin of papers submitted for publication in GEOPHYSICS by employer 1 July 2015–30 June 2016.**

Universities . . . . .	510
Research Institutes . . . . .	74
Service Companies and Manufacturers. . . . .	27
Oil Companies . . . . .	36
Governments . . . . .	27
Consultants. . . . .	12
Mining Companies. . . . .	1
Instrument Companies. . . . .	0
Retired . . . . .	2
<b>Total. . . . .</b>	<b>599</b>

**Table 4. Origin of papers submitted for publication in GEOPHYSICS by employer 1 January 2016–31 December 2016.**

Universities . . . . .	554
Research Institutes. . . . .	64
Governments . . . . .	30
Oil Companies . . . . .	22
Service Companies and Manufacturers . . . . .	16
Consultants . . . . .	8
Retired. . . . .	4
Instrument Companies . . . . .	3
<b>Total . . . . .</b>	<b>701</b>

**Table 5. Manuscript-handling statistics.**

<b>Year submitted 1 July–30 June</b>	<b>Average number of days required for first review</b>
1991–92 . . . . .	172
1992–93 . . . . .	157
1993–94 . . . . .	184
1994–95 . . . . .	182
1995–96 . . . . .	211
1996–97 . . . . .	186
1997–98 . . . . .	205
1998–99 . . . . .	214
1999–00 . . . . .	212
2000–01 . . . . .	211
2001–02 . . . . .	178
2002–03 . . . . .	133
2003–04 . . . . .	141
2004–05 . . . . .	105
2005–06 . . . . .	66
2006–07 . . . . .	53
2007–08 . . . . .	57
2008–09 . . . . .	55
2009–10 . . . . .	66
2010–11 . . . . .	61
2011–12 . . . . .	66
2012–13 . . . . .	61
2013–14 . . . . .	72
2014–15 . . . . .	70
2015–16 . . . . .	66
<b>Year submitted 1 January–31 December</b>	<b>Average number of days required for first review</b>
*2016 . . . . .	60

\*First reviews have not been returned for all papers.

**Table 6. Manuscript-handling statistics.**

<b>Year published 1 July–30 June</b>	<b>Average number of days between acceptance and online publication</b>
1991–92. . . . .	.176
1992–93. . . . .	.181
1993–94. . . . .	.178
1994–95. . . . .	.210
1995–96. . . . .	N/A
1996–97. . . . .	N/A
1997–98. . . . .	.180
1998–99. . . . .	.177
1999–00. . . . .	.202
2000–01. . . . .	.208
2001–02. . . . .	.213
2002–03. . . . .	.195
2003–04. . . . .	.161
2004–05. . . . .	.158
2005–06. . . . .	.181
2006–07. . . . .	.143
2007–08. . . . .	.82
2008–09. . . . .	.111
2009–10. . . . .	.122
2010–11. . . . .	.135
2011–12. . . . .	.126
2012–13. . . . .	.78
2013–14. . . . .	.72
2014–15. . . . .	.65
2015–16 . . . . .	.69
All of 2016. . . . .	.65

**Table 7. Impact factor.**

<b>Year</b>	<b>Impact factor</b>
1975. . . . .	0.629
1976. . . . .	1.095
1977. . . . .	0.773
1978. . . . .	0.591
1979. . . . .	0.918
1980. . . . .	0.895
1981. . . . .	1.087
1982. . . . .	1.100
1983. . . . .	1.461
1984. . . . .	1.193
1985. . . . .	1.206
1986. . . . .	0.968
1987. . . . .	1.084
1988. . . . .	0.931
1989. . . . .	1.017
1990. . . . .	0.905
1991. . . . .	1.166
1992. . . . .	0.697
1993. . . . .	0.919
1994. . . . .	0.824
1995. . . . .	0.877
1996. . . . .	0.867
1997. . . . .	0.824
1998. . . . .	0.687
1999. . . . .	0.818
2000. . . . .	0.861
2001. . . . .	0.649
2002. . . . .	0.834
*2003. . . . .	0.589
2004. . . . .	1.087
2005. . . . .	1.030
2006. . . . .	1.228
2007. . . . .	1.167
2008. . . . .	1.349
2009. . . . .	1.662
2010. . . . .	1.404
2011. . . . .	1.418
2012. . . . .	1.723
2013. . . . .	1.759
2014. . . . .	1.612
2015. . . . .	2.017

\* The impact factor for 2003 is based on a single issue. A recalculation based on all issues in 2003 gives 0.862.

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## Lee Lawyer, chair of the Council

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The Annual Meeting of the Council occurred in Dallas in October 2016 during the SEG Annual Meeting. The mandated duties of the Council are to approve the Annual Report and vote on all dues changes and any Bylaws changes. In addition to that, the Council acts in an advisory capacity to the Board of Directors of the SEG. There were no dues changes. There were several changes to the Bylaws. A proposal from the SEG Board of Directors to merge Active and Associate Member classifications was defeated. Two other proposals were adopted by the Council and subsequently adopted through a vote of SEG members. One of those was to enable the president to name a “past president” rather than a “prior past president” to the Honors and Awards Committee. Another was to restructure the schedule of Annual Report development and publication to align with SEG’s change to calendar-year financial reporting.

There were 58 members present, which was well within the quorum requirements of 1/3 of the total representatives. Of that number, 14 participated via an electronic connection called Zoom. Feedback from the virtual attendees was very favorable. They were able to hear and see all of the activities of the Council and could ask questions or speak when appropriate. That process will be in place at the Houston Annual Meeting.

The Council was unable to approve the Annual Report because the financial statement for the subject period was not available. The SEG has adopted an annual year for financial reports. The operational portion of the Annual Report is from one SEG Annual Meeting to the next one. It was necessary to defer approval of the Annual Report until June 2017. This will occur during an electronic meeting of the Council.

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## Maurice Nessim, director at large

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It has been my great honor to serve as an SEG director at large throughout 2016. During this assignment period, I have had the pleasure to work together with an energetic and visionary Board of Directors. The contribution and commitment of each Board member has made a positive impact to the Society and its outstanding performance.

One of the most interesting parts of this assignment has been the opportunity to work even closer with the SEG staff. The Society has a diverse team of people who are committed to taking SEG to the next level, and it has been a pleasure for me to get to know each and every individual better.

My term in serving the Society began during an unprecedented downturn of the industry, which had severe impact on geophysical business. In order to respond to this environment, we need to adjust our strategy and transform the way we conduct our activities. During the reporting period, based on my deep knowledge of the Middle East market, I was actively engaged in the rethinking of the SEG Middle East office and its directions, and how it will impact SEG activities at large. Additionally, I participated in the transformation of the Continuous Innovation Portfolio (CIP) Committee to be the platform for planning of all SEG businesses. I also, on a regular basis, gave the board a business update on the oil and gas prices, and its impact on the geophysical providers, the geophysical industry, and SEG members.

Despite the downturn in the market, it is important to recognize there is always room for growth and evolution in the world of geophysics. The promotion of new geophysical activities in Mexico has attracted a diverse group of oil companies to help rejuvenate Mexico’s energy market. It has been exciting for me to witness and be a part of SEG’s support for Mexico’s initiatives through the wide variety of technologies and solutions being made available to the operators. This was demonstrated at the AAPG/SEG International Conference & Exhibition (ICE) held in Cancun, Mexico, last September where value was placed on collaboration and how we can all work together to support Mexico’s energy reform. I elaborated on the same topic in the March 2017 “President’s Page” in *The Leading Edge*, “Geophysics: Leading the way in a new frontier,” and how innovative business models and geophysical resource optimization have made it possible to reduce timelines drastically in Mexico’s data acquisition. We must continue to collaborate with one another, as geophysicists will continue to pave the way towards a brighter future by acquiring and studying data to look for new exploration opportunities in Mexico and beyond.

This year, 2017, will be a year of growth. New frontiers are ready for our discovery. In support of this, I recently hosted the International Association of Geophysical Contractors (IAGC) annual conference, “New Frontiers for Mapping a Sustainable Future,” with engaging panel speakers from Africa and South America. SEG Past President Chris Liner, President-Elect Nancy House, and SEG Executive Director Dorsey Morrow actively participated in this event. Going forward in exploring new frontiers, we must be vigilant in reducing our environmental footprint and creating awareness in local communities in order to promote a more positive industry perception. By working together, we can overcome “headwinds” and arrive to the brighter side of our business. One of my focuses was to improve the

relationship between SEG and IAGC, of which I am now the chair, and I am happy to report that the relationship is the best it's ever been with several collaboration efforts.

I value and deeply appreciate the opportunity to be on the SEG Board. The experience has been very fulfilling and enlightening. I would like to recognize the talents of the other Board members and the SEG staff in this challenging, yet opportunistic time to make positive changes in the current market environment and enter new frontiers together.

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### **Vladimir Grechka, director at large**

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I consider serving on the SEG Board a privilege — a treat only a few SEG members receive. The year 2016 was the second year of my three-year term.

The year was tough; as the industry downturn finally hit SEG, its staff suffered massive layoffs on par with the industry as a whole. The Board did not participate in executing the layoffs; it was all done under the supervision of SEG Executive Director Dorsey Morrow, who, in my opinion, has done a much better job than some of his industry counterparts.

I was the Board liaison on three committees: Global Advisory Committee (GAC), Emerging Professionals International Committee (EPIC), and SEG Oil & Gas Reserves Committee (OGRC). Let me briefly describe those activities. The GAC has been revitalized under the leadership of Victor Mocanu and is well on its way to regaining its role as a coordinator of SEG communities around the globe. The EPIC is very vibrant; its various events happen monthly as the young folks are finding ways to establish themselves in our rapidly graying society. The OGRC has a daunting task of promoting the usage of geophysical methods in reserve estimation — the area historically dominated by the Society of Professional Engineers (SPE). There is hope that enthusiastic efforts of committee chair Eric von Lunen will lead to a decisive progress.

Also, I served as a vice chair of the Committee on Nominations. The committee performed smoothly and efficiently under Chair Maurice Nessim, and it looks like we have managed to select a group of distinguished candidates for positions on the SEG Board and SEG Council.

Finally, I have served on the organizing committee of the 17th International Workshop on Seismic Anisotropy and am serving on the organizing committee of the 2nd International Workshop on Microseismic Technology. Overall, it has been an exciting, rewarding, and hugely satisfactory year.

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### **Xianhuai Zhu, director at large**

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It has been my great honor to serve as an SEG director at large on the 2015–2016 Board of Directors, the second year of my three-year term. During this period, I had the pleasure to work closely with fellow members of the Board of Directors and the SEG staff, serving as a member of the Audit Committee and as a Board liaison on the Research Committee and Earth Model Committee. In addition, I have been working closely with the SEG China Office to promote joint conferences between SEG and Chinese geophysicists. Thanks to Forland Geophysical Services (FGS) for supporting my involvement with SEG activities.

In April 2016, led by then-SEG President John Bradford, I attended a joint conference between SEG and the Chinese Society of Petroleum Geophysicists (SPG) in Beijing. Hao Huiming of the Bureau of Geophysical Prospecting (BGP) and I, representing SEG, acted as co-chairs of the technical program committee. More than 300 abstracts were submitted, and 230 were accepted. The theme of the conference was “Geologic-target oriented integrated geophysical studies.” After the conference, we visited the Chinese national oil companies CNPC, Sinopec, and CNOOC. We also visited the Saudi Aramco and CGG offices in Beijing. Based on the meeting with Dr. Ma Yongsheng, Vice President of Sinopec, SEG and Sinopec agreed to form a Foothill Exploration Forum that was held in Nanjing in April 2017. Dr. Qu Shouli from Sinopec, Dr. Zhao Bangliu from CNPC, and I, representing SEG, served as the co-chairs of the technical program committee for the forum.

The 2016 Audit Committee was chaired by Guillaume Cambois. The role of the Audit Committee is to ensure that proper process is followed, that policies and procedures are in place, and that risk is adequately managed. For example, this year we discussed how to run the SEG China and SEG Middle East offices more effectively — to meet local members' expectations while not incurring significant financial loss.

The 2016 SEG Research Committee was chaired by Jacques Leveille. The committee looked closely at how to improve the quality of the SEG expanded abstracts and presentations associated with the SEG Annual Meeting. Immediately after the SEG International Exposition and 85th Annual Meeting in New Orleans in October 2015, two SEG groups almost simultaneously started discussing the SEG Expanded Abstracts and Presentations and, more specifically, how to accept more papers without

compromising quality. These two groups were the SEG Board of Directors and the SEG Research Committee. As a member of the Board, a member of the Research Committee, and having served in the SEG Technical Program Committee for many years, I wrote a President's Page column, published in the February 2016 issue of *The Leading Edge*, titled "How to improve the quality of SEG abstracts and accept more papers." In my opinion, improving the quality of the SEG Expanded Abstracts and Presentations should be a top priority. With good quality, people would be willing to go to sessions and listen to more presentations. In the industry downturn, we geophysicists should continue coming together at the Annual Meeting to improve our expertise, and SEG needs to do all it can to help its members.

At the 2016 SEG Annual Meeting in Dallas, there was a historical photo displayed in the SEG China Pavilion. This photo was taken in 1981 when the first joint technical symposium between SEG and Chinese Geophysical Society (CGS) was held in Beijing. This event involved more than 500 geophysicists and included approximately 65 timely technical papers contributed by both organizations. Believe it or not, I was in the photo! I wrote the President's Page column in the May 2017 issue of *TLE* titled "SEG and Chinese geophysicists: Approaching 40 years of cooperation." The 1981 photo is published with this column.

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### **Guillaume Cambois, director at large**

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This was the last year of my three-year stint as director at large. I served as vice president under the old governance in 2007–2008, and I find the new system much better in terms of board continuity and efficiency. I believe this new governance has served SEG well through the current crisis.

Helping SEG navigate through this crisis has taken most of my time as a board member. SEG Executive Director Dorsey Morrow and his management team needed all the support they could get from the SEG Board of Directors to implement the necessary cuts while maintaining staff morale. To the management's credit, the cost reductions matched the drop in revenues and 2016 ended with a small profit.

However, the 30% decrease in workforce was not without consequences on SEG programs, and it was up to the Board to decide which activities to keep and which to terminate. In that regard, the strategic planning initiative launched by President John Bradford last year was quite well timed

and its conclusions gave us the direction we needed. The Continuous Innovation Portfolio (CIP) Committee, led by Treasurer Alison Small, did a thorough job rating the various programs, which helped us make the difficult decisions. Even though we had to cut a number of programs — some of them popular with the membership — I believe SEG is now more focused on its mission to advance the science of applied geophysics.

It was an honor and a rich experience to serve on the board for the past three years. These were not the best years for the industry or for SEG, but they were quite formative.

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### **Gustavo Carstens, director at large**

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It is hard to believe that I'm writing the report on my last year as a director at large. I've spent three years on the Board of Directors, working with an amazing group of volunteers and with the staff of SEG — the most dedicated people one can find. That has been rewarding in the current situation.

Considering the origin of most of the funds for the operation of the Society, we are strongly influenced by the oil industry situation. So, it was necessary to work hard on the administration of the crisis.

It is obvious that with limited funds it is not possible to go ahead with all the projects we have had in the past and also difficult to implement new ones. It took a lot of time and arguments to rank everything and then decide what to keep and what not to continue. At every board meeting, we were facing budget problems that needed to be addressed. At every Board meeting, we had to consider again how to serve the membership in the best possible way without compromising the future of SEG.

In a very complex environment, it is almost impossible to keep the number of members of the Society. Many of them lost their jobs and find it difficult to pay their dues. Many different options were considered to help those people, and I'm sure that the current Board is still working hard on this matter.

This time with the Board of Directors of SEG was probably the most rewarding activity in my professional life. I've been a member of SEG for 35 years. I've been part of many committees and task forces, but to be part of the Board is incredible. I encourage all Active Members to get more involved and look for opportunities to contribute to the Society.

## Rocky Detomo, director at large

It has been an honor for me to serve you, the membership, as an SEG director at large during the 2015–2016 session — my first year of a three-year term. The year was a difficult one for your SEG Board of Directors in having to deal with the downturn in the oil and gas industry and its resulting negative impact on many of our members and our annual budget. It is trying times like these that cause us to refocus on the things we believe are truly important, and motivate us to be sure we deliver on the promises that we made. In accepting the nomination for this office, I made several promises to you, the SEG membership. During the 2015–2016 year, these were the actions that I took in support of those promises:

### Helping our young professionals around the world grow.

I have supported the continuation of our most impactful student and educational programs, including the Distinguished Lecture (DL) and Honorary Lecture (HL) programs, and our SEG/Chevron Student Leadership Symposium (SLS), Scholarships, and Student Chapter programs. These are challenging and expensive programs that do not generate sufficient direct income for the SEG, but are critical in supporting the growth of our Student Chapters and future membership. We are fortunate that there is continued strong support for the funding of these programs from oil and gas companies and industry individuals through the SEG Foundation. In addition, I have supported the successful growth of our young professionals and recent graduates through SEG's growing EPIC Program and the development of special interests groups (SIGs). Finally, as a contributor to the Membership Committee, I have assisted in efforts to find solutions to issues that limit the opportunities for our membership to contribute through volunteerism.

### Encouraging our geophysicists to work across discipline and professional boundaries.

As a professional physicist working in the oil and gas industry for more than 36 years, I believe there is tremendous opportunity for our technical membership to work across disciplinary and national boundaries, and in a more integrated way with other closely related technical organizations, such as EAGE, AAPG, SPE, SPWLA, AGU, etc. In this regard, I continue to support our volunteers and contributions to the Offshore Technology Conference (OTC), to our SEAM subsidiary and its integrated modeling projects, to our partners in the fledgling SEG/Halliburton EVOLVE project, and as the SEG Board liaison to the Mining, Development and Production, SEG-AAPG Cooperation, and SEG-SPE Cooperation committees. In each of these areas, SEG is taking steps to reach out and work more closely with members who reach across borders and organizations.

### Contributing to a popular awareness of the positive role SEG plays in society.

I am proud to have been a member of the SEG leadership that has moved strongly to advance our support for women in the industry, and to make more visible to regulators and the populace the important role geophysics plays in helping to understand serious issues facing our society. As a member of the SEG Women's Network Committee (WNC), I challenge all members to work to help address gender issues facing our profession across the globe. Gender equality, opportunity, and respect are not just a "woman's issue," but are a "human rights issue" that we all have a responsibility toward. As a profession that has the knowledge and tools to make the world a better place, I have helped raise additional funding for SEG's acclaimed Geoscientists *Without Borders*® (GWB) program, and I have helped draft an SEG position statement outlining the social contribution of applied geophysics in the areas of energy, water, and climate. I have supported our Passive Seismology Committee's effort to improve understanding and technical awareness around the topic of induced seismicity, and I have strongly supported the important, groundbreaking work that our offices in China and the Middle East have accomplished.

All of these programs are under priority resourcing and financial pressures, but they have been enhanced and continued through the effort of your hard-working and forward-thinking SEG staff and Board of Directors. These staff and professional colleagues, all of whom I consider my friends, demonstrate a dedication and commitment to excellence that I find unmatched in my professional experience! If you ever have a chance, please thank them for the extraordinary effort they make.

The coming years will bring growing challenges for SEG and oil and gas professional societies! A persistent, constrained-oil-price environment will require us to be creative in providing valued programs for existing and new-recruit members. Technology and information-sharing advances will drive us to find innovative ways to deliver programs to membership across the world. The growing diversity in our technology and membership will offer us the opportunity to learn more from each other, and to contribute to the improved identification and use of our resources. These challenges require us to examine how we are doing things today, and how we might do them better in the future! During the next two years, I hope to be able to help the SEG in meeting these challenges. If you have any questions or are interested in learning more about any of these programs, please feel free to contact the SEG staff or me at any time. Thank you for your support.

# Committee/Task Force Reports

## AAPG–SEG Cooperation

### Lance Cole, staff liaison

The AAPG–SEG Cooperation Committee was inactive during the reporting period, with both societies desiring to put activity on hold for a period of time during a period of flux for both societies. The committee was not populated with volunteers. At the end of the reporting period, the elected presidents and executive directors of both AAPG and SEG decided to reconstitute the committee as follows. The committee will consist of four volunteers from each society — a co-chair for each and three at-large members for each with all volunteers being emerging professionals. The decision to fill the committee with emerging professionals empowers that critical demographic to exert major influence on the future cooperative efforts of their societies. The committee will also have a senior management representative from each society to provide institutional memory and guidance on boundaries for committee activities. Volunteer recruitment began in late 2016.

## Advisory

### Don Steeples, chair

The Advisory Committee consists of the five most recent SEG presidents and meets at the sitting president's request to develop and deliver advice on specifically requested topics. The committee met to consider only one issue in August 2016 at President Bradford's request.

## AGU–SEG Collaboration

### John Lane, co-chair

The AGU–SEG Collaboration Committee (ASCC) was established as part of the SEG–AGU Alliance MOU signed in 2010. In the MOU, the ASCC was “charged with considering and making recommendations to the respective organizations regarding areas of cooperation, such as joint workshops or programs and continuing education courses.” AGU and SEG provide complementary support for geophysical sciences with SEG focusing on methodology development in applied geophysics, and AGU primarily supporting geophysics as applied to broader scientific questions. ASCC identified the following areas of overlap between the two communities: active and passive

seismology, gravity and magnetics, electrical and electromagnetic methods, near-surface geophysics, geothermal exploration, and basin analysis.

### 2015–2016

The ASCC meets four times a year, of which two meetings are in-person meetings at the major annual meetings of each organization. The members of the 2015–2016 ASCC are: John Lane (USGS), SEG co-chair; Fred Day-Lewis (USGS), AGU co-chair; Remke van Dam (GapGeo); George Tsoflias (University of Kansas); Ludmila Adam (University of Auckland); John Bradford (Boise State University and SEG president); Richard J. Blakely (USGS); John A. Hole (Virginia Tech); David E. Lumley (University of Western Australia); Louise Pellerin (Green Engineering); Andrew Lamb (USGS); Benjamin Drenth (USGS); and Kamini Singha (Colorado School of Mines). Laurie A. Whitesell (SEG staff liaison) and Robert Stewart (SEG Board liaison) provided support.

### 2016–2017

The members of the 2016–2017 ASCC are: John Lane (USGS), SEG co-chair; Sarah Kruse (University of South Florida), AGU co-chair; Remke van Dam (GapGeo); George Tsoflias (University of Kansas); Ludmila Adam (University of Auckland); José Arce (Arce Geofisicos), John Bradford (Boise State University and SEG past president); Louise Pellerin (Green Engineering); Andrew Lamb (USGS); Benjamin Drenth (USGS); John Louie (UNLV); James Irving (UNIL); Dimitrios Ntarlagiannis (Rutgers University, Newark); Anaja Klotzsche (FZ-Juelich); Alireza Malehmir (Uppsala University); Esben Auken (Aarhus University); Steven Wilson (Seismogenic); and David Okaya (USC). Laurie A. Whitesell (SEG staff liaison) and Madeline Lee (SEG Board liaison) provided support.

In 2011, the SEG and AGU executives approved an MOU that provides a framework for joint meetings and workshops to be held by the two organizations. The first cooperative workshop on hydrogeophysics was held in July 2012. The second workshop, on cryosphere geophysics, was held in January 2013. The third workshop on advancements in active/passive full-wavefield inversion seismic imaging and monitoring techniques occurred in July 2014. The fifth workshop, “Potential field and electromagnetic methods as applied to basin studies,” was held in August 2015. The sixth workshop, “Upper crust physics of rocks,” was conducted in July 2016, and the seventh workshop in this series, “Hydrogeophysics: Imaging the critical zone,” is scheduled for July 2017. The technical committee for this workshop is Rosemary Knight (Stanford co-chair), Kristina Keating (co-chair), Anja Klotzsche, Kate Maher, Daniella Rempe, and Kamini Singha.

During this four-day workshop, hydrogeophysicists and other critical zone (CZ) scientists will collaborate to: (1) become informed and exchange ideas, (2) identify the critical areas of future research to optimize the use of hydrogeophysics for CZ science, and (3) write a white paper identifying research focus areas for CZ geophysics.

The ASCC has the goal to hold joint sessions at the major annual meeting of each organization. The standing Special Session on hydrogeophysics at the SEG Annual Meeting has been held since 2012, with Kristina Keating (Rutgers University, Newark) as lead convener until John Lane (USGS) took over in 2015. At the AGU Fall Meeting beginning in 2013, the SEG Near-Surface (NS) Honorary Lecturer (HL) has spoken at the AGU Near-Surface Focus Group's luncheon and/or has been an invited speaker with a technical session designed around the subject of the lecture until 2016 when the NS HL was canceled. Whenever the SEG NS HL presents or speaks, the SEG has been listed as co-sponsor. The ASCC has discussed improved student collaboration, and both SEG and AGU student program coordinators have joined us to discuss progress.

## Annual Meeting Steering (2016)

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**Sarah Reed, chair**

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In first quarter 2015, former and current Dallas Geophysical Society (DGS) officers, along with other notable geophysicists in the local Dallas community, were recruited to serve as committee chairpersons of the 2016 SEG Annual Meeting Steering Committee. Early recruitment served to provide a seamless transition from the previous steering committee and to gain familiarity with the variety of roles.

Cognizant of fiscal constraints due to the oil industry downturn, the focus of planning the SEG Annual Meeting was to provide value to both exhibitors and attendees while keeping costs low. Though this required the exclusion of the golf tournament, all other events exceeded expectations despite their budgetary limitations. For the SEG Opening Ceremony, the keynote speaker, Dave Hager of Devon Energy, spoke appropriately of "The importance of technology in all commodity cycles" from his unique perspective as both CEO and former geophysicist. Shaunna Morrison, the Applied Science Education Program presenter, inspired future geoscientists with her experience in the Mars Science Laboratory mission interpreting x-ray diffraction data from the Rover Curiosity to make sense of the geologic history

of the red planet. The Annual Meeting festivities closed with the Wednesday night gala at the Omni. Attendees had a memorable time at the western-themed event, which included a mechanical bull and cost only half the original budget allotted for it.

To attract more attendees and exhibitors, the opening dates for meeting registration, technical abstract submissions, and housing were moved earlier in the year to accommodate more time for marketing. This had the added benefit of allowing global attendees to start earlier on the visa process. Incorporating feedback from 2015 exhibitors, coffee breaks were strategically placed on the exhibition floor to increase traffic in the main hall. With this new configuration, attendees had the opportunity to enjoy both the technical and commercial aspects of the Annual Meeting more accessibly.

Other changes included establishing the SEG Pavilion, the Near Surface Pavilion, and the China Pavilion within the exhibit hall. This allowed attendees to review all of SEG's programs and services all in one place, as well as providing focus to the near surface and Chinese communities.

Overall, the 2016 SEG Annual Meeting boasted one of the largest technical programs to date with more than 1500 abstracts submitted and remains an important commercial event in the industry with 85% of attendees arriving with the intention to encounter new products, services, or technology.

## Annual Meeting Technical Program (2016)

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**Charles Sicking and  
Jon Ferguson, co-chairs**

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The Technical Program Committee for the Dallas 2016 SEG Annual Meeting began organizing immediately after the 2015 Annual Meeting in New Orleans. The SEG calendar for the Annual Meeting was followed. Abstracts for presentation were accepted from 1 February through 1 April 2016.

A total of 1513 abstracts were submitted for the 2016 Annual Meeting, of which 1103 presentations were accepted for 140 sessions. The rejection rate of 27% is the lowest in recent years. In addition to having 20 presentation rooms, there was a large space for many poster presentations, and this resulted in the very low rejection rate. Every abstract that passed review was accepted. The number of complaints concerning rejected papers was limited to a very few papers

that did not meet the abstract standards. This indicates that the 27% rejection rate is the correct ballpark for planning future meetings.

The 2016 Annual Meeting had the largest technical program in SEG history. The previous record for the largest technical program was the 2015 Annual Meeting in New Orleans. The 2016 program included 91 oral sessions, 24 E-presentation sessions, and 25 poster sessions. Of the 91 oral sessions, eight were special sessions that provided in-depth discussion on a variety of topics. In addition, there were 19 postconvention workshops that covered a wide range of geophysical topics allowing for the professional development of SEG members.

For the 2016 meeting, the E-posters were renamed E-presentations. As in 2015, the E-presentations were presented in smaller rooms with no stage and used video monitors instead of projectors. This format provided closer interaction with the audience. E-papers were 20-minute slide presentations on video monitors. It was suggested that the E-presentations might be presented on the floor of the exhibit hall. This suggestion was approved for the 2017 Annual Meeting.

There was discussion at the 2015 Annual Meeting concerning the reduction of the length of the presentations to 15 minutes in order to accommodate more presentations and have a lower rejection rate. Because the large number of rooms available in 2016 accommodated all of the accepted abstracts and with a length of 20 minutes, all of the presentations were 20 minutes in length.

In an attempt to increase the traffic on the exhibit floor, the coffee breaks were held during the technical sessions on Monday afternoon, Tuesday morning and afternoon, and on Wednesday morning on the exhibit floor. The coffee breaks were 40 minutes long. This was suggested by the 2015 committee and implemented in 2016 as an experiment. There were few complaints about the coffee-break format for the 2016 Annual Meeting. However, there is little evidence that this coffee-break format impacted the level of traffic on the exhibit floor. It is suggested that putting the E-presentations on the exhibit floor might increase the traffic.

The possibility of having “on-demand” presentations was briefly discussed but was not considered for 2016. This should be considered for future Annual Meetings.

An enthusiastic “thank you” goes to the Technical Program Committee members for their hard work and fast turnaround in assembling this outstanding technical program.

Thank you also to the many hundreds of registered reviewers who reviewed every abstract submitted. Finally, we would like to thank the SEG staff, especially the work of Jenny Cole, for their efforts in supporting the committee and in building the Technical Program.

## Annual Meeting Steering (2017)

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**Craig Beasley, chair**

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Our committee began operation at the end of the 2016 Annual Meeting, as is the custom. We had a productive overlap period for some time prior to this official hand-over where committee members dialed in or attended meetings of the 2016 Annual Steering Committee to learn the process. Members appointed to the committee are: Glenn Bear, vice chair; Mihai Popovici, Technical Program chair; Sergey Fomel, Technical Program co-chair; Carmen Comis, Exhibition; Cung Vu, Sponsorship; Scott Singleton, SEG Opening Ceremony and Presidential Address; Ruben Martinez, International and TP Special Session; Haynie Stringer, Volunteer Program; Denise Dorsey, Guest Program; Minoo Kosarian, Applied Science Program; and Katherine Pittman, Golf Tournament and other activities.

Our initial actions included several new initiatives to enhance value for attendees as well as exhibitors and ease burdens on members. Several events were changed, combined, or altogether eliminated due to cost/benefit analysis. Enhancements included making a two-hour lunch break to allow more concentrated exhibitor/member interaction (including allowing exhibitors to disseminate their presentation schedules to members through SEG), placing posters on the exhibition floor, and delaying the abstract deadline from 1 March to 1 April. One outcome is already known — the submissions to the technical program have reached an all-time record high!

Regional-interest luncheons are being combined into one lunch, and we have eliminated the golf tournament. Various other streamlining actions have been taken. We are leveraging the Geophysical Society of Houston (GSH) to develop joint events around the program, which is a new initiative in some respects. Everything is proceeding apace at this point, and we expect a smooth process leading up to the convention. The committee appreciates all of the hard work being done by the SEG staff to make this difficult task successful. We expect to meet our numbers and perhaps

even exceed — something we were not so sure about — but the early indication given by the number of papers submitted is a very positive sign.

## Audit Committee

### Guillaume Cambois, chair

The Audit Committee consists of three nonexecutive members of the SEG Board of Directors. The members of the 2015–2016 Audit Committee were Xianhuai Zhu, Rocco Detomo, and Guillaume Cambois. Board liaison was Treasurer Alison Small, and staff liaison was SEG Chief Financial Officer Dana Falletti.

The Audit Committee's role is to ensure that proper process is followed, that policies and procedures are in place, and that risk is adequately managed. Two of its main tasks are to review the financial statements with the external auditors, and to ensure due diligence in completing and filing the SEG's IRS 990 and 990-T forms.

The fiscal year 2015 audit — which covered the period from July 2014 to June 2015 — was concluded in October 2015 with no findings to report. This was the last July-to-June fiscal year as we transitioned to a calendar year reporting schedule for 2016. Most of the Audit Committee activity in 2015–2016 was to manage that transition and update policies and procedures accordingly. In particular, we had to amend our Bylaws, which explicitly stated that the Annual Report was to be approved by the Council during the SEG Annual Meeting. The Annual Report publication, along with its approval by the Council, is now disconnected from the Annual Meeting.

This 2016 Annual Report is unique in the sense that it covers 18 months of SEG activity and financial performance: from July 2015 to December 2016. Future years will report 12 months, from January to December.

## Books Editorial Board

### Evert Slob, chair

During calendar year 2016, SEG published:

- *Classical and Modern Diffraction Theory* edited by Kamill D. Klem-Musatov, Henning Hoerber, Tijmen Jan Moser, and Michael A. Pelissier

- *Elements of 3D Seismology, third edition* by Christopher L. Liner
- *Handbook of Poststack Seismic Attributes* by Arthur Barnes
- *Interpreter Sam Carries On* by Donald A. Herron
- *Seismic Diffraction* edited by Kamill D. Klem-Musatov, Henning Hoerber, Tijmen Jan Moser, and Michael A. Pelissier
- *Seismic Petrophysics in Quantitative Interpretation* by Lev Vernik
- *3C Seismic and VSP: Converted waves and vector wavefield applications* by James Gaiser (2016 DISC)

Titles planned for publication in calendar year 2017 include:

- *Basic Geophysics* by Enders Robinson and Dean Clark
- *High-resolution Seismic Exploration* by Qing-zhong Li
- *Introduction to Petroleum Seismology, second edition* by Luc Ikelle
- *Microseismic Monitoring* by Vladimir Grechka and Werner Heigl
- *Seismic Inversion* by Gerard Schuster

Acting as reviewers of book proposals and as managing editors for accepted proposals, board members are committed to identifying topics and authors to keep the books program topical and successful.

## Bylaws

### Richard Mongan, chair

#### 2015–2016 accomplishments

**December 2015 to January 2016:** Amended bylaws for CSEG to include the option of electronic voting by all eligible members — with three-fourths favorable majority by all Active and Honorary Members for a measure's passage — in addition to the sole previous option of votes by only those Active and Honorary Members present in person at a general meeting. Equally, the amendments that were being voted on could either be reported in the CSEG Recorder and/or posted on the CSEG website.

**February 2016:** Began working on revisions to the Bay Area Geophysical Society bylaws and opened up some discussion as to whether we had jurisdiction to dictate bylaw changes to a standalone society that may have started existence as an Associate Section.

**February 2016 to October 2016:** SEG Board requested a change in the Bylaws to change from two professional member types (Associate and Member) to one, which would be named “Member.” Every “Member,” except those in the Student category, would be given the right to vote, to petition the Board, and to run for office on the Board of Directors after being a paid member for a minimum of two consecutive dues-renewal years. To this end, we performed a number of edits and substantial rewrites, presenting our draft to the Board and including the revised wording in *The Leading Edge* (July 2016 issue). Also included in this announcement were revisions to Article XI, Section 2. a. (to appoint a past president to the Honors and Awards committee), and to Article VII (concerning a meeting of the Council in the second quarter of each year for purposes that would include approving the SEG Annual Report [the financial year had now become each calendar year]). An alternate Board Authority Bylaws Amendment was also in progress (August) that stated, “Regardless of membership requirements or constraints in the(se) Bylaws, the Board of Directors may, at its discretion, with a majority vote of a quorum of the Board, confer professional membership on any person(s), thereby granting said person(s) full privileges...”. At the Council Meeting, the motion to essentially remove the Associate Member status category failed by a wide margin, although the Board of Directors had previously approved the revision. We are still faced with the problem of finding more responsibilities for the young (early-career) professionals to undertake in the Society before they can become full Active Members.

**2016-2017 goals:**

- 1) Maintain current and revise where necessary, and requested, SEG Bylaws.
  - a) Collaborate among the Committee, solicit input from the Council liaison and SEG staff, and with the proponents of any change draft verbiage with changes tracked to the original document, to be circulated as set forth to the Board of Directors, in *The Leading Edge*, and to the Council.
  - b) The chair of the Bylaws Committee or an appointed deputy to represent and champion changes to the Bylaws at whichever meeting they are presented.

- 2) Identify and rectify any inconsistency discovered in the SEG Bylaws.
- 3) Assist and approve Sections and Associated Societies with any of their bylaw revisions to be consistent with and acceptable to the SEG Bylaws.

**October 2016 to January 2017:** Collaborated on the revision of 30 Articles/Sections of the CSEG bylaws, many of which reflected current practices; however there were others that addressed gender neutrality and inclusivity. Additional edits addressed online voting, electronic notification, and online publications.

**December 2016 to present:** Reviewing proposed changes to the model bylaws for new SAS.

## Continuing Education

### Shuki Ronen, chair

The Continuing Education (CE) Committee works to provide a curriculum of high-quality professional courses to the exploration-geophysics community. To ensure that the current needs and standards of the community are met, it is essential to exercise constant control on the curriculum of offered topics and the way the courses are given.

**Table 1. CE courses held in 2016.**

Event	Dates	Courses	Participants
URTeC 2016	30–31 Jul	1	17
ICE Cancun	5–6 Sep	2	19
Annual Meeting 2016	15–16 Oct	6	74
SaudiAramco Contract Course	25 Aug–2 Sep	1	20

These numbers are down, presumably due to the downturn in the market.

**SEG on Demand.** SEG on Demand launched its new Learning Management System (LMS) platform just before Annual Meeting 2016. The new platform is much more user friendly from both the learner and admin sides. With this new platform, we are also able to offer bundle learning to companies and institutions at a discounted rate, allowing their employees/students to have 24/7 access to the SEG

on Demand learning library for one-year license terms. Discussions have been opened with several of the key players in the industry.

**Competency Management System (CMS).** In order to help those in the global geophysics community identify new learning opportunities and manage their careers, SEG has partnered with International Human Resources Development Corporation (IHRDC), a respected provider of training and competency development solutions for the oil and gas industry, to provide this valuable tool free of charge to SEG members.

This system allows members to assess their current capabilities against specific competency models for key geoscience careers. The software is designed to easily identify competency gaps based on assessment results, then recommend a learning plan that helps close these gaps. Members are then referred to SEG training resources, including eLearning courses, along with generic third-party course titles, SEG technical papers, books, and on-job work assignments.

As of 31 December 2016, there were 172 accounts created, 114 assessments started, and 49 assessments completed.

## Certification Task Force

### Bill Abriel, chair

In 2015, the SEG Board of Directors authorized the scoping of an international SEG certification, intended to provide a measure of professional capability in the field of applied geophysics. The SEG staff (Executive Director Dorsey Morrow and Associate Executive Director, Operations, Stephen Doukas) commissioned an international member survey, which reported significant majority support for certification as it was described. Support was especially strong among students and young professionals.

Subsequently, a volunteer member task force was formed of the following members: Bill Abriel, Guillaume Cambois, Gustavo Carstens, Mike Graul, Eve Sprunt, and Rob Stewart. The task force held several virtual meetings that reached consensus on the following recommendations:

- Investigate how certification best fits into the SEG strategy and portfolio of offerings.
- Clarify the description of certification in the currently mixed market of licenses, endorsements, noninternational certifications, diplomas, credentials, and accreditations.
- Offer the first SEG certification in oil and gas operations. Subsequent certifications could be formulated later in other fields of application (e.g., groundwater).
- Form an assembly of experts to describe, in detail, the specific job tasks and responsibilities of a petroleum geophysicist.
- Formulate the description of a parallel program of education and learning that relates to building capability (e.g., training) for a geophysicist to reach the certification level.
- Secure funds from stakeholders as needed on a stage-by-stage basis to implement the certification program.

## Continuous Innovation Portfolio

### Alison Small, chair

The Continuous Innovation Portfolio (CIP) Committee did not formally meet or solicit new program initiatives during the 2015–2016 year due to budget constraints and initiation of a new strategic planning initiative. The 2015–2016 was a year of fiscal restraint and budget cuts, and financial information summarized by and for the CIP committee's use was used by the Finance Committee and Board of Directors to inform their financial and budgetary recommendations and decisions throughout the year. The CIP Committee once again gathered financial data and metrics and presented it for consideration in an informal ranking of programs and initiatives.

### 2016–2017 goals

The CIP Committee is evaluating its role within a restructured SEG. The committee is working on a proposal to evolve into a Strategy and Planning Advisory Committee. A planned proposal is currently in circulation for evaluation.

## Committee for Passive Seismology

**Stephen Wilson, chair**

It was a big year for the Committee for Passive Seismology (CPS). Following formation, the committee achieved a great deal with frequent communication with the Board on issues such as felt seismicity and laying the groundwork for events and products that will come to fruition in 2017 and 2018. Moving forward, the committee needs to engage more with the active community and get members of the committee to take on more responsibility.

### Summary of activities:

- 1) Formal formation of committee in Q1 2016 with writing of policies and procedures and draft mission statement. Later, consideration was given to expanding the committee membership.
- 2) Technical stewardship and management of passive sessions at AM 2016.
- 3) Early thinking toward the following activities:
  - a) A 2017 workshop on microseismicity and hydraulic fracturing
  - b) Conceptual thinking toward a forum on felt seismicity
  - c) Developing a plan for generating content for SEG Wiki
  - d) Visioning a podcast
  - e) Supporting SEG communications about passive seismology topics (advisory to SEG Board on public release of information on felt seismicity; *TLE* article in September 2016).

## Committee on University and Student Programs

**Jeffrey Shragge, chair**

The main accomplishments of the Committee on University and Student Programs (CUSP) during 2015–16 were the following:

- By late 2015, the CUSP entry in the SEG Procedures Manual had become significantly out of date with respect to the current SEG student-program offerings and contained material that did not fit within purview of this governing document. To address these issues, a small ad-hoc subcommittee was formed to streamline the CUSP Policies and Procedures document and to generate a separate document containing CUSP procedural and operational details. This rewrite was subsequently approved by the SEG Board.
- Strengthening the Student Chapter Excellence Program (SCEP): The SCEP continues to thrive with a record number of SEG Student Chapters (188) participating in the competition. CUSP recognizes the contributions of the SCEP Subcommittee volunteers (S. Verma, E. Titus, A. Aziz, U. Anyiam, C. Tyagi, M. Vanic, H. Sharma, and X. Lang) who each reviewed approximately 95 applications required to form the rankings. We were pleased to announce at the 2016 SEG Annual Meeting that Pandit Deendayal Petroleum University SEG Student Chapter (India) had been recognized with the 2016 Best Student Chapter award for activities completed in 2015.
- Initial development of an online forum: It has been recognized by CUSP that the SEG Student Chapter Program could be strengthened through the development of an online forum (or e-community) in which Student Chapter members, officers, and faculty advisors could interact with counterparts from other Student Chapters about ideas, interchapter collaboration, and dissemination (and archiving) of best practices. Through an effort led by CUSP co-chairs (A. Roeser and C. Tyagi), a beta version of the e-community is up and running, and is ready for trial use between a few Student Chapters selected for participation.

### The three main objectives of the CUSP Committee during 2016–17:

- 1) Continued development of an SEG Student Online Forum as a moderated e-community space to

promote interaction among the SEG, CUSP Committee members, and SEG Student Chapters throughout the world to disseminate ideas, relevant information, and best practices of operating Student Chapters.

- 2) Provide more effective feedback to SEG Student Chapters to help them strengthen their group, their involvement with SEG, and their standing in the SCEP.
- 3) Reduce the number of inactive Student Chapters that have been out of communication for a number of years by making contact with representatives of these groups, and working with them toward increasing their engagement with SEG.

## Development and Production

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**Reynaldo Cardona, chair**  
**Andrew Royle, vice chair**

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The Development and Production (D&P) Committee continued to promote discussion and interaction on the latest technologies to improve reservoir characterization. This included efforts to organize the annual D&P Forum, the D&P Luncheon at the SEG Annual Meeting, and D&P workshop at the Annual Meeting.

At the SEG Annual Meeting, we held the workshop W-15 on “Hydraulic fracture microseismicity: Understanding the mechanisms to extract greater reservoir value.” Organized by Stephen Wilson, Jim Rutledge, and Dave Diller, the workshop resulted in engaging discussions on a method that has become essential for unconventional activities. The committee also organized the D&P Luncheon at the SEG Annual Meeting with speaker Martin Terrell from ExxonMobil who was scheduled to discuss “The local science of induced seismicity.” Unfortunately, the luncheon was canceled due to low registration.

The committee organized a D&P Forum on “Tight reservoirs” scheduled for 5–6 November 2016 in Abu Dhabi, UAE. Unfortunately, the forum had to be canceled due to low registration. The D&P Committee held its meeting at the SEG Annual Meeting on 17 October where the new chair, Andrew Royle, was introduced. Proposals were discussed to organize a U.S.-based workshop, including some of the papers submitted to the canceled D&P Forum on “Characterization of tight reservoirs.”

### 2016–2017 objectives/update:

- Increase coordination of D&P activities with the AAPG and SPE.
- Promote joint workshops, journal special sections, and forums.
- Focus technical discussions on recommended workflows for reservoir characterization and integration. Topics include: reservoir surveillance (4D, DAS, microseismic), quantitative interpretation, and integrated workflows.

## Distinguished Instructor Short Course (DISC)

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**James S. Schuelke, chair**

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The 2016 Distinguished Instructor Short Course (DISC) instructor was James Gaiser. His course was on “3C seismic and VSP: Converted waves and vector wavefield applications.” The course was very well received and appreciated by the attendees.

However, the downturn in the industry during 2016 had a large impact on our DISC program. The goal was to be revenue neutral, which is difficult for a program that has a great deal of upfront costs and very little lead time on anticipated cash flow. The DISC is a course that is presented in many areas around the world. There is a lot of travel and shipping-related costs. The students typically do not register until the last minute, and they do not need to plan ahead as with an SEG Annual Meeting. This puts a great deal of pressure on the SEG staff, the instructor, and the Committee to determine if a meeting will “make.” Do we have enough students to cover our costs? This year that problem was amplified by the industry downturn.

With that said, we were able to hold 14 DISC stops and only canceled five due to low registration. The locations that had to be canceled were London, Rio de Janeiro, Cancun, Bangkok, and Abu Dhabi. The 14 stops held were Houston, Dallas, Midland, Stanford University, Vienna, Buenos Aires, Adelaide, Perth, Canberra, Kuala Lumpur, Nanjing, Beijing, Tokyo, and Al Khobar. Total attendance for the 14 stops was 335, and we held our year-end losses to a couple thousand dollars. This required a heroic effort on the part of the SEG staff and our instructor.

This new paradigm required the committee to look at various ways to reduce the cost of the DISC program while maintaining quality and worldwide reach. We are working with Doug Oldenburg, the 2017 DISC instructor, to test other delivery methods and the use of online documentation and training tools. Doug's tour has started. He has had five tour stops (as of March 2017) starting with Denver (Colorado School of Mines) and then to Asia with Singapore, Kuala Lumpur, Bandung, and Hyderabad. Next on the agenda is Australia and back to East Asia (May–June). Total attendance for the first five DISCs has been 291.

Doug's course is on "Geophysical electromagnetics: Fundamentals and application." It was selected to expand from our traditional seismic-centric courses and includes several new locations for the DISC.

I want to thank my committee members, and especially the SEG staff and DISC instructors, for their tireless effort in making these courses, which at times seems an impossible task, come off so successfully!

## Emerging Professionals International Committee

**Brandy Hawkins, chair**

The Emerging Professionals International Committee (EPIC) is a small SEG committee responsible for providing value and opportunity to SEG's emerging professionals for professional advancement through networking, education, and professional support. The year 2015 was the first during which EPIC hosted events and activities, and in 2016, EPIC has been working to add value to emerging professional members of SEG (those with fewer than eight years in the industry).

The committee chose LinkedIn as the online meeting space for the group. The group uses the space to post events and other EPIC happenings, as well as articles to keep members up to date on the changes in the geoscience world and to keep everyone interested from an industry perspective. EPIC members all post interesting news from industry, and with representatives from different districts, there are posts from different areas of the world.

EPIC saw its first Annual Meeting gatherings in the EPIC Session, a discussion-based UnConference in which emerging professionals shared knowledge on a number of topics. The group also hosted the EPIC Boat Party, a sold-out networking

event aboard the Creole Queen. Elsa Paul at the Young Professionals' Meet and Greet at ICE Barcelona represented EPIC members, and 89 attendees were in attendance for a talk presented by Chris Liner.

The most successful EPIC programming in 2015–2016 was the EPIC Happy Hours. These informal gatherings allow current and prospective EPIC members the opportunity to network in a relaxed environment in a format that does not require company approval/funding for attendance. EPIC Happy Hour events took place in cities around the world including, Denver, Houston, Berlin, Lagos, Lisbon, and Warsaw. The events saw a good mix of people young and less young, working for service companies and E&P. Conversations hovered on previous experiences with SEG and possible challenges ahead for early-career geoscientists. The group looks forward to even greater technical discussion and presentations as EPIC Happy Hours are paired with SEG-sponsored international lecturer tours and local geosciences conferences.

The committee has added 12 new members over the past year, ensuring that at least one EPIC member represents each of the 12 SEG districts. These EPIC members are charged with getting the EPIC name out there and making an EPIC impact on SEG districts around the world, empowering individual members to make a difference in the lives of geophysicists. When the industry turns around, the emerging professionals will be ready.

### 2016–2017 objectives/update:

- 1) Coordinate at least one networking event for emerging professionals in each of SEG's 12 districts.
- 2) Estimate the number of emerging professionals in each district and how many of them are SEG members. Estimates will be primarily derived from networking events in each district.
- 3) Have at least two emerging professionals actively participating on each SEG committee where committee membership is not otherwise restricted.

## Field Camps

**Madeline Lee, chair**

In 1993, the Field Camp Grant program was established by the SEG Foundation to provide seed money for geophysics faculty and SEG Student Chapters to create

and support field courses that give students hands-on experience with data collection and analysis using geophysical instruments and software applications. The 2016 Field Camp Committee made strategic decisions to develop strategies on supporting existing field camps, while providing a foundation for new field camps, as well as continuing a focus on making health and safety a priority.

In 2016, SEG was successful with the grant-application process yielding 15 applications for funding, totaling US\$227,781. From the submitted applications, the committee selected 12 to receive awards totaling \$119,275. Awards ranged in size from \$5,800 to \$15,000. Awards were given to help sponsor field camps in Bulgaria, Indonesia, Kenya, Romania, Russia, South Africa, and the United States. In total, 714 students participated in field camps sponsored in whole or in part through funding provided by donors to the Field Camp Grant program.

The committee made strategic decisions to strengthen the Health, Safety, Security, and Environment (HSSE) portion of the proposal-evaluation process and to help ensure that the SEG Field Camp Program keeps as a primary focus its objective to provide seed money to create and establish field courses among SEG Student Chapters and in university geophysics programs.

The 2016 Field Camp Committee: Madeline Lee, chair; Ingo Geldmacher, Nawfel Gharieni, John Lane, Tonya Richardson, Steve Sloan, Jeffrey Shragge, and Justin Simmons.

#### **The Field Camp Committee set the following objectives for 2017:**

- 1) Update and streamline the Field Camp Committee Policies and Procedures document such that it provides a separation between the policies (to be included in the SEG Procedures Manual) and the procedural minutiae (contained in an internal committee document that does not need to be modified by the SEG Board). This would use the recently updated Committee on University and Student Programs Policies and Procedures manual as a rough “template.”
- 2) Update the HSSE component of the application process to achieve more complete and detailed submissions.
- 3) Codify the role of an impartial and nonvoting field camp application advisor, who is able to provide early feedback regarding application sufficiency/completeness on submissions received sufficiently in advance.

## **Geoscientists *Without Borders*<sup>®</sup>**

### **Michael Burianyk, chair**

Geoscientists *Without Borders*<sup>®</sup> (GWB) is a cornerstone of the SEG strategic plan and is a significant way in which the organization and its membership seek to make a social contribution. The program provides funding that supports geoscience projects that seek to solve problems of human need around the world.

The GWB grant-application process is divided into two phases: Phase I, which is an abbreviated application summarizing a project plan and the problem it is designed to solve; and Phase II, which requires the submission of a full proposal. A select number of Phase I applicants are invited to submit full proposals for Phase II. During 2016, two rounds of applications were submitted and evaluated. The committee reviewed 22 Phase I applications, of which 12 were invited to submit full proposals in Phase II. The committee selected a total of four projects to award funding totaling approximately US\$320,000.

#### **The following projects were awarded funding in 2016:**

- Geophysical mapping of aquifers in Bolivia — project led by Torleif Dahlin of Lund University
- Capacity building in hydrogeophysics at University of Malawi — project led by Tim Larson of University of Illinois
- Geophysics to enhance agricultural productivity and livelihoods of smallholder farmers through improved groundwater management of the Vientiane Plain, Laos PDR — project led by Okke Batelaan of Flinders University
- GPS training and application to seismic hazard in Southern Haiti — project led by Steeve Smithe of URGeo – Faculté des Sciences in Haiti

The 2016 Geoscientists *Without Borders*<sup>®</sup> Committee includes Michael Burianyk, chair; Najib Abusalbi, Nick Lagrillere, Isabelle Lambert, Doug Laymon,

Phoebe McMellon, Robert Merrill, Richard Nolen-Hoeksema, and Gregg Parker.

### **The GWB Committee set the following objectives for 2017:**

- 1) Update criteria for applications to make it easier for committee to decide rankings.
- 2) Update and publicize interim reporting requirements for projects.
- 3) Understand the needs and requirements of applicants (e.g., salaries for project leads) to help clarify what would be considered valid budget items.

## **Gravity and Magnetism**

### **Neda Bundalo, chair**

The Gravity and Magnetism Committee, within SEG, manages numerous activities related to potential-fields methods. In 2015–2016, the committee was involved in the organization of the Annual Meeting technical sessions, the postconvention workshop, and the luncheon. In addition, throughout the past year, the committee activities included: reviews of technical publications, advising on technical standards, and overseeing the Gravity and Magnetism dedicated list server, which includes geophysicists outside SEG. The committee currently has 93 members.

Chuck Campbell has organized the technical oral and poster sessions, with abstract-reviewing assistance from committee members. There were four gravity and magnetic technical sessions: two oral sessions, one e-poster session, and one poster session. The postconvention workshop, “Optimizing value: Non-seismic data in challenging economic environment,” was organized by Ed Biegert, Vsevolod Egorov, Irina Filina, and Maria Hanciuc and was well attended. The workshop’s new interactive format allowed better audience involvement and discussion about strengths and weaknesses of the methods in the nonseismic toolbox, as well as the advantage of the integration of nonseismic methods with other geophysical and geologic data in an optimization of exploration workflows. The luncheon featured Michael Hiner of EMGS debating various consequences of the impact that created Chicxulub crater in the talk titled “What really killed the dinosaurs.”

The committee supports the Meter Reader column in *The Leading Edge* that focuses on different issues involving potential fields. Jerry Hensel coordinates the publication

of this column. Stephen Erck and Rao Yalamanchili, through the Potential Fields special interest group of the Geophysical Society of Houston (GSH), organized bimonthly dinner meetings in Houston. On behalf of the committee, we congratulate Misac Nabighian, a 2016 recipient of the Life Membership Award.

In 2017, the committee will continue to support SEG-related activities that promote knowledge and applications of gravity and magnetic methods. In addition, the committee will actively support awards and recognitions nominated by the committee members. The chair of the Gravity and Magnetism Committee for 2015–2017 is Neda Bundalo, and the vice chair is Luise Sander.

## **Historical Preservation**

### **Bob Wyckoff, chair**

At the SEG Annual Meeting in October 2016, the SEG Board voted to sunset the Historical Preservation Committee. Committee members present at the meeting were Enders Robinson; Lee Lawyer; Bill Gafford; Tom Agnew; Bob Wyckoff, chair; Gary Hoover; John W. Stockwell, Jr.; Ray Earley; Randy Keller; and Kim Guyer. Following is a summary from that meeting.

Agnew, SEG associate executive director of programs, assured the committee that we were not abandoning historical-preservation efforts, but rather changing from a committee form of commitment to a volunteer commitment. Funds are available from the Cecil and Ida Green Endowment for museum purposes. Agnew mentioned that he would be the contact to receive requests for funding projects on an annual basis. Communications can be accomplished by using an online meeting application.

During the meeting, Lawyer asked if there was not a Historical Preservation Committee, then what would SEG be doing. After discussion, Lawyer recommended forming a special interest group (SIG), which fit well with the model recommended in the meeting handout to continue support for the preservation/education of SEG and SEG Foundation geophysical artifacts and documents through a network of professional geophysical associates, students, and facilities. A SIG roster was established for this purpose.

Keller mentioned three new professors at the University of Oklahoma (OU) to contact for help with the OU exhibits, and he hopes volunteers will be active in the

proposed SIG. Gafford mentioned a renewed two-year lease on the Houston Geoscience Center, and SEG Foundation Trustee Associate Dick Baile added another US\$5,000 matching fund. The Geoscience Center is progressing with buildout and inventory, as well as hosting different groups for meetings and socials.

Stockwell, who chairs the SEG Wiki Committee, has a strong desire to move forward with historical-preservation initiatives. He said Colorado School of Mines (CSM) has little interest in setting up exhibits, but we hear that from other facilities as well. Stockwell has several inventory documents that he received from Susan Henley, former SEG staff member who managed the former Geoscience Center in Tulsa. Interested volunteers will need to be more active with reviewing these documents for contributions to SEG Wiki.

Earley will be part of the SIG and bring Tom Harrold up to date on moving forward with help regarding the Oklahoma State University exhibits. Guyer will be part of the SIG helping at OSU/OU and adding Phillip Hall and John Hooper to the SIG for OU exhibits.

#### **Next steps for 2017 (follow up after meeting):**

- Revise SEG Museum Policies (complete)
- Identify work space/storage in GRC 1 basement (complete)
- Provide exhibits for SEG staff (ongoing)
- Travel to OU and OSU to visit and have new loan agreements signed/check inventory at OU (complete)

## **Honors and Awards**

### **Klaas Koster, chair**

The Honors and Awards Committee consists of the five most recent past presidents of SEG, one appointed each year by the current president. The 2016 members were Klaas Koster (chair), Bob Hardage, Dave Monk, Don Steeples, and Chris Liner. Nominations were solicited from the membership at large following the 2015 Annual Meeting in New Orleans. The contributed suggestions from the membership were augmented by nominations from the Honors and Awards Committee itself. Nominations for certain Best Paper or Best Presentation Awards are provided by the Technical Program Committee for the 2015 Annual Meeting, the Editor of

GEOPHYSICS, the Editorial Board of *Interpretation*, and the Editorial Board of *The Leading Edge*.

The Honors and Awards Committee — following extensive research by each of the committee members — handles the decision process for awards. The Honors and Awards Committee recommendations must receive approval from the SEG Board of Directors.

The following awards were conferred at the 86<sup>th</sup> SEG Annual Meeting held in Dallas, Texas. Full citations for these awards were published in the December 2016 issue of *The Leading Edge*.

#### **Maurice Ewing Award:**

Arthur B. Weglein

#### **Virgil Kauffman Gold Medal:**

Gerhard Pratt and Laurent Sirgue

#### **Reginald Fessenden Award:**

Steve Constable, Gilles Lambare & Sheng Xu, and Bill Goodway

#### **Life Membership:**

Christine Krohn, Edith Miller, and Misac Nabighian

#### **J. Clarence Karcher:**

Dario Grana and Nishank Saxena

#### **Special Commendation:**

Dennis Corrigan

#### **Distinguished Achievement:**

OpendTect

#### **Honorary Membership:**

Joe Dellinger

#### **Cecil Green Enterprise Award:**

Yves Lamontagne (Lamontagne Geophysics Ltd.)

#### **Outstanding Educator:**

Roel Snieder and Estella Atekwana

#### **Best Paper in *The Leading Edge* in 2015**

“Separated-wavefield imaging using primary and multiple energy,” *Shaoping Lu, Dan N. Whitmore, Alejandro A. Valenciano, and Nizar Chemingui*

**Honorable Mentions (2),**

**Best Paper in *The Leading Edge* in 2015**

“Can we ever trust the shear-wave log?” *Arthur C. H. Cheng*

“Microseismic shearing driven by hydraulic-fracture opening: An interpretation of source-mechanism trends,” *James Rutledge, Xin Yu, and Scott Leaney*

**Best Paper in GEOPHYSICS in 2015**

“A seismic vertical vibrator driven by linear synchronous motors,” *Rik Noorlandt, Guy Drijkoningen, Johan Dams, and Rob Jenneken*

**Honorable Mentions (4),**

**Best Paper in GEOPHYSICS in 2015**

“Inversion for permeability distribution from time-lapse gravity data,” *Joseph Capriotti and Yaoguo Li*

“Validity of the acoustic approximation for elastic waves in heterogeneous media,” *Philippe Cance and Yann Capdeville*

“Multidomain petrophysically constrained inversion and geology differentiation using guided fuzzy c-means clustering,” *Jiajia Sun and Yaoguo Li*

“Removing false images in reverse time migration: The concept of de-primary,” *Tong W. Fei, Yi Luo, Jiarui Yang, Hongwei Liu, and Fuhao Qin*

**Best Paper in *Interpretation* in 2015**

“Identification of brittle/ductile areas in unconventional reservoirs using seismic and microseismic data: Application to the Barnett Shale,” *Roderick Perez Altamar and Kurt J. Marfurt*

**Technical Program Awards**

**SEG’s 85th Annual Meeting, New Orleans, Louisiana**

**Top Oral Paper**

“Dense sources versus dense receivers in the presence of coherent noise: A land modeling study,” *Carl Regone\*, Michael Fry, and John Etgen*

**Oral Paper Honorable Mention**

“An integrated, multidisciplinary approach utilizing stratigraphy, petrophysics, and geophysics to predict reservoir properties of tight unconventional sandstones in the Powder River Basin, Wyoming, USA,” *Jeff Zawila\*, Sam Fluckiger, Gary Hughes, Preston Kerr, Andrew Hennes, Michael Hofmann, Haihong Wang, and Howard Titchmarsh*

**Top Poster Paper (Tie)**

“Inferring marine sediment type using chirp sonar data: Atlantis field, Gulf of Mexico,” *Jiannan Wang\* and Robert Stewart*

“Quasi-P-wave propagation with an elliptic differential operator,” *Sheng Xu\*, Bing Tang, Jun Mu, and Hongbo Zhou*

**Poster Paper Honorable Mention**

“New concepts for lowering the cost of frequent seismic reservoir monitoring onshore,” *Kees Hornman, Jorge L. Lopez\*, Alben Mateeva, and Hans Potters*

**Top Student Oral Paper**

“Comparison and improvement of laboratory sip and NMR models of permeability,” *Gordon Osterman\*, Kristina Keating, Lee Slater, and Andrew Binley*

**Student Oral Paper Award of Merit**

“3D GPR characterization of sandy mouth bars in an outcrop reservoir analog: Cretaceous Ferron sandstone, south-east Utah,” *Azie Aziz\*, Mohammad Ullah, Robert Stewart, and Janok Bhattacharya*

**Top Student Poster Paper**

“Full-waveform inversion with sparsity constraint in seislet domain,” *Zhiguang Xue\* and Hejun Zhu*

**Student Poster Paper Award of Merit**

“Accelerating extended least-squares migration with weighted conjugate gradient iteration,” *Jie Hou\* and William Symes*

\*Denotes presenter

## Health, Safety, Security, and Environment

### Ian Threadgold, chair

October 2015 through October 2016 was the third year of operation for the SEG’s Health, Safety, Security, and Environment (HSSE) Committee. The committee’s ninth meeting was held at the 2015 SEG Annual Meeting. Attendance at that committee meeting, however, was poor.

Over the remainder of the year, the committee attrition continued. Several of the members lost their jobs (including

the SEG staff liaison to the committee), and several others had to drop out due to increased workload during the industry downturn. Overall, we lost 75% of the committee membership during this year. We were left with three members, which included the outgoing board liaison and committee chair, who both completed their three-year terms.

The HSSE Committee had been developing drafts of three guidance documents during its time in operation, on the following topics:

- Exhibition floor safety guidelines (developed jointly with SPE)
- Guidance on personal protective equipment (PPE) for field activities
- Guidance on the development and implementation of HSSE plans for student field activities

The committee perceived these as significant areas of risk or hazards in activities that the Society managed or sponsored, and it was felt that guidance could help reduce those risks. The significant drop in committee participation, due to the industry downturn, delayed completion of the documents and getting SEG Board approval. However, it remains a goal that this work not be lost and still is brought to completion.

#### **2016–2017 objectives/updates:**

Since October 2016, the chair has been asked to continue for a fourth year, and the following goals for the committee were established:

- Attempt to renew the committee membership after losing 75% in the downturn. In addition identify potential chair for 2017–2018.
- With postings on the SEG LinkedIn page and in the SEG SmartBrief, two new volunteer HSSE Committee members were identified. This brings total to seven including SEG Board and staff liaisons.
- An original member of the committee has expressed some preliminary interest in being the next chair of the HSSE committee after the 2017 Annual Meeting.
- Get the three guidance documents that the committee has developed through approvals by the SEG Board or business office, as appropriate.

- After discussions with SEG Executive Director Dorsey Morrow and SEG Director at Large Paul Cunningham, the exhibit floor safety guideline was deemed not necessary, as SEG is considered indemnified by contract with Freeman, the exhibition services company SEG employs, and via exhibitor insurance policies.
- PPE and field-plans guidance will be circulated for comment in the revised committee in Q2, then sent to the Field Camps and Geoscientists *Without Borders*® Committees for comments, before sending to the SEG Board.
- Develop a forward plan for the committee if membership can be increased to a viable level.

The committee’s mission continues to be “... to help ensure that HSSE is taken into consideration for any activities that the SEG manages or sponsors. It will not duplicate the work that the IAGC and IOGP do with HSSE for geophysical operations but rather compliment it, and utilize wherever possible industry guidance already developed.”

## ***Interpretation* Editorial Board**

### **Kurt J. Marfurt, editor-in-chief**

This is the fourth *Interpretation* annual report since its launch in October 2012. The Editorial Board members for 2016 included Kurt Marfurt, editor-in-chief (EIC); Hongliu Zeng, deputy EIC; William L. Abriell; Huyen Thi Thanh Bui; Thomas Hearon; Donald A. Herron; David H. Johnston; Steve Laubach; Balazs Imre Nemeth; John J. O’Brien; Oskar Vidal Royo; Cedric Schmelzbach; Gerard T. Schuster; Stephen A. Sonnenberg; Tracy Stark; Linda R. Sternbach; Yonghe Sun; Lisa Stright; Leslie Wood; Chicheng Xu; and Guangfa Zhong.

*Interpretation* is built on special sections, with standing sections on “Tools, Techniques, and Tutorials” and “Pitfalls,” as well as a general technical section. There are three motivations for the special sections. First, the readers of *Interpretation* can find multiple articles addressing a given technical topic or geologic basin, thereby identifying unifying themes and alternative perspectives. Second, the special sections are organized by guest editors, thereby broadening not only the intellectual scope but also the geographic and demographic diversity of the journal. Third, in addition to the

published Call for Papers requesting submissions from the geotechnical community at large, the special editors directly enlist contributions from potential authors who are either authorities on a specific technical topic, or seasoned interpreters in a specific basin. Such invitations from the special editors, on behalf of AAPG and SEG to publish in *Interpretation*, greatly facilitate the release of proprietary data, workflows, and best practices from company management. Indeed, such requests are correctly viewed as outside recognition of company expertise and therefore aligned with business goals of being a preferred partner, operator, or technology provider.

The expectation is that each board member will initiate at least two special sections each year. Not all special sections receive the minimum of four papers; in this case, accepted papers appear in the general technical section. Papers accepted for publication prior to the target special section publication date are placed online as accelerated articles immediately after they have gone through the galley proof.

Tables 1 and 2 summarize the origin of papers. Table 1 represents the period July 2015–June 2016, and somewhat represents the membership of SEG and AAPG. However, at the recommendation of former Deputy Editor-in-Chief Randy Ray, we have enlisted special editors to construct several basin-focused in addition to technology-focused special sections. In 2016, there were special sections on the deepwater South China Sea as well as on the Gulf of Mexico basins, resulting in an increase in authors from China (Table 2). The upcoming 2017 special sections on gas hydrates in the South China Sea and lacustrine reservoirs in China's Ordos Basin, as well as the Niobrara Basin and Appalachian Basin of the United States, has led to submissions from China exceeding those from the United States (Table 3). Future special sections will increase this diversification with Calls for Papers submitted for one or more basins in Eastern Europe, Canada, and Argentina as well for others in the United States.

Tables 3 and 4 group the contributions by type of institution. With the continuing low oil price and depressed industry employment opportunities, and the desire of university students to document their capabilities through peer-reviewed publications, it should be no surprise that universities contribute 60% of the papers. However, note that the simple classification in these tables has a North-American bias — with many of the Chinese “university” authors working in institutions that are more

accurately categorized as a university-industry-government technology labs based at university sites.

During its fourth year in 2016, the reputation of *Interpretation* has grown. As an academic working in the exploration area, I have the privilege to visit and interact with oil and gas companies around the world, as well as with other academic institutions. Anecdotally, I believe that *Interpretation* has quickly found its niche and has hit its target audience in the interpretation community. More quantitatively, in only its fourth year of publication, and through the diligent efforts of the previous editor and deputy editors-in-chief, Yonghe Sun and Randy Ray, and the SEG and AAPG Tulsa-based editorial staff, Thomson Reuters ISI included *Interpretation* in its Science Citation Index (SCI). Many government research institutions and universities use the SCI as a component in employee evaluation and promotion decisions. While the initial impact factor of a brand-new journal is low (*Interpretation's* SCI = 0.52 for 2016, Table 8), the process is now open for future authors to build on this early success and increase the journal's impact.

This success has led to some growth pains in 2016, with a significant increase in the number of unsolicited papers to the general technical section (Table 5). As deputy EIC in charge of the technical section, Hongliu Zeng was quickly overwhelmed. To address this issue, we requested and were granted permission to define a cadre of high-energy deputy associate editors, including Gaurav Dutta, Dallas B. Dunlap, Shu Jiang, Mason Kass, Chaoli Lan, Marcilio Castro de Matos, Osareni Christopher Ogiesoba, Bradley C. Wallet, Rui Zhang, and Bo Zhang. These deputy associate editors have been proficient in conducting efficient, timely, and objective reviews of papers ranging from neutron density log interpretation to seismic imaging of fractured reservoirs. With their hard work, we have reduced the average time of the first review by 15% from 69 days in 2015 to 59 days in 2016 (Tables 6 and 7).

In summary, through the efforts of the Tulsa-based editorial staff, the work of the special section editors and the board of editors, and most importantly, the contribution of the authors and reviewers, *Interpretation* is running smoothly, addressing the needs of our readership, and further building its reputation as a peer-reviewed journal.

**Table 1. Origin of papers submitted for publication in Interpretation by country, 1 July 2015–30 June 2016.**

USA	96
China	34
Canada	13
UK and Northern Ireland	11
Brazil	6
France	5
Australia	4
Spain	4
Egypt	3
Germany	3
Netherlands	3
Saudi Arabia	3
Switzerland	3
Denmark	2
India	2
Italy	2
Mexico	2
Norway	2
Austria	1
Japan	1
Malaysia	1
New Zealand	1
Nigeria	1
Romania	1
Russian Federation	1
Sweden	1
Syrian Arab Republic	1
Taiwan	1
Turkey	1
<b>Total</b>	<b>208</b>

**Table 2. Origin of papers submitted for publication in Interpretation by country, 1 January 2016–31 December 2016.**

China	72
USA	70
Norway	14
Canada	11
UK and Northern Ireland	10
Saudi Arabia	9
Brazil	6
Spain	4
France	3
Russian Federation	3
Switzerland	3
Argentina	2
Australia	2
Egypt	2
Germany	2
India	2
Malaysia	2
Netherlands	2
New Zealand	2
Denmark	1
Hungary	1
Italy	1
Japan	1
Nigeria	1
Portugal	1
Romania	1
South Africa	1
Sweden	1
<b>Total</b>	<b>230</b>

**Table 3. Origin of papers submitted for publication in Interpretation by employer, 1 July 2015–30 June 2016.**

Universities . . . . .	111
Oil Companies . . . . .	35
Service Companies and Manufacturers . . . . .	18
Research Institutes . . . . .	17
Consultants . . . . .	16
Governments . . . . .	9
Instrument Companies . . . . .	1
Retired . . . . .	1
<b>Total . . . . .</b>	<b>208</b>

**Table 4. Origin of papers submitted for publication in Interpretation by employer, 1 January 2016–31 December 2016.**

Universities . . . . .	140
Oil Companies . . . . .	28
Research Institutes . . . . .	22
Service Companies and Manufacturers . . . . .	17
Governments . . . . .	12
Consultants . . . . .	11
<b>Total . . . . .</b>	<b>230</b>

**Table 5. Planned and published special sections in the quarterly (February, May, August, and November) issues.**

Year	2013		2014				2015				2016				2017			
	A	N	F	M	A	N	F	M	A	N	F	M	A	N	F	M	A	N
Planned special sections	1	1	2	2	4	8	8	8	6	7	3	5	6	6	4	4	7	6
Special sections published	1	1	2	3	3	4	6	6	8	4	3	5	6	6	4	4	-	-
Papers in special sections	8	10	23	21	19	26	35	32	50	30	27	22	28	13	19	-	-	-
Papers in general technical section	9	7	4	6	2	9	4	7	4	6	7	11	13	18	11	-	-	-
Total papers published	21	19	28	26	21	35	40	41	55	38	35	34	42	33	30	-	-	-

**Table 6. Manuscript-handling statistics.**

<b>Year submitted</b> <b>1 July–30 June</b>	<b>Average number of days</b> <b>required for first review</b>
2013–14 . . . . .	64
2014–15 . . . . .	69
2015–16 . . . . .	59

<b>Year submitted</b> <b>1 January–31 December</b> *2016 . . . . .	<b>Average number of days</b> <b>required for first review</b>
	59

\* First reviews have not been returned for all papers.

**Table 7. Manuscript-handling statistics.**

<b>Year published</b> <b>1 July–30 June</b>	<b>Average number of days</b> <b>between acceptance and online publication</b>
2013–14 . . . . .	82
2014–15 . . . . .	70
2015–16 . . . . .	58
All of 2016 . . . . .	68

**Table 8. Impact factor.**

<b>Year</b>	<b>Impact factor</b>
2016 . . . . .	0.510

## Meetings Review and Planning Committee

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**Mark Houston, past chair**  
**Carmen Dumitrescu, current chair**

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**Mission:** The primary mission of the Meetings Review and Planning Committee (MRPC) is to provide to the SEG Board of Directors and SEG staff member-driven advice for all proposed meetings that request in-kind or financial support of SEG. A secondary purpose of the MRPC is to ensure that all segments of our Society have visibility, voice, and representation into the content, approval/rejection, and scheduling of proposed meetings. MRPC membership includes representatives from SEG's regional advisory committees (RACs), from SEG standing committees (IQ Earth, Research, Development and Production, Gravity and Magnetics, Oil and Gas Reserves, and Mining and Geothermal), and from intersocietal/cooperative committees (OTC, Intersocietal Relations, Arctic Tech, and Global Affairs).

### 2015–2016 accomplishments:

- Meeting approvals — The slate of reviewed and approved meetings mirrors the changing face of SEG membership and the continuing historically low oil prices. Of 25 submitted and approved meeting proposals, about 70% of the meetings were international and 50% were intersocietal or jointly sponsored meetings. Meetings sponsored or initiated by the SEG regional offices (Middle East and China) increased to 40% and no student-focused meetings were submitted for approval.
- Meeting classification change — The old meeting classification in terms of Levels I–V was replaced with two categories which better reflect resource and financial SEG commitments:
  - PROMOTED meetings, which do not require SEG Board approval, that SEG will encourage and help market, and
  - OPERATED meetings, which do require SEG Board approval, that SEG will commit staff and financial support.

### 2016–2017 objectives/updates:

- Revamp the Meeting Proposal Submittal Form to better estimate the meeting costs and finances, and to clarify

the expected benefits from the requested meeting to help allocate SEG staff and financial resources.

- Continue to provide informed recommendations to the SEG staff and Board on event approvals, making sure that the events are consistent with the SEG mission; appropriately separated in time, geography, and subject matter; and that the meetings are fiscally effective for SEG.
- Encourage closer communications between the RACs and the Global Affairs Committee (GAC) to identify particular needs for proposed SEG meetings. Specifically, the RACs should act as advisors for their regions and countries to highlight meeting needs from SEG.
- Finally, the MRPC will work with SEG staff to:
  - Provide a more complete calendar, by region, to include AAPG, EAGE, SPE, AGU, DUG, and other pertinent geoscience/engineering meetings, workshops, etc.
  - Provide a link to the World Health Organization advice page to help facilitate meeting planning for staff and members.

## Membership Committee

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**Madeline Lee, chair**

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At the time of the 2016 Annual Meeting, the official member count (paid and lapsed) was 26,691, which included 9900 students, 9331 Active Members, and 7460 Associate Members. The 2016 diversity report indicated that SEG's professional members reside in 119 countries and student members in 92 countries, with 357 student chapters in 67 countries.

In 2016, the Membership Committee, along with support from SEG staff, conducted research on determining different channels to support emerging professionals, whether through combining Associate and Active into one professional membership, streamlining the transfer process from Associate to Active membership, or decreasing the number of experience years required to be an Active Member. A potential benefit of this process could result in more SEG members participating in executive positions. These are

still important discussions that are supported by the current Membership Committee.

Sponsorship of student membership dues has been key to student membership enrollment in past years, and ensuring a long-term funding solution for student membership is critically important. The Membership Committee assessed the Society's student membership eligibility requirements and the impact of restructuring membership dues similar to dues of sister organizations. Additionally, dues waivers were put forward to enable students from World Bank I, II, and III countries to request a dues waiver until SEG has a method for receiving payments from these countries.

SEG rolled out a digitally focused marketing campaign that included the "Seismic Soundoff" podcast and the "SEG SmartBrief," which aim to meet the needs of SEG's members and attempt to increase member retention. These new marketing tools, such as the "SEG SmartBrief," were well received, especially with emerging professionals.

Finally, implementation of the dues-waiver process allowed SEG to support members by retaining their Associate and Active memberships, and the Membership Committee became more involved in the Active Member application process, which streamlined the process for applicants and ultimately the Board.

**The Membership Committee and SEG staff remain committed to the following objectives in 2017:**

- Identify payment options other than in U.S. dollars for those who reside outside the United States to support SEG as a global society.
- Engage emerging and young professionals in the Society and increase their involvement in the Council and committees.
- Determine a modified membership scheme by merging SEG Associate and Active memberships to one professional membership.

## Mining

### José Arce, chair

José Arce served his final year as chair of the Mining Committee in 2016. As he stepped down, Sean Walker took the chair position, with Jean Legault as his co-chair.

During 2016, the SEG Mining Committee held meetings both at the Vancouver Roundup in January — organized by Ken Witherly and Sean Walker — as well as during the Prospectors and Developers Association of Canada (PDAC) yearly conference held in March in Toronto. The meeting during the PDAC was held at the Metro Toronto Convention Center, and the location was arranged by Ken Witherly.

The 2016 Dallas Annual Meeting had an extensive program for us. The mining group organized three technical sessions — two oral and one poster session — with attendance varying between 20 to 50 participants. A few of the presentations were selected for their outstanding quality and given a committee award, including the "Best Student Paper Award" given to Michel Gaucher for his poster presentation. The committee also organized a field trip to the Halliburton Wireline Training Facility to learn of future technologies that eventually will be used in downhole mining geophysics as well. We also organized two workshops: one half-day workshop on unmanned-vehicle geophysical applications, championed by Sean Walker; and an airborne-induced polarization (AIP) full-day workshop led by Jean Legault.

Also, as part of the program, the committee invited mining geophysics students for a social gathering at the Biergarten and later on, took the students to dinner along with several of our professional members. During our Mining Luncheon, Yaoguo Li from the Colorado School of Mines Center for Gravity, Electrical and Magnetic Studies (CGEM) gave a presentation titled "Geology differentiation using inversions of multiple geophysical data sets: A new frontier in quantitative geophysical interpretation." The luncheon also had high attendance.

During the Dallas Annual Meeting, the committee met and discussed several issues. As a first order, there was a vote to select our key technical contact for the 2017–2018 period, and Glenn Chubak was selected. José Arce then stepped down as the committee chair, and Sean Walker and Jean Legault took the positions of chair and co-chair of the committee.

## Publications Policy

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### Tamas Nemeth, chair

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The Publications Policy Committee, comprised of leaders of SEG publications boards and committees, recommended two sets of policy changes that subsequently were adopted by the SEG Board of Directors in late 2015 and during 2016:

- Elimination of all mandatory color charges for GEOPHYSICS authors and increase in page charges for both GEOPHYSICS and *Interpretation*
- Elimination of the requirement that authors electing to pay the author processing fee for open-access publishing also be required to pay all voluntary page and color charges in addition to mandatory page and color charges
- Approval of several procedures manual changes related to a Bylaws change creating a Vice President, Publications position on the SEG Board of Directors and removing the Editor position from the SEG Board

The committee also had discussions about the possibility of adopting double-blind peer review for GEOPHYSICS and possibly other publications. This investigation is ongoing.

#### 2016–2017 objectives/update:

In addition to addressing questions about review processes, the committee will in 2017 prepare for adjustments related to the Vice President, Publications position. This vice president will become a member of the committee, then become chair of the committee after her or his SEG Board of Directors service is complete.

The committee will be charged with reviewing multiyear business plans for SEG publications, including ongoing developments to increase discoverability of SEG content and to meet public-access and open-access mandates. The committee also will focus on whether and how SEG publications activities must adapt to help fulfill the strategy the Society adopted in 2016.

## Research

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### Jacques P. Leveille, chair

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The Research Committee currently has dispersed members from a variety of industry segments and academia. Membership has declined even though we added 12 new members. We started with 128 members in January 2015 and ended 2016 with 84 members. This is obviously a reflection of the deep downturn in exploration and production. In 2015–2016, many companies continued to implement travel restrictions or bans. This has led to the cancellation of all the planned Summer Research Workshops in 2016, although two have been postponed until 2017. The committee continued its role in providing special sessions and postconvention workshops at the SEG Annual Meeting.

#### 2016 Annual Meeting Special Sessions:

- Recent advances and the road ahead
- Injection-induced seismicity

#### 2016 Annual Meeting Postconvention Workshops:

- Where are we heading with FWI? — Part 1
- Towards a better understanding of the uncertainty in seismic images
- 4D Part 1 — Time lapse studies: Unleashing their potential
- Microseismic/passive seismic for reservoir properties
- VO into the 21st century
- Multiphysics — Integration for exploration and formation evaluation and reservoir monitoring
- Fiber-optic sensing for exploration and monitoring: Development, applications and challenges
- 4D Part 2 — Reservoir surveillance in a “lower for longer” world: Getting more for less
- Better understanding of surface noise in land data (canceled)
- Low cost geophysics: How to be creative in a low-cost environment

- Where are we heading with FWI? — Part 2

#### 2017 SRW and other joint society planned workshops:

- Reservoir monitoring for CO<sub>2</sub> injection projects (postponed from 2016)
- Elastic imaging: From acquisition to elastic earth model determination (postponed from 2016)
- GU/SEG workshop on the upper crust physics of rocks

#### Other activities/updates:

There were continued efforts to improve active member participation through the creation of various subcommittees. The Research Committee also responded to a request by then-SEG President John Bradford for recommendations on how to improve the quality of the technical presentations at the Annual Meeting. A set of recommendations was generated and shared with the president. The Board of Directors recognized that many good ideas and suggestions were contained in the report and directed the Research Committee to work with the Publications Policy Committee and the Technical Program Committee for the 2017 Annual Meeting to consider and implement suggested improvements. This activity is under way.

Four outstanding candidates ran for the vice chair position. Azra Tutuncu of Colorado School of Mines was elected vice-chair while Partha Routh took over the duties of chair of the Research Committee at the end of the 2016 Annual Meeting.

## Reviews

### Patrick T. Taylor, chair

My term as chair ended last September when Sven Treitel assumed this position. For the period of October 2015 through September 2016, there were 28 book reviews in *The Leading Edge*, five fewer than last year. These reviews covered a wide range of earth-science topics, but most concerned exploration geophysics. With 34 members, we anticipate the high level of reports useful to the SEG membership will continue. Kudos once again to Stacy Baker (SEG staff liaison) for her excellent job of processing the reviews and other editorial matters.

## Scholarships

### Andreas Rueger, chair

Since its inception in 1956, the SEG Scholarships Program has helped advance geophysics today and inspire geophysicists for tomorrow. Approximately US\$7.5 million in scholarship money has been awarded to date to the top geosciences students in the world. From freshmen just beginning their education to PhD students doing research to advance the field, SEG scholarship awardees are recipients of the most prestigious geoscience scholarship in the world. They are the beneficiaries of the gifts from SEG members, their employers, SEG Sections and Associated Societies, and memorial funds established to honor colleagues, friends, and family members of geophysicists.

From October 2015 to October 2016, the SEG Scholarships Committee managed the application process for the 2016–2017 academic year. The committee evaluated 655 applications and granted 148 students scholarships totaling \$560,002.66.

During the evaluation process, each committee member ranked applicants for merit based on information provided in their applications. Individual rankings were compiled and a composite-forced ranking was created to determine the highest-qualified applicants in each of six categories (freshman, undergraduate, and graduate, each divided into North American and international). The committee considered the specific selection criteria for each of the individual scholarships and carefully matched qualified applicants, in some cases with the assistance of advisory boards that provided feedback and recommendations on applicants. All scholarships are merit-based, ensuring that the top geoscience students in the world are honored and awarded.

During that time period, Scholarship Committee members also served as mentors to each of the 142 recipients for the 2015–2016 academic year, helping them learn more about career opportunities in geophysics and connecting with valuable resources to enhance their education and prepare for their careers.

Scholarships Committee members in 2016 were Andreas Rueger, chair; Zhaobo Meng, Ron Kerr, Camelia Knapp, Bruce Mattocks, Karl Schleicher, Esther Babcock, and Lorie Bear.

### The Scholarship Committee set the following objectives for 2017:

- 1) Maximize the global reach of the SEG Scholarships program using as much of the unrestricted scholarship funds as possible to award scholarships to students around the world (particularly in light of the loss of funds specifically for students in universities outside of North America).
- 2) Determine the best strategy for awarding scholarship funds, using the SEG Strategic Plan for guidance.

## SEG–NGWA Collaboration

### John Lane, co-chair

The SEG–NGWA Collaboration Committee (SNCC) was established as part of the SEG–NGWA affiliation MOU signed on 23 May 2016. In the MOU, the National Groundwater Association (NGWA) was “charged with considering and making recommendations to the respective organizations regarding areas of cooperation, such as joint workshops or programs and continuing education courses.” NGWA and SEG provide complementary support for geophysical sciences with SEG focusing on methodology development in applied geophysics, and NGWA primarily supporting geophysics as applied to hydrologic scientific questions. The collaboration committee identified the following areas of overlap between the two communities: water resource management, ground and surface water measuring and monitoring, and remediation of water resources.

The committee meets four times a year, of which two meetings are in-person meetings at the major annual meetings of each organization. The members of the 2016–2017 committee are: John Lane (USGS) SEG co-chair; Bill Alley (NGWA) co-chair; John Jansen (LBGMN); John Sciacca (AECOM); Jonathan Ajo-Franklin (LBL); Kristina Keating (Rutgers University, Newark); Gordon Osterman (Rutgers University, Newark), and Stephen Moysey (Clemson). Laurie Whitesell (SEG staff liaison) and John Bradford (SEG Board liaison and SEG past president) provided SEG support.

In 2016, the SEG and NGWA executives approved an MOU that provides a framework for joint meetings and workshops to be held by the two organizations.

## SEG Oil & Gas Reserves

### Eric von Lunen, chair

During 2016, the joint society effort updating the Petroleum Resources Management System (PRMS) guidance document continued. Early in 2017, the draft was distributed for review. SEG sees three critical elements within the document to watch closely. These are:

- Glossary of terms, with our intent to use similar definitions on critical words within document
- Reliable technology, with our intent on advocating geophysical technology as quantifiable in uncertainty and confidence discussion
- PRMS principles encapsulated in figures: resource classification of initial petroleum in-place tied to uncertainty and figures describing project maturity subclassification in terms of project status of commerciality, and jointly tied to uncertainty

Past team members have been helpful in transition to new chair.

At the SEG Annual Meeting postconvention workshop, we had a lively discussion on OGRC concepts that was attended by approximately 25 people. Guest speaker Creties Jenkins (AAPG) led a discussion in what technology (in his mind) applies to resource/reserve discussion in unconventional exploitation. This discussion drifted to critical issues listed above, reliable technology in terms of uncertainty and path forward to implementation of reliable technology with and without classic case-history concept.

Finally, there were several discussions between the Canadian Society of Exploration Geophysicists (CSEG) and SEG leadership on the OGRC on the PRMS topic. CSEG has a parallel document (COEGH) being developed within Canada.

## SEG–SPE Collaboration

### Jamie Rector, co-chair

The SEG–SPE Collaboration Committee’s work has fostered a series of workshops on injection-induced seismicity. Per agreement, the societies take turns being the primary operator. The initial SPE-operated workshop occurred in September 2012 in Broomfield, Colorado,

USA. Being a sensitive issue only beginning to be understood, response was strong — basically a sellout. This led to a second SEG-operated workshop in September 2014 in Banff, Alberta, Canada, which was also a sellout. Purposely scheduling workshops about 18 months apart — long enough for advances in understanding to occur — a third SPE-operated workshop was held 28–30 March 2016 in Fort Worth, Texas, USA. There were six volunteers on the organizing committee with SEG’s co-chair being Shawn Maxwell and SPE’s co-chair being Norm Warpinski.

Technical content in the workshop series has mirrored evolving technical understanding. While the initial two workshops focused primarily on seismology, the Fort Worth workshop purposely focused on engineering considerations. As with the initial two workshops, the Fort Worth workshop was a sellout. Financially, after reimbursing SPE the agreed upon US\$35K operator fee, the workshop still generated a net surplus of about \$25K with 35% of that going to nonoperator SEG. Planning is under way for a fourth SEG-operated workshop in late 2017 from which SEG would receive the \$35K operator fee plus 65% of any net surplus.

Fort Worth attendees represented a good mix of stakeholders, 64% representing industry (operators, service companies, and consultants), 18% from government and regulatory bodies, and 14% from academia. The participants were distributed approximately equally among engineers, geophysicists, and those representing other areas of expertise. Technical sessions featured invited speakers covering a broad range of topics from case studies, seismology aspects, geomechanics, fracture mechanics, reservoir engineering, regulations, protocols, risk, liability, mitigation, and communication with the public. Several technical posters rounded out the technical content.

Technical content in the workshop series reflects evolving stakeholder knowledge. Back in 2012, there were few confirmed instances of induced seismicity or direct causation from specific injections. By 2016, the scientific community had widely acknowledged that injection-induced seismicity is occurring in certain locales. Seismic monitoring and processing techniques have improved, regional seismic networks have been expanded, and seismic images of active fault systems are commonplace. Industry and academia are cooperating in developing statewide fault maps and stress maps. Injection-volume reporting has improved, but there is still a gap in pressure data. Regulatory bodies are adopting informed yet individual approaches to seismic monitoring, reporting of operation

activities, and regulatory rule. Reducing allowable injection/disposal rates is a common tool that, upon early examination, appears to be mitigating injection-induced seismicity.

## SEG Wiki

### John W. Stockwell Jr., chair

More than 8000 edits to the SEG Wiki have been made in the past year which is more than 22% of all edits made to the wiki to date!

Subject-matter experts continue to lend their expertise in crafting new geoscience articles in the SEG Wiki. Volunteers have been developing content as part of our adopt-a-page campaign that aims to expand the depth and breadth of entries online. Examples of pages currently in development are potential fields and electric resistivity surveys. Additionally, the geophysical tutorial series, co-published in *The Leading Edge*, reached its 20th article in April 2017. Recent topics covered in the tutorials include step-by-step NMO correction and linear inversion.

Translation of Robert Sheriff’s *Encyclopedic Dictionary of Applied Geophysics*, fourth edition by Spanish-speaking translators is now under way. The core leadership team has trained their five-to-seven-person volunteer teams and identified individualized workflows for the content assigned to them. To date the nearly 50 volunteers have contributed more than 3000 total edits resulting in 377 completed Spanish translations of terms from Sheriff’s book.

Encouraged by the Spanish translation effort, a small number of Arabic-speaking volunteers has engaged SEG staff about utilizing the SEG Wiki and its new translation software to aid in an Arabic translation of Sheriff’s *Encyclopedic Dictionary*. Discussions of a second pilot project are under way.

Laura Guertin was awarded the 2016 SEG Wiki Champion award in October 2016. Her third class of Pennsylvania State Brandywine undergraduate students completed new entries in the SEG Wiki in November — this semester’s entries include articles on energy, oil sands, surface water, and much more.

**In the upcoming year, the goals of the Wiki committee are:**

- Identify ways to collaborate and merge the SEG Wiki’s work with sister societies, including naming suggestions for a unified wiki and solidifying a URL into which we can grow.
- Increase the number of biographies in the SEG Wiki that highlight the work of international pioneers of the science (outside North America) to meet our goal of 1000 biographies online by end of year 2017.
- Migrate historical content from the seg.org website (e.g., DISC and Honorary Lecturers) to the SEG Wiki.

## SEG Women’s Network

### Maitri Erwin, chair

The SEG Women’s Network Committee (WNC) creates opportunities for networking, exposure to role models, sharing of best practices, surveys, and self-empowerment and technical webinars for women in geosciences and related careers. It also engages in activities to identify issues and possible solutions to the conditions, treatment, image, or handling of women in geophysics. The committee increases awareness of women’s and dual-career issues via a series of awareness articles and advertising campaigns. The Women’s Network actively promotes student engagement and mentoring.

**The WNC is committed to the following:**

- Promote SEG membership among women by creating worthwhile activities which increase awareness of diversity issues and provide opportunities to network:
  - create physical opportunities for SEG women’s networking
  - provide self-empowerment and self-training opportunities via webinars
- Mentor young women to pursue careers in geophysics.
- Develop a clear understanding of the WNC stakeholders by working with SEG.
- Identify needs and develop a strategic plan to address those needs inside the SEG, with a prioritized approach following WNC priorities and resources.

- Prepare and launch surveys to assess women’s careers in various geophysical sectors and academic environment/culture.
- Expand outreach to members:
  - publish a series of articles in *TLE*’s “Full Spectrum” column
  - advertise the SEG Women’s Network on the SEG website and in SEG magazines as well as other societies’ magazines
  - create and maintain a presence of SEG WNC in social media

**The committee made significant advances this past year:**

- Published four “Full Spectrum” articles, contributed two “Wiki Interview Series” articles, and one WNC workshop preview article in *TLE*.
- Organized the successful 5th and 6th Annual Women’s Network Breakfast with more than 100 in attendance.
- Continued to partner with the SEG Wiki to expand the biographies of women on the site by joining the Wiki Committee and by encouraging the creation of new entries.
- Advanced the nominations of women for SEG leadership roles, resulting in the nomination of both Anna Shaughnessy and Nancy House for SEG president with House becoming president-elect at the 2016 SEG Annual Meeting.
- Advanced the nominations of women for SEG Honors and Awards, resulting in the selection of Best Educator Award to Estella Atekwana.
- Conducted a couple of webinars with a schedule of webinars for upcoming years.
- Activated the organization of a Women in Geosciences Panel at the AAPG/SEG International Conference and Exhibition (ICE) in Barcelona, Spain, and Cancun, Mexico.
- Co-sponsored and collaborated with the Geophysical Society of Houston (GSH) in the spring and fall.
- Conducted two surveys addressing and focusing on women geophysicists’ work conditions in academia with *TLE* articles to follow based on results.
- Created a postconference workshop on bullying and bias.

- Created a new networking event at the SEG Annual Meeting, which was a smashing success with approximately 80 members in attendance.
- Significantly expanded outreach through social media, establishing and launching an active presence on LinkedIn, Twitter, Facebook, and Instagram.
- Expanded committee membership and developed a new e-community for the committee workspace.
- Doubled SEG WNC membership.

#### **2015–2016 Committee Leadership:**

- Maitri Erwin, chair
- Patricia MacQueen, vice chair
- Uche Aigbokhai, secretary
- Dee Smith, finance chair
- John Bradford, SEG Board liaison
- Maria Angela Capello, past chair
- Eve Sprunt, past chair
- Nancy House, past chair

#### **2016–2017 Committee Leadership:**

- Maitri Erwin, chair
- Uche Aigbokhai, secretary
- Madeline Lee, SEG Board liaison
- Maria Angela Capello, past chair
- Eve Sprunt, past chair
- Nancy House, past chair

## **Technical Special Interest Group Task Force**

### **Chris Krohn, chair**

The Technical Special Interest Group (SIG) Task Force kicked off in January 2017, building on prior discussions led by SEG President Bill Abriel. SIGs are communities of volunteers with a shared interest or purpose. Their

development has the potential to substantially increase the connectivity of like-interested geophysicists, generating leading edge content for both them and the SEG.

#### **Plans for 2017 include:**

- Develop a pilot of two to three SIGs using Basecamp software as a trial platform.
- Recruit moderators for the pilot SIGs and promote the trial to the SEG community.
- Develop and refine practices for SIGs based on the pilot. Explore the greater strategic impact on the SEG of greater cyber-based communication between members.

## **Technical Standards**

### **Jill Lewis, chair**

Technical Standards Committee members include Jill Lewis, Troika International (chair); Victor Ancira, Troika International (2017 co-chair); Bill Rimmer, Rimmer Consultants; Rune Hagelund, Daeco (format advisor); Stewart Levin, Stanford University (format advisor); Robert Firth, Troika International; Alexander Sokolov, Schlumberger; Friedrich Roth, EMGS; Peter Green, Aramco; Nils Aatland, CGG; Barry Barrs, Exxon; Philip Wild, Moveout Data; Jay Hollingsworth, Energistics liaison; Ted Bakamjian, SEG staff liaison; Robert Stewart, 2016 SEG Board liaison, University of Houston, and Ruben Martinez, 2017 SEG Board liaison, Reservoir Geoscience.

The Technical Standards Committee serves as a forum for discussion of geophysical developments in which standards need to be defined. When problems of sufficient magnitude to warrant action by SEG are identified, an appropriate subcommittee is appointed to develop a set of standards and make a recommendation to the Board concerning their adoption.

**SEG-D\_r3.1.** The committee completed many years of work with final publication of SEG-D, Revision 3.1 in October 2015. This update to the SEG-D standard includes the addition of little endian samples and a new layout for the Coordinate Reference System (CRS). The new layout keeps the SEG-D format in line with the new P1/11 CRS format that should also be included. A list of other specific changes is available in release notes published alongside the standard itself on the Technical Standards Web page [seg.org/ts](http://seg.org/ts).

**SEG-Y\_r2.0.** The SEG-Y, Revision 2.0 data-exchange format was approved by the SEG Board of Directors and subsequently published in early 2017. This is a major update to the venerable SEG-Y workhorse seismic data exchange standard, culminating more than two years of development and feedback from a large community of users. SEG-Y\_r2.0 provides highly enhanced flexibility while maintaining a high degree of backward compatibility. Notable new features of SEG-Y\_r2.0 include:

- Up to 65,535 additional 240-byte trace headers
- The ability to unambiguously map or remap trace-header contents (For example, Seismic Unix and PASSCAL can now create revision 2-compatible SEG-Y while still preserving their prior trace-header usage.)
- Capacity for traces to have up to 232–1 samples, and for up to 264–1 traces per line and ensemble
- Sample intervals can be arbitrarily large or small
- Support for little-endian and pair-wise byte swapping
- Microsecond time-stamp accuracy
- Higher-precision coordinates, depths, and elevation and more options for coordinate reference system specification
- Depth, velocity, electromagnetic, gravity, and rotational sensor data types
- Optional XML-based Extended Textual File Headers for ease in machine processing

**SEG SPS\_r3.0.** Work continues on an update to the SEG SPS\_r2.1 format published in 2006. The anticipated output is Revision 3 of the Shell Processing Support format for 3D surveys. A goal is to ensure that SPS is closely associated with the P1/11 format. Not only will the new format enable better survey planning but also improved handshaking with field acquisition and processing. Now to include seabed node planning and a checklist, this could be the foundation of a workflow of exchange formats from planning to interpretation.

The SEG Technical Standards Committee continues to work proactively with several other standards bodies to maximize alignment among industry standards.

## Tellers Committee

### Kim Guyer, chair

The ballot tabulation for the membership vote on the five proposed Bylaws amendments approved by the SEG Council at its October 2015 meeting was completed in February. Survey & Ballot Systems, Inc. (SBS) was contracted to conduct the ballot mailing and tabulation. Official paper ballots were sent out on 3 December 2015 to 8620 Active members eligible to vote. All votes were received, tabulated, and verified by SBS and results were submitted to the SEG business office. The vote on the Bylaws had a participation rate of 16.8%. The final results include 1395 returned ballots received on or before 31 January 2016. The SEG Tellers Committee verified the count provided by SBS, and all five Bylaws amendments were approved by a majority vote of the Active SEG membership. The approved proposals and a brief description are provided below.

#### **Proposal 1 – Restructure membership of the Council, specifically district representation**

The number of representatives from each district will be normalized at two.

#### **Proposal 2 – Office of Editor to Vice President, Publications**

The Editor position will be replaced by the Vice President, Publications on the Board of Directors.

#### **Proposal 3 – Membership approvals**

A committee established by the SEG Board of Directors or the president will be delegated authority to approve applicants for Active Membership, speeding acceptance of applicants for Active Membership without any change to membership requirements.

#### **Proposal 4 – Dues-waiver policies**

The SEG Board is granted authority to establish and implement policies on dues waivers.

#### **Proposal 5 – Committee of Tellers**

The Committee of Tellers will be dissolved. Oversight responsibility of the voting process will be transferred to the Committee on Nominations.

The Tellers Committee was sunsetted upon conclusion of the January 2016 membership vote.

## *The Leading Edge* Editorial Board

### Ezequiel F. Gonzalez, chair

During the 2015–2016 period, *The Leading Edge* (*TLE*) continued fulfilling its responsibility of delivering technical content, with emphasis on practical applications, and valuable general information to readers. The year 2015 was challenging for the oil and gas industry, forcing numerous changes to the SEG structure. In *TLE*, we had to take actions to address the demanding financial situation without changing the essence of the journal or compromising the expected level of quality. Beginning in early 2016, an 88-page-per-issue budget (not counting cover pages) was enacted, and new word- and figure-count guidelines for authors were created and enforced. Extra dedication and effort of authors, editors, reviewers, and SEG staff made it possible to publish *TLE* effectively and efficiently under the 2016 budget constraints.

The 2015–2016 *TLE* Editorial Board members were: Doug Foster, Ezequiel Gonzalez (chair), John Lane, Mosab Nasser, Baishali Roy, Julie Shemeta, and Tracy Stark. During the 2016 SEG Annual Meeting in Dallas, Kyle Spikes was presented as a new board member, and Julie Shemeta took the chair role. We had the privilege of counting on the support of a group of outstanding SEG staff members: Ted Bakamjian (associate executive director, Knowledge Management), Steve Brown (*TLE* managing editor), Natalie Blythe (*TLE* assistant editor), Isaac Farley (digital publications manager), and Maria Gee (*TLE* graphic designer). I personally thank Steve Brown and Natalie Blythe for their excellent and continuous work, and Ted Bakamjian for his assistance in dealing with multiple matters. Each *TLE* special section had a group of guest editors who deserve credit for the selection and vetting of the technical articles published.

### Special sections published during the October 2015–October 2016 time period were:

- *Education in the geosciences* (October 2015)
- *Resource plays*
- *Rock physics* (November 2015)
- *Resource plays II: Geophysics* (December 2015)
- *Australia* (January 2016)

- *Imaging/inversion: Estimating the earth model* (February 2016)
- *Subsalt imaging* (March 2016)
- *Offshore geophysical applications/OTC* (April 2016)
- *AVO inversion* (May 2016)
- *Honoring Mike Batzle* (June 2016)
- *Advances in seismic sensors* (July 2016)
- *Independent submissions* (August 2016)
- *Hydrogeophysics* (September 2016)
- *4D seismic* (October 2016)

Additionally, standalone papers — i.e., articles that did not form part of any special section — as well as established columns with some technical (e.g., tutorials, Interpreter's Corner, workshops review) and general interest content (e.g., From the Other Side, President's Page) were published to satisfy *TLE* readers' preferences (based on results of SEG readership polls).

Following thoughtful discussion by the Editorial Board, "Separated-wavefield imaging using primary and multiple energy," by Shaoping Lu, Dan N. Whitmore, Alejandro A. Valenciano, and Nizar Chemingui was chosen as the 2015 Best Paper in *TLE*. Two papers were awarded with Honorary Mention: "Can we ever trust the shear-wave log?" by Arthur C. H. Cheng, and "Microseismic shearing driven by hydraulic-fracture opening: An interpretation of source-mechanism trends," by James Rutledge, Xin Yu, and Scott Leaney.

*TLE* has initiated a number of objectives for 2016–17, including:

- Continue to adhere to *TLE* page budget (ongoing).
- Begin publishing online-only content in SEG Digital Library and *TLE* Digital Edition to supplement print magazine (began in April 2017 and ongoing).
- Improve quality of graphics in *TLE* Digital Library (achieved).
- Initiate ongoing quarterly review process for *TLE* Best Paper award (ongoing).

To conclude, I thank all *TLE* readers for their support and feedback. It has been a pleasure and an honor for me to be part of the Editorial Board of *The Leading Edge*.

## Translations

### Yunyue Li, chair

The Translations Committee continued its traditional activity of reviewing and recommending books for translation from foreign languages and subsequent publication by SEG. Work continued on:

- *CBM AVO: A tool for locating sweet-spots of CBM reservoirs and well appraisal* by Xin-Ping Chen (written in Chinese)
- *Ludger Mintrop: The man who looked into the earth — The conquest of the subsurface* by Gerhard Keppner (written in German)

### 2016–2017 objectives

The main goal of the Translations Committee is to advance the translation into Spanish of the *Encyclopedic Dictionary of Applied Geophysics*, fourth edition by Robert Sheriff. The translations will be performed under the SEG Wiki platform to allow collaboration between SEG staff and the numerous volunteers involved in the project.

## Travel Grants

### Brian Miller, chair

The SEG Travel Grants Committee is comprised of SEG members from industry and academia. The primary work of the committee centers on evaluating applications from students who wish to participate in SEG-sponsored student programs and who are seeking funding for research. In 2016, the programs for which students applied to participate were the SEP/ExxonMobil Student Education Program (SEP), which was conducted in Katowice, Poland, and at the SEG Annual Meeting; and the SEG/Chevron Student Leadership Symposium, conducted at the SEG Annual Meeting. Applications for travel grants and assistance were evaluated for the SEG Technical Program Travel Grant, AAPG|SEG ICE in Barcelona, Spain, and the Summer Research Workshop grant for the SEG–AGU Rock Physics workshop in Hilo, Hawaii, in July. Applications for the first SEG Near-Surface Research Award were evaluated as well.

In 2016, the Travel Grants Committee was divided into two evaluation groups that together evaluated applications

for eight student programs. The programs, numbers of applicants, and recipients selected were as follows:

- SEG/ExxonMobil Student Education Program (Katowice, Poland): 30 recipients were selected from 138 applicants
- SEG/ExxonMobil Student Education Program (Dallas, Texas): 30 recipients were selected from 128 applicants
- SEG/Chevron Student Leadership Symposium: 51 recipients were selected from 127 applicants
- Technical Program Travel Grant: nine recipients were selected from 97 applicants
- Near-Surface Research Award: one recipient was selected from 12 applicants
- Student Chapter Outreach Grant: six recipients were selected from 69 applicants
- Summer Research Workshop (Rock Physics Workshop): six recipients selected from seven applicants
- Travel Assistance for students presenting on the Technical Program at the AAPG|SEG ICE meeting in Barcelona: 10 recipients were selected from 34 applicants

The 2016 Travel Grant Committee members were Brian Miller, chair; Michelle Abraham, Cameron Coatsworth, Titus Emmanuel, Francesca Fazzari, Seth Haines, Tim Maciejewski, Brian Sabin, Brackin Smith, Kyle Spikes, Payson Todd, and Chirag Tyagi.

### The Travel Grants Committee set the following objectives for 2017:

- Improve the method for reporting publications on students' applications to allow committee members a more objective way to weight publications in their evaluations.
- Adjust the evaluation schedule to allow for greater attention to evaluations by reducing the last-minute scramble to evaluate.
- Increase communication with the committee before applications are released, such as holding conference calls, to help increase participation and improve the quality of evaluations from committee members.

# Representative Reports

## AGI Environmental Geoscience Advisory

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**Ali I. Mese, representative**

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The AGI Environmental Geoscience Advisory Committee (EGAC) has been established in helping to identify and focus on the highest-priority environmental informational needs and issues best addressed by the geosciences community. The activities of the AGI Environmental Affairs Program are guided by the EGAC. EGAC members represent AGI member societies, other government and academic institutions, and include individual scientists with appropriate expertise and interest. Approximately 35 geoscientists are actively involved in various aspects of environmental research and industrial applications, and the EGAC provides a forum for developing broad consensus concerning the role of geosciences in key environmental issues.

The Environmental Awareness Series is one of the key projects in AGI's Environmental Affairs program covering significant themes of environmental and social concern and demonstrate the complexity and interrelation of the natural systems. The series booklets cover major topics of environmental and societal concern and demonstrate the complexity and interconnection of natural systems that we use and depend upon. Each booklet is an effective educational tool that provides a readable, well-illustrated introduction to a topic. Target audiences for the booklets include general readers, legislators, teachers, and students.

Another publication series by AGI is *EarthNotes* that is published with an aim to increase public awareness of the vital role the geosciences play in society's use of resources and interactions with the environment. *EarthNotes* are standalone, short illustrative reports that contain summaries of interesting and timely information about earth and earth scientists. The reports are contributed by knowledgeable earth scientists on a wide range of topics, from understanding the health risks associated with wildfire ash to explaining how deep-water oil drilling is accomplished.

AGI welcomes Eve S. Sprunt as its president, Keri A. Nutter as secretary, and Carolyn Olson as the member at large to its 2016–2017 Executive Committee.

## American Geosciences Institute (AGI)

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**Louise Pellerin, representative**

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The American Geosciences Institute (AGI) was founded in 1948, under a directive of the National Academy of Sciences, as a network of associations representing geoscientists with a diverse array of skills and knowledge of our planet. The Institute provides information services to geoscientists, serves as a voice of shared interests in our profession, plays a major role in strengthening geoscience education, and strives to increase public awareness of the vital role the geosciences play in society's use of resources, resilience to natural hazards, and the health of the environment. AGI represents and serves the geoscience community by providing collaborative leadership and information to connect earth, science, and people.

AGI is known for its Information Services aggregating research vital to geoscientists' work; education and outreach, such as Earth Science Week, for schools and the public; public policy, facilitating the flow of information between geoscientists and decision makers; workforce development research and analysis of career paths; and publications that inform on a range of geoscience topics and news.

The Policy & Critical Issues program supports science-based decision making at all levels through a portal to decision-relevant, impartial geoscience information, aggregated from multiple organizations in one place. Through the Information Resource Development initiative geoscience information is available to help decision makers, educators, and the public across all sectors of society.

In an effort to keep SEG members abreast of AGI activities, updates are posted periodically on the SEG website and in *The Leading Edge*. In 2016, AGI welcomed Allyson K. Anderson Book as the new executive director, and SEG's own Eve Sprunt as president-elect.

## GeoScienceWorld

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**Ted Bakamjian, SEG representative**

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GeoScienceWorld (GSW) is a nonprofit collaborative and comprehensive Internet resource for research and

communications in the earth sciences that is built on a core database of peer-reviewed journals and is integrated with the GeoRef index. SEG is one of GSW's seven founding organizations, along with American Association of Petroleum Geologists, the Geological Society of America, the Geological Society of London, the American Geosciences Institute, the Mineralogical Society of America, and the Society for Sedimentary Geology. The journals aggregation launched in February 2005 and today includes 46 journals from 28 publishers. SEG has three journals available through GSW: *GEOPHYSICS*, *The Leading Edge*, and *Interpretation* (copublished with AAPG). SEG also is one of 11 publishers participating in GSW eBooks, which launched in 2014 and includes 1100 titles, including approximately 100 from SEG.

GSW is supported by institutional journal and book subscriptions and perpetual-access sales of books to institutions. Institutions subscribing to the journals are required to purchase access to the entire journals aggregation. Compensation to the publishers is based on a combination of the amount of content the publisher contributes and how much it is used. By participating in GSW, SEG extends the usage of its publications beyond the SEG Digital Library while also earning royalties. Approximately one-third of usage of *GEOPHYSICS*, *TLE*, and *Interpretation* occurs through GSW, with nearly all of the rest enabled by the SEG Digital Library. Journals payout to SEG for its participation in GSW was US\$384,658.82 for 2015 and \$436,983.90 for 2016. The 2016 payout was unusually high because GSW received payments for two years of service from a large consortium of universities. GSW eBooks royalties for a fiscal reporting period that ended in June 2016 were \$20,059.19.

GSW has provided all of its services through the HighWire Press platform since its 2005 launch. Early in 2017, GSW announced it is moving the aggregation to Silverchair Information Systems' platform. GSW and GSW eBooks are scheduled to launch on Silverchair in August 2017.

## IPTC Management

**Joseph Reilly, board member**

**Mohammed Badri, board member**

The International Petroleum Technology Conference (IPTC) rotates between Asia Pacific and Middle East locations. IPTC is organized to advance technology related to exploration and production as well as transportation

and processing. IPTC partners are the American Association of Petroleum Geologists (AAPG), the European Association of Geoscientists and Engineers (EAGE), the Society of Exploration Geophysicists (SEG), and the Society of Petroleum Engineers (SPE). Key factors responsible for IPTC's success are the host national oil company, an international oil company co-host, and service-sector support. Structurally, IPTC is incorporated with the four societies as owners (20% interest to SEG). The Board of Directors consists of eight members, two appointed from each society. Joe Reilly became chair of IPTC's Board of Directors following IPTC 2016 Bangkok.

**IPTC 2015 Doha (6–9 December 2015) — A successful event despite challenging times.** This ninth edition of IPTC was hosted by Qatar Petroleum, with Shell acting as cohost. Despite the industry downturn, IPTC attracted 3800 individuals, representing 630 companies from 63 countries. On the financial side, the conference generated a net surplus of US\$2,196,000 (\$439,000 to SEG's 20% interest). Under the theme "Technology and partnerships for a sustainable energy future," the conference included a total of 62 technical sessions with more than 350 papers.

SEG-sponsored sessions covered integrated geophysical acquisition, seismic processing and imaging, and geophysical reservoir characterization. New features in the technical program were "Ask the Expert" sessions as well as top-rated papers selected from the annual meetings of the sponsoring societies. The IPTC Excellence in Project Integration Award went to Total for its CLOV project. The conference also included two CEO plenary sessions, five executive panel sessions, and a Society Presidents panel session. Approximately 100 students from 39 countries and 76 universities participated in a five-day education summit. The Young Professionals (YP) and High School Students Programs were also well attended.

**IPTC 2016 Bangkok (14–16 November 2016) — A successful event despite challenging times.** PTT Exploration and Production (PTTEP) served as host, and the conference theme was "Innovation and efficiency excellence for our energy future." The challenging but rewarding work of planning, organizing, funding, and gathering technical content was completed during this reporting period. Here is a sneak preview of results, to be covered in more detail in next year's report: attendance of 3712 delegates and a financial net surplus of more than \$600,000 to IPTC.

**Timing of future IPTC conferences.** During 2016, Qatar Petroleum informed IPTC that it would only host the

IPTC conference every fourth year, which created a gap year in 2017. IPTC's board considered alternative hosts and locations, but did not find viable options. Additional gap years could occur in the future if alternatives are not found every other cycle of the Doha rotation. At industry's request, changes were also made in timing of the conferences — moving from a historical December timing to March for Asian locations and January for Middle East locations. Considering all changes, the next IPTC conference will be 26–28 March 2019 in Beijing.

## NAPE Advisory Committee

### Allen Gilmer, representative

Partners in the North American Prospect Expo (NAPE) are the American Association of Petroleum Landmen (AAPL), the Independent Petroleum Association of America (IPAA), the American Association of Petroleum Geologists (AAPG), and the Society of Exploration Geophysicists. Started by AAPL in 1993, IPAA joined the partnership in 1995, with AAPG and SEG coming aboard in 2004 with each having a 10% interest. Having a majority ownership position, AAPL operates NAPE. Other partners participate through a NAPE Advisory Committee in which, beginning with 2016, Allen Gilmer began serving his second three-year term as SEG's representative.

NAPE is an environment in which prospect developers interact with potential buyers with the expectation of doing business. This environment naturally draws engineers, geoscientists, landmen, lenders, and capital providers, etc. And because there is the expectation of making deals, many attendees are decision makers. NAPE began with Winter NAPE (now called NAPE Summit), and then was expanded to include Summer NAPE; much later, two regional conferences were added (Pittsburgh and Denver). NAPE Pittsburgh did not prove to be viable and was dropped after two years. NAPE Denver lasted longer, but still proved to be nonviable and was dropped in February 2017. This report focuses on 2016 NAPE events.

**NAPE Summit 2016 (10–12 February 2016, Houston, Texas, USA).** Still in an industry downturn, NAPE Summit performed well. It drew approximately 11,300 attendees, a 24% decrease compared to the nearly 15,000 attendees in 2015. There were 696 exhibitors, as compared to 876 in 2015. The charity luncheon still drew more than 1000 individuals enabling a US\$260,000 charitable donation. Sponsorships dropped from \$1.7 million in 2015 to \$1.2 million, about a 30% drop. Overall though,

due to cost control and innovation, the net surplus only dropped about 9%, to \$5.2 million from \$5.7 million in 2015. Innovations included moving the International Expo into the main Expo, and having both domestic and international prospect theaters.

**Summer NAPE 2016 (10–11 August 2016, Houston, Texas, USA).** Like NAPE Denver, Summer NAPE has been streamlined to a two-day format incorporating innovations like the prospect theater. Prior to the recent downturn, Summer NAPE attendance would exceed 5000, generating a net surplus about one fifth of that realized from NAPE Summit. Attendance decreased to 4400 in 2015, dropping further to approximately 3000 in 2016. Percentage drops for number of exhibitors, sponsorship dollars, and business conference attendance were in the similar 30–35% range.

**NAPE Denver 2016 (12–13 October 2016, Denver, Colorado, USA).** Although drawing 2500 attendees in 2014 during strong economic conditions, attendance during the downturn deteriorated to approximately 1000 by 2016, despite user-friendly modifications in format and timing (switching from December to October). Even with major cost reductions, only one of the meetings generated a net surplus, with 2015 eking out only a \$57,000 net surplus (which became negative after AAPL's management fee).

## OTC Board of Directors

### Wafik Beydoun, representative

**OTC Asia 2016 (22–25 March 2016, Kuala Lumpur, Malaysia).** SEG Subcommittee: Deva Ghosh, chair, and Arthur Cheng, vice chair. Attendance at OTC Asia 2016, the second OTC Asia conference, remained strong with more than 20,000 attending from 70 countries. Financially, the conference provided a net surplus to OTC of US\$3,270,000. Host NOC PETRONAS provided strong financial and volunteer support. There were 355 technical papers presented in 58 technical and six interactive e-poster sessions. Additionally, there were two executive plenary sessions, eight country briefings, 10 panel sessions, and two topical luncheons. New to OTC Asia, there were five Spotlight on New Technology awards.

**OTC 2016 (2–5 May 2016, Houston, Texas, USA).** SEG Subcommittee: Jim Kreamer, chair, and Alex Martinez, vice chair. More than 68,000 attendees from

120 countries attended, a decrease from 95,000 at OTC 2015. Still, the exhibition floor was sold out with more than 2600 companies exhibiting. Financially, the conference provided a net surplus to OTC of \$17,201,000. Details of the technical program and awards are contained within the separate report by SEG's Technical Program Subcommittee. Following OTC 2016, SEG volunteers were already in place and working immediately on OTC 2017.

**Arctic Technology Conference (ATC) (24–26 October 2016, St. John's, Newfoundland and Labrador, Canada).** SEG Subcommittee: Ian Atkinson, chair, and Craig Rowe, vice chair. Despite extremely strong Canadian support, attendance of less than 1000 reflected (1) Shell's recent cessation of offshore Alaska drilling and (2) suspected company travel/conference restrictions during tough times. ATC 2016 generated only a \$56,000 net surplus for OTC. All things considered, the next ATC will be pulled back to Houston. ATC incorporated six topical breakfasts/luncheons and five panel sessions. There were five technical sessions focusing on geology and geophysics. SPE offered one training course following ATC. Both "Individual" and "Company" Distinguished Achievement awards were made.

**Financial performance (OTC FY16, August 2015—July 2016) and 2017 events.** Net distribution to SEG of all OTC events for FY16 was \$1,530,000. Two events will occur during 2017: OTC 2017 (1–4 May 2017) and OTC Brazil 2017 (24–26 October 2017).

## OTC 2016 Technical Program

### Alex Martinez, chair

Held annually since 1969, OTC 2016 was held 2–5 May 2016 in Houston, Texas, at the NRG Center. More than 68,000 attendees from 120 countries attended, not unexpectedly down from 95,000 attendees for OTC 2015. Still, the exhibition floor was sold out and it was the third-largest in show history with more than 2600 companies exhibiting representing 47 countries. International companies made up 51% of exhibitors.

There were more than 325 technical paper presentations, plus 11 panel sessions and 24 breakfast/luncheon presentations. OTC's innovation-oriented event, d5, was held for the second time. For the first time ever, OTC's

sponsoring societies offered training courses at OTC. SEG offered two courses, which were canceled when preregistration was too low to support holding the courses.

### Technical sessions where SEG was involved in some manner included:

- Advances in quantitative reservoir characterization, chaired by Dan Heinze, XiMotion LLP, and Alex Martinez, ExxonMobil
- Applying geoscience technology to drilling and completions, chaired by Ashwani Dev, Halliburton/Landmark, and Brian Brookshire, NCS Subsea
- Geostatistical reservoir and lithology characterization (AAPG/SEG), chaired by Jim Kreamer, consultant, and Buford Pollett, University of Tulsa

### Of the 11 panel sessions, three of high interest to geoscientists included:

- The perspective of IOC investments in Brazil's oil and gas business
- Mexico's energy reform: An update on the Mexican reform and bidding rounds
- Mexico energy reform II: Changes to the service sector and first look at new deepwater plays seen in new multi-client exploration data

### Two breakfasts/luncheons of particular interest to geoscientists include:

- Topical luncheon: Presalt Brazil: Strategic thinking with a pragmatic approach for a massive investment
- Topical breakfast: Moving forward in Newfoundland and Labrador despite the tough times, Jim Keating, Nalcor (*This breakfast, proposed by SEG, was considered a lead-in to the 2016 Arctic Technology Conference, 24–26 October 2016 in St. John's, Newfoundland and Labrador, Canada.*)

OTC's Spotlight on New Technology awards recognized 13 technologies, including a "Small Business Winner" for technologies developed by small businesses having fewer than 300 employees. The 2016 OTC Distinguished Achievement Awards were awarded to Don Hardeman for Individual Achievement; the Marine Technology Society Dynamic Positioning Committee for Institutional Achievement; and both George Hirasaki and Yuri Makogon for the Heritage Award.

SEG greatly appreciates the support and hard work of its members who serve (1) within SEG's OTC Technical Program Subcommittee and (2) in other roles within OTC.

## Unconventional Resources Technology Conference (URTeC) Management

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### Frank Brown, SEG volunteer representative

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Unconventional Resources Technology Conference (URTeC) is a science-based annual conference developed as a collaboration of AAPG, SEG, and SPE. URTeC focuses on unconventional reservoir development with a specific emphasis on integrated workflow. Started in 2013, the initial two conferences were held in Denver, and then moved to San Antonio, Texas, for 2015 and 2016. The 2017 conference will be held in Austin, Texas, from 24–26 July. The 2018 conference will be held in Denver. The sites for future conferences are under consideration. Now in its fifth iteration, URTeC has earned a solid reputation within industry, one of the reasons that by 2017, eight additional societies have stepped aboard as supporting organizations.

URTeC operates through a management committee outlined in a Sponsoring Organizations Agreement. Leadership of the Management Committee rotates between

the societies, with SEG's representative beginning a two-year term as chair following URTeC 2016. The Technical Program Committee operates with co-chairs from the three societies. SEG co-chairs for URTeC 2016 and 2017, respectively, were Gene Sparkman and Shawn Maxwell.

Attendance for URTeC 2016 was more than 2800, as compared to more than 3300 for URTeC 2015. Although 30% of paper authors had an SEG affiliation, only around 13% of conference attendees had an SEG affiliation even though the role of geophysics in defining/measuring stimulated volume, optimizing spacing, and identifying sweet spots is continually growing. Certainly, increased support by SEG membership is an important goal. Financially, net surplus to the partners was US\$484,000 (\$145,000 to SEG's 30% WI). By comparison, net surplus for URTeC 2014, before the downturn began, was more than \$1,200,000 with more than 5600 attendees.

From 596 abstracts, the final technical program at URTeC 2016 consisted of 221 oral presentations and 121 e-papers. Highlights included: opening plenary session with addresses from Scott Sheffield, Dan Dinges, and Gary Ross; four topical luncheons; two topical breakfasts; and two special sessions. The agenda incorporated "team" presentations in which multiple disciplines discussed their teams' contributions to reservoir development. E-paper presentations, to smaller groups of 20–40 participants, were especially popular. For URTeC 2016, complimentary exhibit-floor admissions were available to attendees affected by the economic downturn. Having the e-papers in the exhibition area allowed those individuals to still participate in the technical program.

## Foundation Board of Directors

### Michael C. Forrest, chair

The SEG Foundation has raised \$1 million to \$5 million per year during the last 10 years, for a total of more than \$35 million to support SEG programs, mostly for students and early-career geophysicists. The cyclic nature of the oil exploration and production industry, especially during the last three years, requires the Foundation to have a long-term plan for fund-raising from individuals and corporations.

The Foundation endowment is approximately \$15 million, of which about half is for scholarships, and we have a targeted annual spending rate goal of 3% to 5%. The Foundation contributes \$2 million to \$2.5 million yearly to SEG from the combination of endowment spending and corporate sponsored donations.

Thank you to the thousands of corporations and individuals who contribute to the SEG Foundation.

### 2015 FUND-RAISING RESULTS

Results: \$2,209,764

#### Corporate Giving

Anadarko — SEG Scholarships: \$625,000  
Chevron — SEG/Chevron Student Leadership Symposium (SLS): \$800,000  
Noble Energy — SEG Field Camps: \$20,000  
Paradigm — Annual Fund: \$5,210

#### Society/Section Giving

AIPG Foundation — GWB: \$500  
EEGS — GWB: \$2,420  
Geophysical Society of Houston — SEG Scholarships: \$10,000  
Geophysical Society of OKC — SEG Scholarships: \$4,700  
Geophysical Society of Tulsa — SEG Scholarships: \$5,000  
Pacific Coast Section of SEG — SEG Field Camps: \$1,000  
Permian Basin Geophysical Society — SEG Scholarships: \$1,050  
SEG Near Surface Technical Section — SEG Near Surface Award: \$25,000

#### Individual Giving

17 Major Gift Donors (\$10,000+ donation/pledge) — Cumulative total: \$445,000

Five new Trustee Associates (\$10,000 donation/pledge)  
25 Sustaining Trustee Associates (\$2,000/year)  
Donations with SEG membership dues: \$46,860

### 2015 Foundation Board of Directors

Michael C. Forrest, chair; Peter M. Duncan, vice chair; Michael G. Loudin, treasurer; David C. Bartel; Arthur Cheng; Pete W. Cramer; Erik G. Finnstrom; Hank H. Hamilton (resigned in summer 2015); Julie K. Hardie; Magne A. Reiersgard; Anna C. Shaughnessy; Robert F. Talley; and Cung Vu.

### 2016 FUNDRAISING RESULTS

Results: \$1,072,486

#### Corporate Giving

AAPG Foundation — GWB: \$120,000  
Geosoft, Inc. — GWB: \$5,812  
IHS Markit — SEG Wiki: \$30,000  
Noble Energy — SEG Challenge Bowl Finals: \$6,000  
Paradigm — SEG Student Chapters: \$25,000  
Statoil — SEG DL and SEG Scholarships: \$300,000

#### Society/Section Giving

Pacific Coast Section of SEG — SAGE field camp: \$1,000  
Permian Basin Geophysical Society — SEG Scholarships: \$1,050

#### Individual Giving

16 Major Gift Donors (\$10,000+ donation/pledge) — Cumulative total: \$312,877  
One new Trustee Associate (\$10,000 donation/pledge)  
32 Sustaining Trustee Associates (\$2,000/year)  
Donations with SEG membership dues: \$59,493

### 2016 Foundation Board of Directors

Michael C. Forrest, chair; Peter M. Duncan, vice chair; Michael G. Loudin, treasurer; David C. Bartel; Glenn W. Bear; Craig J. Beasley; M. Lee Bell (resigned in October to serve on SEG Board); Arthur Cheng; Pete W. Cramer; Erik G. Finnstrom; Julie K. Hardie; Magne A. Reiersgard; Anna C. Shaughnessy; Robert F. Talley (retired from Board in December); and Cung Vu.

### 2017 Fundraising

The Foundation's 2017 fundraising goal is \$2,275,000: \$1,500,000 for corporate, \$25,000 for societies/sections, and \$750,000 for individuals. The Foundation's priorities are Annual Fund, GWB, corporate renewals, and Society giving.

*Note: all monetary values are in US dollars.*

## SEG Near Surface Technical Section

**John Lane, past chair**

The SEG Near Surface Technical Section was formed in October 2014 based on SEG Board approval and the signatures of 50 active members. Since that time, SEG Near Surface Technical Section membership has more than doubled. In addition to membership growth, the scope and activities of the SEG near-surface geophysics community continues to expand. In July 2015, the SEG Near Surface Technical Section conducted with our partners (ASEG, CGS, KSEG, and JSEG) the 2nd Near Surface Asia Pacific Conference. That same year, SEG operated the 3rd International Conference on Engineering Geophysics in Al Ain, UAE. Annually, the SEG conducts a joint workshop with the American Geophysical Union (AGU), and in the Middle East, there is a biannual workshop of near-surface imaging.

The SEG Near Surface Technical Section conducts technical sessions at the SEG Annual Meeting and has consistently worked to expand the number and quality of the sessions. There were six technical sessions at the 2015 SEG Annual Meeting and in 2016, the SEG Near Surface Technical Section conducted eight technical sessions with four being Special Sessions. The SEG Near Surface Technical Section Evening Reception participation is growing as well with 125 people in attendance last year. Each year the SEG Near Surface Membership nominates deserving members for the Harold Mooney Award, and every 18 months, the joint EEGS/SEG NSTS Frank Frischknecht Award is conveyed to a deserving near-surface geophysics professional. At the 2015 Annual Meeting, the Harold Mooney Award was bestowed on Koya Suto, and in 2016, the recipient was Susan Hubbard. In 2016, the Environmental and Engineering Geophysical Society awarded the Frank Frischknecht Award to Esben Auken.

The SEG Near Surface Technical Section worked with the SEG Foundation to establish the SEG Near Surface Research Award that provides funds for near-surface geophysical research by deserving graduate and undergraduate students. The first recipient of the research award was Brady Flinchum, a PhD student at the University of Wyoming, who is researching hydrogeophysics. The SEG Near Surface Technical Section also awards a near-surface newsletter best student chapter article award. It was first awarded at the 2015 SEG Annual Meeting, with the University of Kansas

taking the honors; in 2016, the SEG Student Chapter from Eötvös Loránd University, Budapest, Hungary, won the best article award.

The SEG Near Surface Technical Section newsletter has been a consistent communication tool for near-surface geophysicists at SEG. In 2016, there were a couple new columns added to the newsletter. “On the Horizon” is a column dedicated to young professionals and early-career academics and was the brainchild of Anja Klotzsche, newsletter editor. This column has proved so successful that the focus group of near-surface geophysicists is actively submitting content. Another new column in the newsletter is called “Founders of Near Surface: Leaders, Mavericks and Icons.” This column is an interview series conducted with key figures of near-surface geophysics who helped establish near-surface geophysics as a valuable discipline within geophysics. The third new column within the newsletter is called “My Dog Ate My Homework.” This column brings information and tips that students primarily may need but that other members find very useful. Like membership, events, and technical sessions, the SEG Near Surface Technical Section newsletter is growing as well.

**2015–2016 section leadership:** Phil Sirles, chair; Steve Sloan, chair-elect; John Lane, past chair; Kristina Keating, vice chair; Dylan Mikesell, secretary; Seth Haines, finance program lead; Anja Klotzsche, newsletter editor; and Sarah Morton, student program lead.

**2016–2017 section leadership:** Steve Sloan, chair; Mike Powers, chair-elect; Phil Sirles, past chair; Kristina Keating, vice chair; Dylan Mikesell, secretary; Seth Haines, finance program lead; Anja Klotzsche, newsletter editor; and Sarah Morton, student program lead.



## SEG Real Estate Corporation

**Bob Wyckoff, chair**

The SEG Real Estate Corporation Board of Directors was appointed in January 2012. The purpose of the corporation is overseeing the activities associated with building maintenance and property management, leasing of all space not occupied by SEG staff, and maximizing the value of the physical assets of the corporation. Under Chair Gary Servos, a new SEG building project was initiated to accompany the existing SEG building completed in 1986. The new building, along with financing, was completed in 2015 including a 150-vehicle parking garage. The combined office space for lease is approximately 180,000 sq. ft., which is on 11 acres of prime commercial Class A real estate property in Tulsa, Oklahoma. SEG staff occupies approximately 20,000 sq. ft. on the fifth floor of the original building located behind the new building.

The 2016 combined occupancy rate is at 89% for the two SEG Class A buildings. Newmark-Grub provides property management, and lease terms range from five to 10 years. This puts SEG in an excellent position for maximizing the value of the physical assets of the corporation. The 2017 projected occupancy rate is 92%. The increase in projected occupancy is based on request for proposals (RFPs) received. This is the first step in the leasing process and can be a moving target.

A near/long term capital financial planning document has been completed. This document lists the maintenance recommendations regarding the buildings and grounds for budget purposes going forward.

The SEG office space renovation is complete. SEG Chief Financial Officer Dana Falletti mentioned in an article during renovation: “We are completely redesigning and rejuvenating our space.” A new agreement for a cell-tower installation has been completed with attractive financial benefits to SEG.

The 2017 SEG Real Estate Corporation Board of Directors consists of Keith Willson, chair; Steve Simmons, vice chair; Dorsey Morrow, secretary; Bill Underwood, Finance Committee chair; Tom W. Harrold, Audit Committee chair (deceased in March 2017); Kim Guyer, Buildings and Grounds Committee chair; and Ray Earley, new board member.

Many thanks go to the SEG staff for their steadfast service to the SEG Real Estate Subsidiary, and also to the Real Estate Board of Directors and their committee work for a successful year.

## SEAM

**Manik Talwani, chair**

The SEAM mission is to provide opportunities for companies to share the high cost of model design and data simulation. It also provides a forum for industry leaders to discuss geophysical problems of common interest, advances the art of modeling and computation by stimulating research and development, and it provides data sets for industry benchmarks and educational purposes ([www.seg.org/SEAM](http://www.seg.org/SEAM)).

The 2016 SEAM Board of Directors consisted of Manik Talwani, chair; Leon Thomsen, vice chair; Robert Corbin, treasurer; Kevin Bishop; Gladys Gonzales; Nancy House; Josef Paffenholz; Chuck Peng; and Chris Usher. The Board has several committees, for example Finance and Business Development. The SEAM Board continues to ensure that the operations of SEAM are conducted in a fiscally and legally responsible manner.

### SEAM projects active in 2016

The SEAM Phase II consortium, “Land seismic challenges” (2011–2016), constructed three digital models for 3D numerical simulations of land-seismic exploration challenges (unconventional, arid, and foothills). During 2016, the project was wound down, and deemed a complete success. Further information is available at <http://seg.org/News-Resources/Research-and-Data/SEAM/Phase-II>.

“Pressure prediction and hazard avoidance” (2014–2017) is a three-year RPSEA-partnership project involving 11 further corporate sponsors in the design and execution of a model of Gulf of Mexico pressure mechanisms and their geophysical expression. The purpose of the project is to help the industry understand the influence of various processes that affect pore pressure in subsalt reservoirs. Basin modeling ensured that properties were consistent with geologic history. The project was built on the SEAM Phase I Gulf of Mexico salt model, but including additional property variations resulting from pressure changes. Following this, geophysical

simulations were performed and distributed to participants for the purpose of testing pressure prediction procedures. During 2016, the RPSEA portion of the project was completed. Further information is available at <http://seg.org/News-Resources/Research-and-Data/SEAM/Phase-II>.

As an extension to the pressure-prediction project, a short-term “Pore pressure 4D” project, solely funded by RPSEA (with 20% in-kind contribution from SEAM) modeled pore-pressure evolution in a turbidite reservoir during production. This project represented a significant enlargement of the SEAM mission, as it involved not only geophysics, but also geology, geomechanics, and engineering. It served as a pilot project for the more ambitious “Life of Field” project (see below). With an extraordinary effort by volunteers and vendors, it was completed in September 2016, with deliverables currently available for license. Further information is available at <http://seg.org/News-Resources/Research-and-Data/SEAM/Phase-II>.

### **SEAM data sales**

A detailed description of the available data sets and license fees may be found at <http://seg.org/News-Resources/Research-and-Data/Licensed-Data>.

### **The 2017 objectives include:**

The “Life of Field” project is aimed at providing benchmark models and simulations intended to improve the efficiency and accuracy of Life of Field (LoF) workflow for both clastics and carbonates. Simulations required are the modeling of geology and the time production effects on reservoir fluid flow, geomechanics, geophysics, and well data not possible to obtain in the field. The project was scheduled to launch on 31 December 2016 with seven sponsors and others under consideration. Further details are given at <http://seg.org/News-Resources/Research-and-Data/SEAM/Life-of-Field>.

Business development is a high priority with prior projects winding down. The SEAM Board will identify new projects that are consistent with our mission and feasible (both technically and financially) in a time of low oil prices and stretched corporate budgets.

In 2017, SEAM is celebrating its 10<sup>th</sup> anniversary, and this milestone is being marked in various ways throughout the year.

## **SEG Global Inc.**

### **Jie Zhang, chair**

SEG Global Inc. developed a joint Global Advisory Committee (GAC) task force to create a tiered system for prioritizing regions in order for SEG to better serve the global geophysical community.

The SEG Global Inc. Board received a number of new directors in 2015–2016, who demonstrated they are interested in China and China geophysics, important to the SEG Global Inc.’s strong focus on SEG China. SEG Global Inc. developed an updated five-year strategic plan for the China operations with the goal of reaching a financially successful and sustainable operation. Specific goals of the plan include developing and supporting a strong board that will provide support, vision, and guidance.

With the establishment of the wholly foreign-owned enterprise (WFOE) and the expansion of events in China, efforts are underway to reduce the operating deficit of the SEG China office in Beijing. The focus of the China office has shifted away from the previous broad service to the geophysical community (with a heavy emphasis on membership services and student events) toward a revenue-generating model that emphasizes conducting conferences, workshops, and forums. To ensure the success of the office under this model, SEG has set the following business goals.

SEG China will be the premier global geoscience society in the People’s Republic of China. It will facilitate the flow of geophysical ideas and technology in the country and internationally. When appropriate, it will partner with Chinese constituents to deliver superior and innovative products and services that meet their business needs while fulfilling the overall mission of the Society at same time.

### **SEG Global Inc. has planned 11 projects in 2017:**

- 1) A “Development geophysics” course was offered by SEG President Bill Abriel in conjunction with Professor Yin of CGS in Qingdao on 15–16 April 2017.
- 2) The SEG/CGS International Geophysical Conference, a joint conference with the expectation of 400 attendees, took place at the China University of Petroleum

(Qingdao) 17–20 April 2017 and included a presentation by President Abriel who kicked off the conference with other Chinese dignitaries.

- 3) The Foothill Exploration Forum, co-organized by SEG and SINOPEC, was held 22–24 April 2017 in Nanjing. SEG Board President-elect Nancy House, SEG Treasurer Lee Bell, SEG Second Vice President Jie Zhang, SEG Director at Large Xianhuai Zhu, and SEAM Vice Chair Gladys Gonzalez were invited participants.
- 4) The 2017 SEG Microseismic Technology and Applications workshop is scheduled for 5–7 June in Hefei.
- 5) An in-house training with CNOOC in Beijing will be conducted in July.
- 6) A BGP in-house training of the SEG continuing education course, “Migration and velocity model building” by Dr. Ian Jones, is scheduled for mid-August in Zhuozhou.
- 7) An SEG public short course is scheduled for 21–25 August. Zhang and Hong Liu will be the technical co-chairs.
- 8) The OBC/OBN Technology and Applications workshop will be sponsored by CNOOC and COSL. It will take place in early September in Beijing.
- 9) The SEG Carbonate Reservoirs workshop, sponsored by CNPC, will take place in October in Chengdu.
- 10) The 2nd Full-waveform Inversion workshop will take place in November in Beijing.
- 11) Aramco Asia will sponsor/conduct a student program in China next year with awards, scholarships, and recognition for geophysical students in China. In 2017, Aramco will also sponsor a recognition award for student paper presentations.

**2016–2017 objectives/update:**

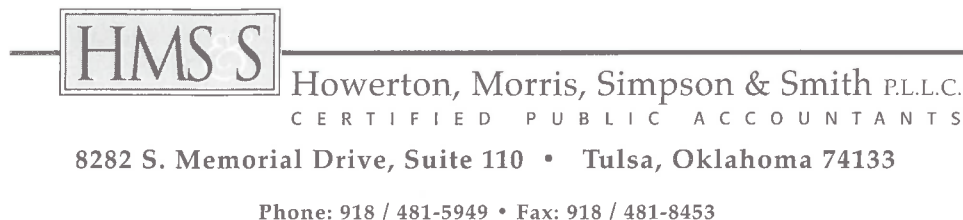
- Resolve current SEG China registration issues by deregistering the SEG representative office in Beijing.
- Increase the number of SEG events and outreach in the Middle East and China.
- Complete the SEG Global Inc.-GAC regional assessments and present recommendations for SEG growth to the SEG Board of Directors.

**Society of Exploration Geophysicists**

Consolidated Financial Statements

31 December 2016

*(With Independent Auditors' Report Thereon)*



## INDEPENDENT AUDITORS' REPORT

To the Board of Directors of  
Society of Exploration Geophysicists

We have audited the accompanying consolidated financial statements of the Society of Exploration Geophysicists (a nonprofit organization), which comprise the consolidated statement of financial position as of 31 December 2016, and the related consolidated statements of activities and cash flows for the eighteen months then ended, and the related notes to the consolidated financial statements.

### **Management's Responsibility for the Financial Statements**

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

### **Auditor's Responsibility**

Our responsibility is to express an opinion on these consolidated financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the consolidated financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements.



Board of Directors of  
Society of Exploration Geophysicists  
Page 2

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

**Opinion**

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the consolidated financial position of the Society of Exploration Geophysicists as of 31 December 2016, and the consolidated changes in its net assets and its consolidated cash flows for the eighteen months then ended in conformity with accounting principles generally accepted in the United States of America.

*Hawelka, Morris, Singer + Smith, P.L.L.C.*

23 May 2017

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

## Consolidated Statements of Financial Position

As of 31 December 2016

**Assets**

## Current assets:

Cash and cash equivalents	\$ 1,948,162
Accounts receivable, less allowance for doubtful accounts of \$94,748 in 2016	3,382,905
Accounts receivable - SEG Foundation	397,695
Inventories	366,100
Prepaid expenses	465,120
Deferred leasing costs	<u>123,525</u>
Total current assets	<u>6,683,507</u>

Investments	7,269,457
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Deferred leasing costs – long term	877,192
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## Property and equipment:

Land	489,605
Building and leasehold improvements	30,897,386
Application development	633,260
Furniture, fixtures and equipment	902,332
Capital lease equipment	<u>60,268</u>
	32,982,851
Less accumulated depreciation	<u>7,969,238</u>
Net property and equipment	<u>25,013,613</u>

	\$ <u>39,843,769</u>
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See accompanying notes to consolidated financial statements.

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

## Consolidated Statements of Financial Position (Continued)

As of 31 December 2016

**Liabilities and Net Assets**

Current liabilities:	
Accounts payable and accrued liabilities	\$ 1,480,971
Current portion of capital lease obligation	20,286
Deferred revenue	3,226,127
Current portion of long term debt	<u>608,827</u>
Total current liabilities	<u>5,336,211</u>
Long term debt	18,758,510
Capital lease obligation	12,061
Deferred revenue	<u>563,095</u>
Total liabilities	<u>19,333,666</u>
Unrestricted net assets	15,173,892
	<u>\$ 39,843,769</u>

See accompanying notes to consolidated financial statements.

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

## Consolidated Statements of Activities

For the Eighteen Months Ended 31 December 2016

Revenues:	
Membership dues	\$ 1,821,878
Conferences and meetings	14,357,912
Publication sales and advertising	5,038,859
Professional development	466,458
Building lease operations	3,375,729
Research and data	4,882,757
Other	13,274
Foundation support for programs	3,723,019
Investment income	<u>56,165</u>
Total revenues	<u>33,736,051</u>
Expenses:	
Program expenses:	
Membership record services	499,586
Conferences and meetings	9,062,973
Publications and advertising	4,502,087
Professional development	1,641,229
Humanitarian, student and early careers	3,185,332
Global outreach and business development	728,738
Building lease operations	4,530,238
Research and data	4,646,717
Other	<u>181,826</u>
Total program expenses	<u>28,978,726</u>
Support expenses:	
US-based management, general and administrative	<u>5,667,047</u>
Total expenses	<u>34,645,773</u>
Decrease in net assets before contributions to Foundation	(909,722)
Contributions to Foundation	<u>(261,561)</u>
Decrease in net assets	(1,171,283)
Unrestricted net assets, beginning of period	<u>16,345,175</u>
Unrestricted net assets, end of period	\$ <u>15,173,892</u>

See accompanying notes to consolidated financial statements.

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

## Consolidated Statements of Cash Flows

For the Eighteen Months Ended 31 December 2016

Cash flows from operating activities:	
Decrease in net assets	\$ (1,171,283)
Adjustments to reconcile decrease in net assets to net cash used by operating activities:	
Depreciation and amortization	1,674,774
Loss on disposal of assets	43,258
Net realized/unrealized loss on investments	393,055
Net gain on sale of rooftop rights for cell towers	(587,338)
(Increase) decrease in assets:	
Accounts receivable	(917,456)
Accounts receivable-SEG Foundation	(94,763)
Inventories	132,801
Prepaid expenses	728,087
Deferred leasing costs	(281,002)
Accrued interest receivable	2,794
Increase (decrease) in liabilities:	
Accounts payable and accrued liabilities	(3,046,806)
Deferred revenues	<u>(4,572,931)</u>
Net cash used in operating activities	<u>(7,696,810)</u>
Cash flows from investing activities:	
Purchases of property and equipment, net of disposals	( 5,074,206)
Purchases of investments	( 8,920,035)
Proceeds from sale of rooftop rights for cell towers	587,338
Proceeds from sale of investments	<u>13,370,725</u>
Net cash used in investing activities	<u>(36,178)</u>
Cash flows from financing activities:	
Proceeds from construction loan	6,053,747
Proceeds from leasing of equipment	60,268
Payments on capital lease	(27,921)
Payments on construction loan	<u>(632,663)</u>
Net cash provided by financing activities	<u>5,453,431</u>
Net decrease in cash	(2,279,557)
Cash, beginning of period	<u>4,227,719</u>
Cash, end of period	\$ <u><u>1,948,162</u></u>
Taxes paid	\$ <u><u>78,073</u></u>
Interest paid	\$ <u><u>982,886</u></u>

See accompanying notes to consolidated financial statements.

## SOCIETY OF EXPLORATION GEOPHYSICISTS

Notes to the Consolidated Financial Statements

For the Eighteen Months Ended 31 December 2016

### NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

#### Nature of Operations

The Society of Exploration Geophysicists (the “Society”), was organized in 1930 as a not-for-profit organization. The objectives of the Society are to promote the science and common scientific interests of geophysicists, and to maintain a high professional standing among its members. The Society accomplishes these objectives by publishing scientific literature, conducting professional development and student programs, hosting technical meetings and conferences, and providing other informational services.

The Society maintains offices in the United States, United Arab Emirates and China.

These financial statements do not include the SEG Foundation (the “Foundation”), a separate not-for-profit organization with a separate board of directors. The Foundation receives contributions for public education and other scientific and humanitarian purposes on behalf of the Society.

#### Principles of Consolidation

The consolidated financial statements include the accounts of the Society and its subsidiaries, SEG Advanced Modeling Corporation (“SEAM”), SEG Real Estate Corp and SEG Global, Inc. All intercompany balances and transactions have been eliminated.

#### Cash and Cash Equivalents

Cash and cash equivalents include cash in banks and all highly liquid investments with an original maturity of three months or less. Accounts at each institution are insured by the Federal Deposit Insurance Corporation up to \$250,000. At times, cash exceeds federally insured limits, but management believes any possible risk of loss is minimal. At 31 December 2016, the Society and SEAM had deposits in excess of the federally insured limit.

#### Accounts Receivable

Accounts receivable largely consists of uncollateralized billings for exhibit space, research completed and in progress, SEG’s share of revenues related to collaborative conferences, advertising, page charges, and reimbursements for tenant improvement costs. Accounts receivable are stated at the amount billed, less an allowance for uncollectible accounts. The Society provides for losses on receivables using the allowance method. The allowance is based on experience, terms of agreements, and other circumstances affecting the ability of customers to meet their obligations. Outstanding balances are written off when management determines that the receivables will not be collected.

(continued)

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

Notes to the Consolidated Financial Statements

For to the Eighteen Months Ended 31 December 2016

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Accounts Receivable (continued)

The Society provides for probable uncollectible amounts through a provision to bad debts expense and a corresponding amount to the allowance based on management's assessment of the current status of individual accounts. Unpaid amounts that remain after management has pursued reasonable collection efforts are written off through a charge to the allowance for uncollectible accounts and a credit to accounts receivable. Interest is not charged on outstanding balances.

At 31 December 2016, management estimates that the allowance for uncollectible accounts of \$94,748 is adequate to absorb any losses which might arise from nonpayment. Receivables are considered impaired if full payments will not be received in accordance with contractual terms. Such impaired receivables are written down to the amount of cash expected to be collected.

Inventories

Inventories of publications for resale are valued at the lower of cost, determined by the average method, or market. In the eighteen months ended 31 December 2016, the Society wrote-down inventory by \$104,366.

Investments

Investments consist of marketable debt and equity securities which are valued at their fair values in the statements of financial position. Fair values for investments are based on quoted market prices. Unrealized gains and losses are included in the statements of activities. Investments in joint ventures are valued at cost.

Property and Equipment

The Society capitalizes all expenditures for property and equipment in excess of \$1,000. Property and equipment are carried at cost. Depreciation is computed using the straight-line method based on the estimated useful lives of the assets. When assets are retired or otherwise disposed of, the cost and related accumulated depreciation are removed from the accounts, and any resulting gain or loss is included in the statement of activities. Expenditure for maintenance and repairs are charged to expense as incurred. Major improvements are capitalized. The lives used in computing depreciation are as follows: building – 40 to 50 years; software, tenant improvements, furniture and equipment – 3 to 10 years.

The Society reviews the carrying value of property and equipment for impairment whenever events and circumstances indicate that the carrying values of long-lived assets may not be recoverable from the future cash flows expected to result from their use and

(continued)

## SOCIETY OF EXPLORATION GEOPHYSICISTS

Notes to the Consolidated Financial Statements

For the Eighteen Months Ended 31 December 2016

### NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

#### Property and Equipment (continued)

ultimate disposition. In cases where the undiscounted expected future cash flows are less than the carrying values, an impairment loss is recognized equal to the amount by which the carrying value exceeds the fair value of each asset. The factors considered by the Society in performing an impairment assessment include current operating results, trends, and prospects, and the effects of obsolescence, demand, competition, and other economic factors. Based on these criteria, there was no impairment for the eighteen months ended 31 December 2016.

#### Application Development

Direct costs associated with the purchase of enhancements, upgrades, and new modules for the Society's accounting and association management systems are capitalized and amortized over the estimated product life of three years on the straight line basis.

Unamortized costs are carried at the lower of book value or net realizable value.

#### Net Assets

Net assets and income, expenses, gains and losses are classified based on the existence or absence of donor-imposed restrictions. Accordingly, our net assets and changes therein are classified and reported as follows:

- ***Unrestricted*** – Unrestricted net assets represent those resources that are not restricted by donors. Board-designated net assets represent amounts that the Board of Directors set aside for future use. The Society does not have any board-designated net assets at 31 December 2016.
- ***Temporarily Restricted*** – Temporarily restricted net assets reflect donor-imposed restrictions that require us to utilize or expend the related assets as specified. We record contributions as temporarily restricted if they are received with donor stipulations that limit their use through either time or purpose restrictions. When donor restrictions expire, that is, when a time restriction ends or a purpose restriction is fulfilled, temporarily restricted net assets are reclassified to unrestricted net assets and presented in the statement of activities as “net assets released from restrictions.” Our policy is to record temporarily restricted contributions received and expended in the same accounting period as unrestricted revenues and expenses in that period. The Society does not have any temporarily restricted net assets at 31 December 2016.

(continued)

## SOCIETY OF EXPLORATION GEOPHYSICISTS

### Notes to the Consolidated Financial Statements

For to the Eighteen Months Ended 31 December 2016

#### NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

##### Net Assets (continued)

- ***Permanently Restricted*** – Permanently restricted net assets reflect donor-imposed restrictions which stipulate that the related resources be maintained in perpetuity, but which permit us to expend part or all of earnings derived from the donated assets for either specified or unspecified purposes. The Society does not have any permanently restricted net assets at 31 December 2016.

##### Income Taxes

The Society is exempt from federal income tax under Section 501(c)(6) of the Internal Revenue Code. Income from its consolidated for-profit subsidiary is subject to income tax. Advertising income not directly related to the Society's tax-exempt purpose and income from debt-financed real estate are subject to taxation as unrelated business income. Tax expense of \$78,073 for the eighteen months ended 31 December 2016 was associated with unrelated business income.

Management has evaluated the tax positions of the Society and its consolidated subsidiaries and concluded that the companies have taken no uncertain tax positions that require adjustment to or disclosure in the financial statements to comply with the provisions of the accounting guidance for income taxes. Tax periods that remain open for examination periods ended June 2013 through December 2016.

##### Revenue Recognition

Funding for certain program activities is received in advance, recorded as deferred revenue and recognized as follows:

- Membership dues and publication subscription revenues are recognized ratably over the applicable membership or subscription period.
- Meeting revenues are recognized as revenue at the time of the meeting.
- Research revenues are recognized as the related services are performed in accordance with the terms of the contracts.

##### Building Lease Operations

SEG Real Estate Corp utilizes a real estate management and leasing company to manage leasing, operations and maintenance of the building. Office space that is not used by the Society is leased to other organizations.

## SOCIETY OF EXPLORATION GEOPHYSICISTS

### Notes to the Consolidated Financial Statements

For July 1, 2015 to December 31, 2016

#### NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

##### Fair Value Measurements

The Society establishes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1 measurements) and the lowest priority to measurements involving significant unobservable inputs (Level 3 measurements). The three levels of the fair value hierarchy are as follows:

- Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets that the Society has the ability to access at the measurement date.
- Level 2 inputs are inputs other than quoted prices included within Level 1 that are observable for the assets, either directly or indirectly.
- Level 3 inputs are unobservable inputs for the assets.

The level in the fair value hierarchy within which a fair measurement in its entirety is based on the lowest level input that is significant to the fair value measurement in its entirety.

##### Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reported period. Actual results could differ from those estimates.

##### Subsequent Events

The Society has reviewed subsequent events and transactions which occurred after 31 December 2016 through the date of the independent auditor's report on these financial statements, which is the date that the financial statements were available for release. The financial statements include all events or transactions, including estimates, required to be recognized in accordance with accounting principles generally accepted in the United States. The Society has also determined that there are no non-recognized subsequent events which require additional disclosure in order for these financial statements to not be misleading.

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

Notes to the Consolidated Financial Statements

For the Eighteen Months Ended 31 December 2016

## NOTE 2 – INVESTMENTS

At 31 December 2016, investments at fair value were as follows:

Equity investments:		
Bond mutual funds	\$	4,494,790
Stock mutual funds		1,881,795
Exchange traded fund - stock		<u>642,872</u>
Equity investments (Level 1 Assets)		7,019,457
Joint ventures (Level 3 Assets)		<u>250,000</u>
Total investments	\$	<u><u>7,269,457</u></u>

The Society's joint venture fair value is cost since its interest is not a controlling interest. No identified events or changes in circumstances have occurred that would have had a significant adverse effect on fair value. The Society has received significant cash flow in excess of cost since its purchase. It is not practicable to estimate fair value. The Society's ability to sell this investment is limited.

Investment income (loss) in the accompanying consolidated statements of activities for the eighteen months ended 31 December 2016 includes the following:

Interest and dividend income	\$	449,220
Gain (loss) on investments		<u>(393,055)</u>
	\$	<u><u>56,165</u></u>

Fees charged by investment advisors totaled \$99,373 for the eighteen months ended 31 December 2016.

## NOTE 3 – RELATED PARTY TRANSACTIONS

The Society and Foundation support each other with contributions, and the Society provides services to the Foundation, some of which are reimbursed by the Foundation. During the year ended 31 December 2016, the Society implemented a requirement for related parties to reimburse a portion of the costs of shared services (indirect costs).

(continued)

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

Notes to the Consolidated Financial Statements

For to the Eighteen Months Ended 31 December 2016

NOTE 3 – RELATED PARTY TRANSACTIONS (CONTINUED)

Transactions for the eighteen months ended 31 December 2016, are as follows:

Foundation support for program activities	\$ 3,723,019
Reimbursement from the Foundation for fundraising and administrative services	\$ 362,642

In-kind contributions to the Foundation consist of the portion of allocation of indirect costs not required to be reimbursed totaling \$261,561.

Accounts receivable due from the Foundation was \$397,695 at 31 December 2016.

NOTE 4 – SALARY REDUCTION PLAN

The Society sponsors a salary reduction plan. The plan is nondiscriminatory and covers all SEG employees who are foreign nationals or legal residents of the United States and have attained the age of twenty one. The Society's contributions to this plan are computed based on a safe harbor non-elective 3% of salaries and a one-for-one safe harbor matching contribution of employees' contributions, up to a maximum of 3% of salaries. In addition, a discretionary profit sharing contribution can be made after reaching the end of the plan year. The discretionary contribution, if any, will be determined from year to year.

For the eighteen months ended 31 December 2016, the Society's expense for the safe harbor match and safe harbor non-elective contributions was \$202,083 and \$290,846, respectively. The administrative expenses incurred by the Society was \$20,728.

NOTE 5 – LONG TERM DEBT

SEG Real Estate Corp entered into a loan agreement with a bank to fund construction of a new building not to exceed the principle amount of \$20 million, with interest at LIBOR plus 2% through the construction period. Effective November 15, 2015, SEG Real Estate Corp converted to a permanent financing arrangement with the construction lender. The loan principal was divided among three tranches of \$2,000,000, \$5,000,000, and \$13,000,000, respectively.

(continued)

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

## Notes to the Consolidated Financial Statements

For the Eighteen Months Ended 31 December 2016

## NOTE 5 – LONG TERM DEBT (CONTINUED)

The loan is collateralized by all assets of SEG Real Estate Corp, including the existing building, and is guaranteed by the Society. SEG Real Estate Corp and the Society have semi-annual financial reporting requirements and affirmative covenants including 1) a requirement for the Society to maintain liquid assets of at least \$5 million, and 2) a requirement for the Society and SEG Real Estate Corp to maintain a combined tangible net worth of at least \$10 million.

Long term debt consists of the following:

Note payable due in monthly installments of \$14,198.28 including interest at 3.35%, maturing in October 2020 with a balloon of \$1,462,975	\$ 1,887,216
Note payable due in monthly installments of \$29,548.62 including interest at 3.66%, maturing in October 2022 with a balloon of \$3,688,391	4,813,727
Note payable due in monthly installments of \$68,817.75 including interest at 3.97%, maturing in October 2025 with a balloon of \$9,361,582	<u>12,666,394</u>
	19,367,337
Less: current portion of long-term debt	<u>608,827</u>
	<u>\$ 18,758,510</u>

Long term debt matures as follows:

<u>Years Ending</u> <u>31 December</u>	
2017	\$ 608,827
2018	632,506
2019	657,108
2020	2,113,449
2021	585,525
Thereafter	<u>14,769,922</u>
	<u>\$ 19,367,337</u>

Interest incurred for the eighteen months ended 31 December 2016 of \$1,014,844 consist of \$17,068 capitalized in building cost during construction phase and \$997,776 expensed as debt interest.

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

## Notes to the Consolidated Financial Statements

For the Eighteen Months Ended 31 December 2016

## NOTE 6 – LEASING ARRANGEMENTS

SEG Real Estate Corp leases approximately 59% of the office space in its first building and 89% in the second building to unaffiliated parties under non-cancelable operating leases.

Deferred leasing costs consist of costs incurred to obtain new tenants, including leasing commissions and incentives, that are paid in advance and due upon occupancy. These costs are amortized over the life of the lease.

The following is a schedule of minimum future rental revenues from unaffiliated tenants, including leasing commitments made subsequent to 31 December 2016 as of:

<u>Years Ending 31 December</u>	<u>Amount</u>
2017	\$ 2,366,838
2018	2,283,143
2019	2,239,737
2020	2,118,772
2021	2,035,529
Thereafter	<u>5,742,150</u>
	\$ <u>16,786,169</u>

## NOTE 7 – CAPITAL LEASES

The Society leases certain equipment under non-cancelable capital leases. For financial reporting purposes, minimum lease payments to the equipment have been capitalized and included in fixed assets on the balance sheet. Amortization of the leased property is included in depreciation expense.

The following is a schedule of future minimum lease payments under capital leases as of 31 December 2016:

<u>Years Ending 31 December</u>	<u>Amount</u>
2017	\$ 22,594
2018	<u>13,180</u>
Total	35,774
Less Amounts Representing Sales Tax/Interest	<u>3,427</u>
Total	\$ <u>32,347</u>

(continued)

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

Notes to the Consolidated Financial Statements

For the Eighteen Months Ended 31 December 2016

**NOTE 7 – CAPITAL LEASES (CONTINUED)**

Interest expense on the capital lease obligation was \$1,008 for the eighteen months ended 31 December 2016.

**NOTE 8 – OPERATING LEASES**

SEG leases certain equipment under non-cancelable operating leases. Rental expense for the eighteen months ended 31 December 2016 totaled \$54,140.

Future minimum rental payments are as follows at 31 December 2016:

<u>Years Ending</u> <u>31 December</u>	<u>Amount</u>
2017	\$ 36,301
2018	36,301
2019	36,301
2020	<u>9,075</u>
Total	\$ <u>117,978</u>

**NOTE 9 – SALE AND LEASE ARRANGEMENT**

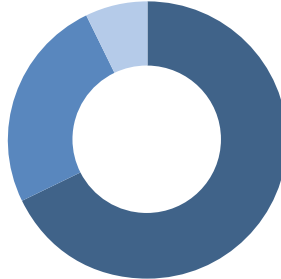
In 2016, SEG Real Estate Corp received \$587,338 for the leasing rights to the rooftop of the first building for the purpose of placing cell towers and receivers. Simultaneously, the buyer entered into a 40 year leasing agreement for the rooftop and is entitled to enter into sublease agreements with third parties for placement of receivers on the towers subject to SEG Real Estate Corp's prior approval and receipt of 50% of the proceeds from the arrangements.

# SEG Foundation Financial Summary

The following charts display the sources of revenue and program and support expenses for 2016 and 2015 (in thousands):

## 2016 Sources of Revenue

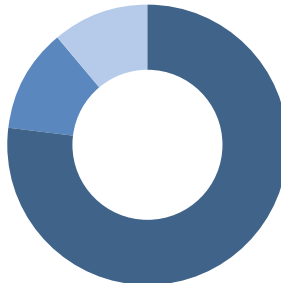
- Contributions 68%
- Interest & Dividends 25%
- In-kind Support from SEG 7%



Total Revenue, Gains (Losses) & Other: \$1,444  
 Contributions: \$1,134  
 In-kind Support from SEG: \$120  
 Interest & Dividends: \$427  
 Unrealized Gain on Investments: \$512  
 Loss on Bad Debt: (\$750)

## 2015 Sources of Revenue

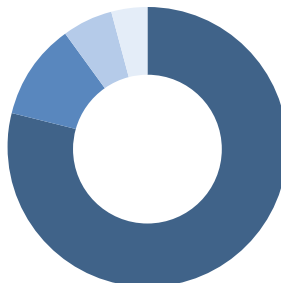
- Contributions 77%
- Interest & Dividends 12%
- In-kind Support from SEG 11%



Total Revenue, Gains (Losses) & Other: \$1,629  
 Contributions: \$2,210  
 In-kind Support from SEG: \$330  
 Interest & Dividends: \$338  
 Unrealized Loss on Investments: (\$861)  
 Loss on Bad Debt: (\$387)

## 2016 Expenses

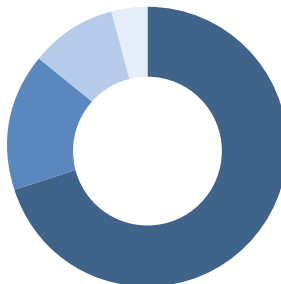
- SEG Program Support 79%
- Management & General 11%
- Fundraising 6%
- Investment Fees 4%



Total Expenses: \$2,686  
 Grant Awards to SEG: \$2,111  
 Fundraising & Support Services: \$575  
 Net Assets, End of Year: \$21,912

## 2015 Expenses

- SEG Program Support 70%
- Management & General 16%
- Fundraising 10%
- Investment Fees 4%



Total Expenses: \$3,607  
 Grant Awards to SEG: \$2,526  
 Fundraising & Support Services: \$1,081  
 Net Assets, End of Year: \$23,154

Audited financial statements available at [seg.org/foundation](http://seg.org/foundation).

## 2016 Summary

Program and support expenses are funded by contributions from corporate and individual donors (new contributions and payments on existing pledges), the Foundation’s Development Reinvestment Fee, and by the Annual Fund when necessary. Due to the downturn in the oil market, the Foundation anticipated lower contribution revenues compared to 2015 and significantly reduced its management and general support services and fundraising expenses during 2016. The Foundation net assets were \$21,912,000 at the end of 2016.

## Foundation-funded SEG Programs

During 2016, Foundation donors supported 18 SEG programs/activities, providing grants to SEG totaling \$2.1 million. These programs include: Geoscientists *Without Borders*® (GWB), Scholarships, Student Membership, Field Camps, Student Leadership Symposium (SLS), Student Education Program (SEP), Challenge Bowl World Finals, Student Chapters, Travel Grants, International Geosciences Student Conference (IGSC), Summer Research Workshop Awards, Near Surface Geophysical Research Award, Distinguished Instructor Short Course (DISC), Distinguished Lecture, Honorary Lecture, SEG Online, SEG on Demand, and SEG Wiki.

## Revenues: Contributions

A reduction in industry-wide corporate budgets during 2016 drastically impacted the overall fundraising results for the Foundation. However, note that revenue only includes new pledges and contributions made in the current year and does not include cash received from pledges made in prior years.

## Expenses: Supporting Services

SEG reduced its staff by 35% during 2016 related to the oil market downturn over the last three years. This was done in an effort to drastically reduce the budget across the organization, including its subsidiaries and supporting organization, such as the Foundation. The Foundation Board of Directors and Development Committee recognized the reduction in budgets industry-wide and used this opportunity to focus on select fundraising projects and stewardship activities during 2016.

The Foundation’s expenses include program services, management and general, and fundraising. Program services are directly related to program grant awards to SEG. Management and general are related to the general administration and operation of the Foundation. Fundraising is directly related to the stewardship and development of donors.

## Fundraising Efficiency

A commonly used metric for monitoring fundraising efficiency is the “fundraising cost ratio” defined as fundraising expenses divided by total contributions. Calculating fundraising expenses and revenues using rolling averages over a period of three to five years reduces the impact on any one large gift, bequest, grant, or a low revenue year on the fundraising cost ratio in any given year. The Foundation has chosen to use a three-year rolling average to calculate its fundraising cost ratio. According to CharityWatch, a charity is considered to be highly efficient when a Cost to Raise \$100 is \$25 or less ([charitywatch.org](http://charitywatch.org)).

### Fundraising Efficiency Formula

$$\frac{\text{fundraising expenses}}{\text{contributions}} \times \$100 = \text{dollars spent per } \$100 \text{ raised}$$

Dollars spent per \$100 raised

