

# AEG NEWS

*ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS*  
Connecting Professionals, Practice and the Public

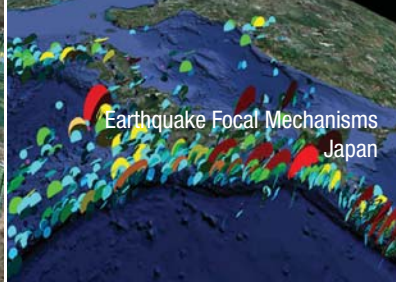


December 2013

Vol. 56, No. 4



USGS Hydrostratigraphy  
Sections  
Miami, Florida



Earthquake Focal Mechanisms  
Japan



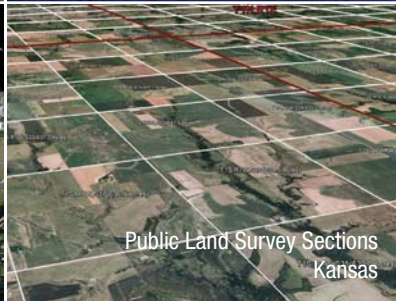
Wallkill Watershed  
New Jersey



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Midcontinent, USA



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London, England



Public Land Survey Sections  
Kansas



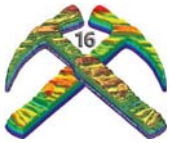
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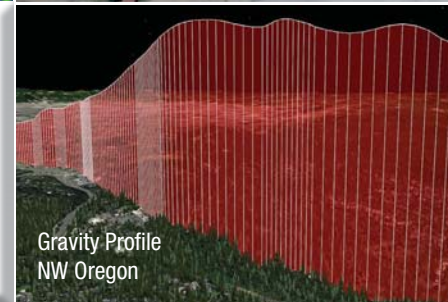
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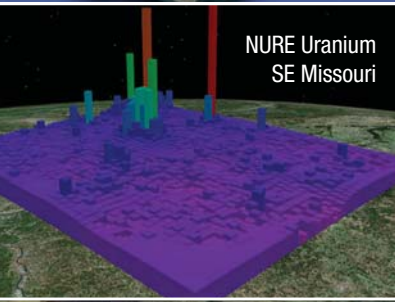
**RockWorks16  
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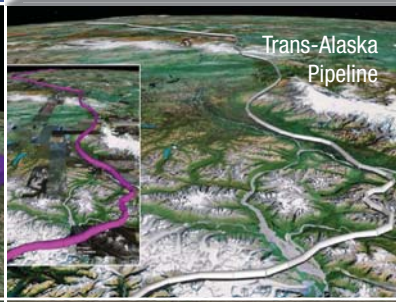
The RockWorks16 EarthApps is a **FREE** collection of over 70 programs for plotting your data within Google Earth. It does **NOT** require any other software (other than Google Earth). It's **FREE**. Really.



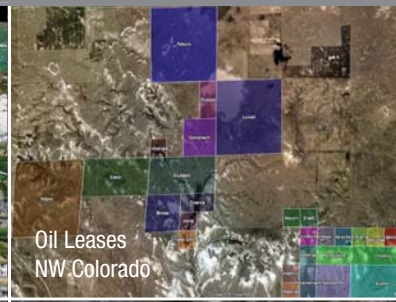
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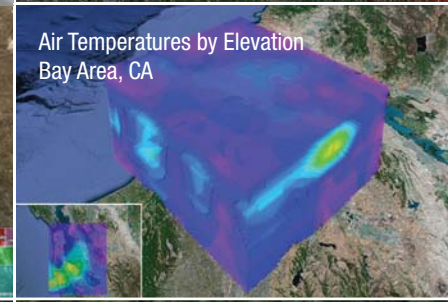
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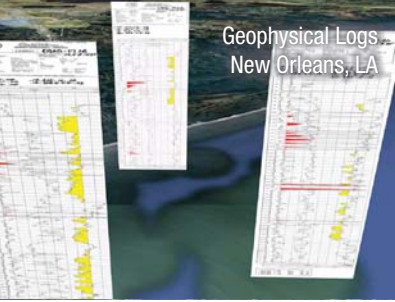
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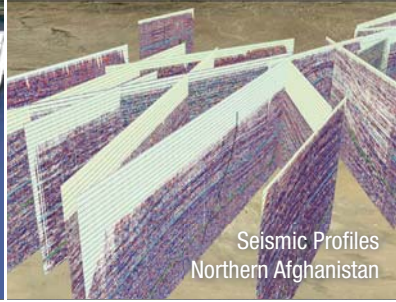
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NW Colorado



Air Temperatures by Elevation  
Bay Area, CA



Geophysical Logs  
New Orleans, LA



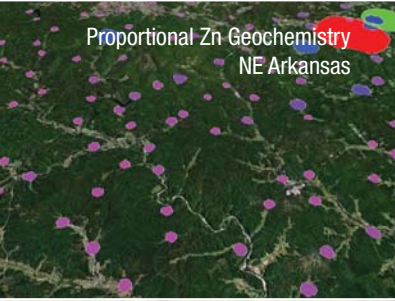
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Northern Afghanistan



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Ft. Myers, Florida



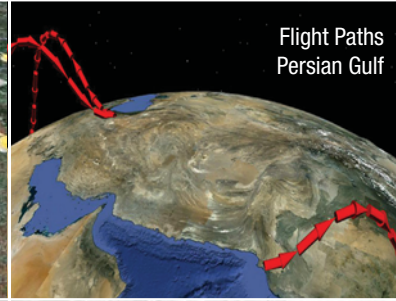
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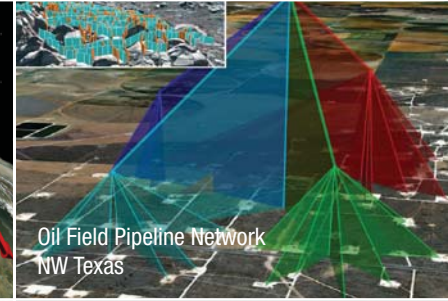
Proportional Zn Geochemistry  
NE Arkansas



Weather Forecast  
Siberia, Russia



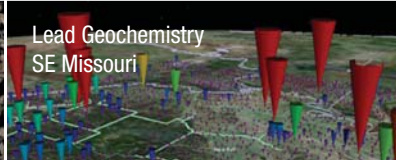
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Oil Field Pipeline Network  
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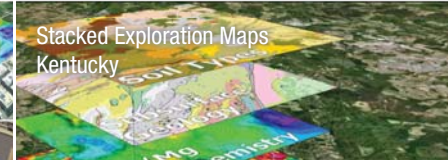
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N. Arizona



Lead Geochemistry  
SE Missouri



Contaminant Plume  
Washington, DC



Stacked Exploration Maps  
Kentucky



# AEG NEWS

ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS

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2. Images should be sent as high-resolution jpeg or tiff files. **Questions?** Contact Andrea Ptak at 206-725-9169/[andrealeighptak@me.com](mailto:andrealeighptak@me.com).
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Sculpted slope in granite with ideal fracture spacings - see story on page 27...

## THE ASSOCIATION

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# Why AEG?

Gary C. Luce, AEG 2013–14 President



hy AEG? This is a simple question but the answer has been expressed in many ways by many members over the years. For me the answer is very clear:

“to protect the public and advocate for the profession of applied geology.” In my opinion, virtually everything else we do and believe follows from this simple statement.

In this my Presidential Message to the membership, I discuss where AEG is today and the themes that the Executive Council (EC) will be focusing on over the next year. Our goal is to tell the story of the “Why” of AEG and help us create a vision of our future as an organization.

During my time on the EC we have faced several challenges. I am happy to report AEG is now moving in a positive direction both financially and in our advocacy of the profession. Some great things are happening within AEG and there are many reasons to be very optimistic about our future!

Just a few of those things are:

1. AEG under Treasurer **Ken Ferguson’s** leadership last year has reversed the past years’ need to borrow from our Treasurers Reserve. We are now beginning to repay the account and provide additional funds for initiatives and committee budgets.
2. The *AEG Insider* is off and running to a chorus of positive feedback from members, vendors and non-members. As an added benefit, the advertising from this effort is generating significant unanticipated revenue. Thanks go to **Serin Bussell**, our Corporate Relations Director, who is the driving force behind this endeavor!
3. We had a very successful Shlemon Specialty Conference on Dam Failures last May in Denver.
4. Our Alaska Section is in the process of reforming and by the time this article is printed should be back!
5. We are considering a joint conference with the American Rock Mechanics Association (ARMA), possibly in September of 2014 in San Francisco.
6. The EC is exploring ways to collaborate more with AGI and other associations.
7. AEG has implemented a partnership with Midwest Geosciences Group to provide webinars for our members.
8. Our website technical problems have largely been resolved and we can now focus on our content.
9. Our e-store is being reinstated in collaboration with the AEG Foundation.
10. We are applying this year in Torino, Italy, to IAEG to host their annual meeting in 2018 in San Francisco.
11. We had a very successful Annual Meeting in Seattle! Thanks to the Committee Chairs **Kathy Troost** and **Mark Molinari**, Meeting Manager Heather Clark and all our Headquarters Staff.



AEG President Gary Luce (L) makes good on his promise to visit Sections that have not been on the list for a while. He is here with Debun Misra and students from the University of Alaska Fairbanks.

12. Our first science fair for K-12 students was a successful addition to the Annual Meeting and is encouraging for the future of our profession. Thanks go to **Jules Johnston** and the K-12 Committee for putting the fair together.
13. *AEG NEWS* got a new editor—**Anna Saindon**—who is bringing a new look to the publication, and who by all accounts is doing an excellent job. If you are not aware, this is one of our most demanding volunteer positions, which makes her efforts even more impressive.

Over the past year I have spent time thinking about what my role as President should be as our Needs Assessment (NA) process evolves, and changes to the Association are proposed or implemented. The next two years or more will be transitional as the NA process plays out. During this time, AEG must continue to function, and our officers and I, as President, must lead as efficiently as possible to serve the membership and yet nimbly adapt to the coming changes.

This year starts on the heels of the successful Seattle Annual Meeting. At the Board of Directors (BOD) meeting in Seattle, the management of the Association took what I believe is a giant step forward in governance. Through the leadership of past presidents **Matt Morris** and **Jennifer Bauer**, combined with the efforts of the Strategic Planning Committee, the BOD meetings have become much more strategically focused than in past years, with an emphasis on targeted planning workshops. These workshops result in the EC talking much more “with” the BOD than “at” the BOD. The benefits were apparent in the increased level of engagement of the BOD—a primary recommendation from the Needs Assessment.

I want to cover a few specific outcomes of the NA here (details can be found in the Strategic Planning Committee report). The NA process has helped us identify what AEG does

best and where the Association can improve on our processes. Not surprisingly, the NA identified our meetings and publications as two of our most successful endeavors. In reflecting on the success of these two activities, it becomes apparent that it is not an accident they are so successful.

We plan these events four to five years ahead and have a process of continuous evaluation. Extending this approach to all our operations is incredibly important so that we know where we are going and so we don't, as Yogi Berra put it, “end up some place else.” With that in mind, the BOD has embraced a plan to look at the entire Association from a long-range strategic planning perspective. On behalf of the BOD, we will be asking all committees, primary vendors and publications editors to begin the process of creating a minimum of a five-year plan. At the time of this publication, that planning process will be well underway and results will be presented in future *NEWS* articles this year.

While this planning process plays out, my goals are to start a broader conversation with the membership through the *NEWS* and at my presidential visits about not only “Why AEG” but recounting our history, governance structure and accomplishments. I am going to particularly focus on making presidential visits to sections that are struggling or have not had a visit from a president recently.

Each of my *NEWS* reports this year to the membership will address current news and also short overviews of important fundamental aspects of AEG. It is my hope that these messages will provide context to the NA and help chart a course for the Association through the foreseeable future. The five themes I will address in the *NEWS* this year are:

- Remembering our Past and Envisioning the Future of AEG.
- Principles of Operations and Leadership of Volunteer Associations
- Branding of AEG
- Building Our Membership
- Passing the Torch of Leadership

## Theme 1: Remembering our Past and Envisioning the Future of AEG

This theme is based on my own realization of my lack of knowledge about the early years of the Association (I heard somewhere that “the past holds the key to the future”). How can we plan the future if we don't know where we came from? To this end, I am going to ask that you join me in exploring that past and better understanding the vision that our founding members had for AEG, as well as the lessons they learned along the way. Therefore, the EC is launching a number of educational endeavors as described below.

Beginning with the March issue of *AEG NEWS*, two short biographical sketches of our past presidents will be featured. The articles will focus on their accomplishments and core values. The goal is to create a special publication that can be a resource now and into the future.

We are also taking a look at the history of our publications. The “Celebration of the *NEWS*” will be the March Special Edition issue. This piece will include interviews with past editors, comments from membership, and samples of the various publication

styles that evolved and will coincide with the roll out of a updated look for the *NEWS*.

Other features being considered include our committees, Shlemon Specialty Conferences, past Association executives, the history of the AEG Foundation, Annual Meetings, and our Sections and Chapters.

“Engineering and Geology are so evidently and so intimately related that a knowledge of the former must include, and is incomplete without, an acquaintance with the latter; in turn, Geology derives much aid from engineering works, records and researches. It is an art that Geology must be treated for its results to be of immediate practical value to engineers; but as all art is based on definite laws or principles, he will derive most benefit from Geology, and be the most proficient in its practical application, who founds his work upon it, also, as a science.”

William Henry Harrington in *Engineering Geology*.

With this look back at our history, it is my hope that the answer to “Why AEG?” will be made clearer to our all members. Then together we can, better “...tell our story,” in the words of the Needs Assessment. I welcome other ideas on retrospectives that would serve to enhance these efforts.

## Conclusion

As the 57th President of AEG, I find it humbling to look at the names and accomplishments of our past presidents. To work with the BOD and the rest of the EC is indeed a privilege. I am both honored and enormously grateful to have the chance to give back to the Association and to our profession a small portion of what I have gained from my membership in AEG.

I look forward to bringing to you my next theme in the March *NEWS* focusing on the “Principles of Operation and Leadership of Volunteer Associations.”

I will be visiting as many Sections this year as I can and welcome the opportunity to talk with you and hear your ideas on how AEG can serve your needs. Please feel free to call, write or email me at any time with your ideas.

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## AEG’s Mission:

**AEG contributes to its members’ professional success and the public welfare by providing leadership, advocacy, and applied research in environmental and engineering geology.**

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# Staying the Course

Paul Santi, AEG 2013–14 Treasurer

**A**s you have heard over the last year or two, we have been tightening our financial belt to deal with an unsustainable approach to our fiscal model. Namely, we have had to increase the baseline funds in our operations account to cover our expenses in “real-time.” In the past, there was a short period each year when we used the next year’s dues payments (which start arriving in the fall) to pay the current year’s bills.

We now maintain sufficient funds in the operations account to cover the full year’s expenses without relying on the next year’s income. This required withdrawals from the Treasurer’s Reserve account in late 2012 and in 2013. However, this account has had good investment performance, helping us maintain a balance of approximately \$213,000 as of November 20, 2013, compared to a pre-withdrawal balance of \$266,000 on October 31, 2012. Currently, \$144,799 in withdrawals from the reserve have not been paid back.

At the 2013 mid-year Board of Directors meeting, a new policy was adopted that directs surpluses from the Annual Meetings and Shlemon Specialty Conferences to be deposited into the Treasurer’s Reserve account with the ultimate goal of accumulating the equivalent of one year’s operating expenses for the Association (approximately \$360,000). It is possible that this goal will be met in two to three years if future Annual Meeting surpluses are similar to those of the recent past.

While the books are still open on the 2013 Seattle Annual Meeting as a few final expenses are cleared, it appears to be a very successful meeting from a financial standpoint with an expected surplus comparable to recent meetings. Much thanks and congratulations go to the Annual Meeting Co-chairs, the Planning Committee, and Meeting Manager Heather Clark!

A short overview of our income and expenses fills out our financial picture:

- membership income through July 31 was just over \$223,000, which is under budget by about \$10,000 after factoring in the portion allocated to the Legislative Fund. This is almost identical to the 2012 membership revenue.
- In general, expenses are tracking close to budget, with some tracking higher than budgeted. The *AEG NEWS* and the *E&EG* Journal continue to run at a deficit as expected. For the *AEG NEWS*, the decision was made to move to full color for the printed version beginning in June, which will result in costs higher than budget by about \$1,000 per issue. Our greatest source of expense other than administration is for the publishing of the *NEWS*. Steps—such as shifting costs for the Program with Abstracts to the Annual Meeting and making an opt-in category to receive a print copy of the *NEWS* during membership renewal and registration—have been taken to reduce this impact in the 2014 budget.
- The Corporate Sponsor income for FY13 continues to be a great success due to efforts by Headquarters. The revenue realized from Multiview/Multibriefs (website and *AEG Insider*) continues to be a bright spot in the finances.

Through July 31 they have produced nearly \$15,000 in revenue, which exceeds the budgeted income. Administrative costs continue to be kept in check by diligent attention from Headquarters and AEG leadership. Headquarters is to be commended for reducing expenses and agreeing to cuts in their contract.

Overall, our financial outlook is better than last year. Through two quarters, our total revenue minus expenses for the Operations, Meetings, and Legislative accounts is \$273,000 for 2013, compared to \$245,000 for 2012.

The 2014 budget includes projected total revenue of about \$366,000 and total expenses of \$362,000, resulting in a surplus

**“In conclusion, we continue to budget carefully, spend thriftily, and look for other income opportunities that fall within our mission.”**

of about \$4,000. This is below the \$6,000 recommended by the Finance Committee. We are comfortable with this difference due to the conservative nature of the budget and to specific line items (such as some of the committee budgets, depreciated expenses, and bad debt write-offs) that are not expected to be as great as budgeted. In addition, the expected membership revenue is slightly higher than last year due in large to the elimination of the early renewal discount, which seemed to have little impact on renewal. Numbers used in the membership revenue calculations are conservative, based on 2013 membership through July.

In conclusion, we continue to budget carefully, spend thriftily, and look for other income opportunities that fall within our mission. As we continue to stabilize our operational finances and build our Treasurer’s Reserve fund, we expect to find slightly more latitude to target funds strategically to better meet our members’ needs. Specifically, we expect that



Paul Santi with Susan Steer-Wier at the 2013 Annual Meeting

the implementation of ideas from the Needs Assessment will require us to orient our resources in ways that may be different from the past. I look forward to this process, and to my continued role as Treasurer.

PHOTO BY  
ANDREA LEIGH PTAK

# 2013 Annual BOD Meeting Summary

*Dale Andrews, AEG 2013–14 Secretary*

**T**he AEG Board of Directors (BOD), composed of all Section Chairs and the Executive Council, meets twice a year to oversee, review, and conduct the business of the AEG. The latest meeting, held September 14–15 following the Annual Meeting in Seattle, served as a time to monitor the health of the Association, to identify problems, and to recommend solutions. The Board also dedicated several hours to address the recommendations of the Needs Assessment audit that AEG underwent this year. Included below are several highlights of the meeting.

## Needs Assessment Workshop

During the meeting, time was dedicated to conducting a workshop, led by **Duane Kreuger** and **Paul Hale**, which focused on the results of the Needs Assessment. The Board was split into focus area groups, each individually strategizing on a specific topic. Topics included: AEG's governance structure, resource alignment, benefits and value propositions, and communications. The goals of this exercise were to brainstorm ideas, develop action items, and disseminate this information to the appropriate ad-hoc committees developed to evaluate and implement positive changes that will ultimately allow AEG to better meet our members' needs.

## Membership Health

2013 was a positive year for AEG from a Full Member perspective. The ranks of Full Members grew 9% from 2012 to 2013, the largest growth in this sector since the 2008 recession. Our overall membership numbers as of September 30 totaled 3,218. The one area of concern is with our free Student Memberships, which were down 19% from last year.

## Finances

The 2014 budget was approved unanimously by the BOD. Read Treasurer **Paul Santi**'s summary of AEG's finances for details.

## AEG Foundation

AEG Foundation President **Patty Bryan** reported that thanks to the generosity of its donors, more than \$65,000 were raised for the various AEG Foundation programs in the 2012 fiscal year. As a result of this generosity, the Foundation was able to provide 21 awards totaling \$25,500 at the 2013 Annual Meeting.

## 2013 Annual Meeting Update

The Annual Meeting was a tremendous success with over 500 in attendance and is expected to have made a surplus. There was a large contingent of students (77), which is great for the future of the Association, but does result in a large number of complimentary registrations. In the short run, this is a mixed blessing, but in the long run the enthusiastic participation of students will pay off, as they become passionate members.



ANDREA LEIGH PTAKE

**AEG's 2013–14 Executive Council** (L to R): Past President Matt Morris, President Gary Luce, Vice President Ken Ferguson, Treasurer Paul Santi, and Secretary Dale Andrews.

Short courses and field trips were well attended. In total, 116 attendees took advantage of field trips, and 42 participated in the short course offerings. Field trips included Mt. Rainier, the North Cascades, Whidbey Island, and Central Washington, among other locales.

See the Photo Essay on pages 15–20 for highlights.

Upcoming Annual Meeting locations include Phoenix (2014), Pittsburgh (2015), Hawaii (2016), and Denver (2017). The BOD voted for San Francisco as the 2018 meeting location, which, pending approval, would be a joint meeting with the IAEG. If the IAEG does not select San Francisco for 2018, then Portland is willing to host the 2018 AEG Annual Meeting and San Francisco will try for the 2022 IAEG meeting.

## New Initiatives

In an attempt to provide more time for the BOD to spend on strategic and future-focused goals, the Board implemented a consent agenda. The consent agenda is a tool used to streamline meeting procedures by collecting routine, non-controversial items into a group whereby all are passed with a single motion and vote. Incorporating the consent agenda proved to be an effective timesaving option and will likely become used for all future meetings.

President **Gary Luce** also began implementing a rolling five-year plan for AEG and asked the same of each of our operational committees. The five-year plan is intended to create a living document that provides the framework for each committee's—and ultimately AEG's—short- and long-term goals. It adds yet another layer of transparency that will help facilitate goals tracking and assist those transitioning into new leadership roles.

The next BOD meeting will be held in Denver, CO, April 26–27, 2014.

# Operational Committee Highlights

Becky Roland, AEG's Chief Operating Officer

**T**he AEG Headquarters would like to thank all of the AEG members who volunteer their time and energy to the Association. Your hard work and dedication to the Association provides AEG with programs and services that benefit all of our members. AEG would not be the same without you—thank you!

We will be highlighting a different AEG committee in upcoming editions of the *AEG NEWS* as our way to thank you for your help and make others aware of volunteer positions available on your committees. If your committee is seeking additional members or volunteers for specific positions, please contact **Becky Roland** ([broland@aegweb.org](mailto:broland@aegweb.org)).

## Student and Young Professional Support Committee (SYPSC)

Co-Chairs: Adair Gallisdorfer and Nate Saraceno

|                 |                 |                |
|-----------------|-----------------|----------------|
| Jon Barnes      | Tej Gautam      | Duane Kreuger  |
| Eric Chase      | Deb Green       | Kevin Miner    |
| Christina Dance | Emily Hess      | Justin Thomas  |
| Casey Dowling   | Julie Johnston  | Hilary Whitney |
| Ken Ferguson    | Stephanie Kline | Chelsea Windus |

## Volunteer Position Open

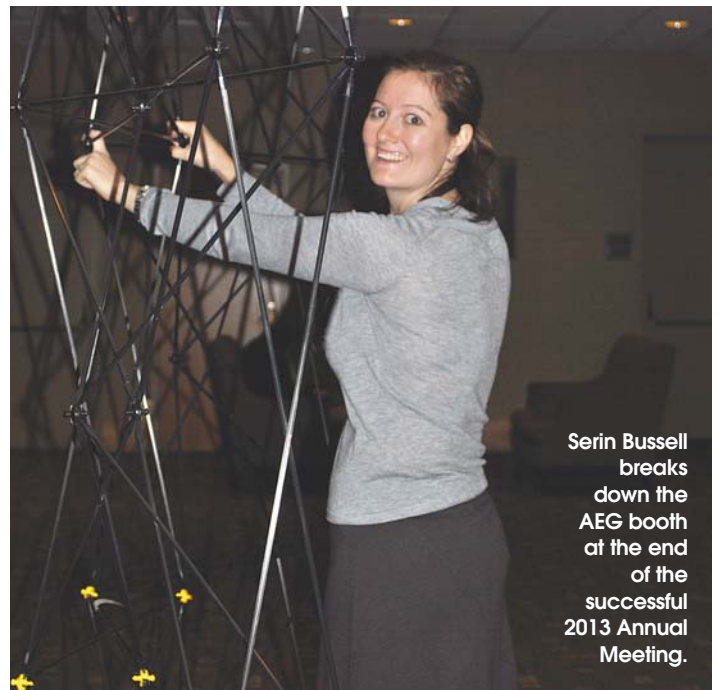
The SYPSC is seeking a volunteer for the position of Visiting Professional Program Committee Liaison. If you would like to learn more about this opportunity and find out how you can help on the Committee, please contact **Nate Saraceno** ([nrsaraceno@gmail.com](mailto:nrsaraceno@gmail.com)) or **Adair Gallisdorfer** ([agallisdorfer@yahoo.com](mailto:agallisdorfer@yahoo.com)).

## AEG Says Farewell to Serin Bussell

As many of you know, **Serin Bussell** of Pivotal Nonprofit Solutions, LLC, partnered with Phoenix-AMC last October to help manage AEG. During her year as Corporate Relations Director, Serin contacted sponsors, advertisers, and exhibitors as part of AEG's revenue generating strategy. She also worked with a number of committees including ASE, Advocacy, Continuing Education, Membership and Messaging, SYPSC, SPC, SCSC and Website to help implement committee programs and activities. In addition, she facilitated monthly "Collaboration Calls" among Sections and Committee members.

In addition to coordinating the AEG Insider and responding to member requests and inquiries, her favorite part of the position has been building connections and friendships with AEG members. Over her 11 years as an AEG member, Serin has gotten to know many of you, but it has been especially rewarding working with AEG members in a new capacity to help improve the AEG experience for everyone.

Beginning in January, Serin has decided to explore other opportunities in project management and logistics. AEG would like to thank Serin for all her hard work on behalf of the Association.



ANDREA LEIGH PTAKE

Serin Bussell breaks down the AEG booth at the end of the successful 2013 Annual Meeting.




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# SDSMT Field Camp

*Konner Horton, Recipient, 2013 Beardsley-Kuper Field Camp Scholarship*

**B**efore leaving Ole Miss I was told that field camp at South Dakota School of Mines and Technology was “the most fun you never want to have again.” I have never heard a truer statement. I arrived in Rapid City, SD, less than 48 hours after taking my last final exam in Mississippi. Little did I know that the two days of packing and driving would be the most relaxed I would be for the next five weeks.

Week one was an introduction to the local geology, through the use of the infamous Jacob's Staff. We moved up the stratigraphic column, five feet at a time, for the next four days. Of course, the time spent on those hillsides proved invaluable later, when trying to identify a formation elsewhere. If you could avoid the rocks being kicked loose by the 40 other students above you, some of it might have even been considered pleasant.

Week two helped us sharpen our mapping skills in one of the most beautiful pieces of private land I have ever seen. Lakota Peak was our first mapping exercise at camp; the steep learning curve became apparent pretty quickly. Luckily, in contrast to our mapping, the weather was incredible. My last few hours there were spent on top of a ridge looking out over the valley with Mount Rushmore in the distance.

Scan-line surveys came in week three, and they were just as tedious as I had imagined—at least we had great weather the whole time. Fortunately we did not have to hand in a report; we just had to give a presentation of our findings. Unfortunately, 14 groups take a long time to work through 20-minute presentations. Lucky for us, the bar down the street, the Hall Inn, was closing its doors forever that night, and the crew from Ole Miss helped give it a proper send-off. Needless to say, the following day's surprise field mapping test yielded at least a few sub-par maps.

The last two weeks seemed to melt together. We assessed dams, mapped potential dam sites, and took a tour of the hydrology of the Black Hills. Over those two weeks we worked on four or five projects, ending with another presentation on our last Friday. Those last two weeks were a test of everyone's determination at camp. It was hard to care enough to work hard at that point; most of us just wanted it all to end, take whatever grade we were given, and be done. It finally ended and I think we were all as relieved as we had ever been.

Throughout our time there, no day was as welcome as Sunday—nowhere to go and nothing due on Monday. One of these Sundays happened to be on the only weekend of the year when people were allowed access to the Crazy Horse Memorial. Not to miss out on this unique opportunity, we all loaded up in whatever vehicles could be found and headed out. This weekend was a little more popular than I had hoped. Arriving at the memorial I could see the arm with way too many people on it. Fortunately for me, I was with two like-minded friends. Upon seeing the line for the trail to the



Stewart Newcomb on top of the Amphitheater, Ranch A, Wyoming



L to R: Konner Horton, Michael Jones, James Cozort, Stewart Newcomb, Aaron Jones on the overlook to Thompson Gulch

sculpture and the throng of people already atop it, we decided Harney Peak was calling our names. A few hours later, looking down on South Dakota from its tallest point, I knew we had made the right decision.

After five weeks of long summer days and sleepless weekend nights, we arrived in Rapid City. It was finally time to go home. I learned a lot in those few weeks, the most valuable lesson being that geologists rarely agree on anything. It became sometimes painfully apparent that geology is far from exact, and therefore requires constant revision. We must always have some sort of doubt in order to find the best solution.

## Advertising/Sponsorship/ Exhibit Committee

### Maximizing Value for Our Corporate Supporters

*Duane Kreuger, Chair*

The ASE Committee continues to be active working as a liaison between our Members, our Supporters and AEG Headquarters. Over the last year, we have continued to work on increasing the breadth and quality of the AEG Insider, which has proven to be a well-received e-publication that our Supporters value. We also worked with Corporate Relations Director **Serin Bussell** to develop easy-to-use templates for Sections to solicit new sponsors and advertisers. We recently started working with the 2014 Annual Meeting Planning Committee to help coordinate their efforts to bring sponsors and exhibitors to what will be an amazing meeting in Scottsdale. To those who supported our 2013 Annual Meeting in Seattle, thank you for your patronage—we appreciate your participation and couldn't do it without you! If you have any questions or ideas, don't hesitate to ask.

## Committee on Memorials, Biographies and Citations

### The Committee Has a New Charter!

*Allen Hatheway & Richard Proctor, Co-Chairs*

The committee was formed in 2005 to preserve memorials, bibliographies and citations of prominent engineering geologists. These may include non-members of AEG, such as the many outstanding practitioners who worked before the term Engineering Geology was coined and before AEG was founded. We embrace the term "Legendary People" and we seek to preserve past and future compilations of relevant personal and career professional works, achievements, and awards.

The Committee strives to honor the human element of the profession of engineering geology. The personalities submitted may come from volunteers or be solicited, and may be living or deceased. They are submitted for reason of the relevancy of their accomplishments to our profession. The Committee welcomes existing published materials. There are no formal specifications or physical requirements for the submittals, and multiple digital, captioned, images are especially encouraged.

If you are interested in being part of this Committee, contact **Richard Proctor** ([enalou@hotmail.com](mailto:enalou@hotmail.com)).

## Strategic Planning Committee

### Assessing our Needs and Planning Strategically

*Deb Green, Co-Chair*

Greetings fellow Members! By the time you read this article, my Co-Chair **Duane Kreuger** and I will have begun the process of transitioning our roles as Co-Chairs of the Strategic Planning Committee (SPC) to **Cynthia Palomares** and **Nate Saraceno**. Cynthia and Nate are dedicated and capable AEG Members who will bring new perspectives and fresh ideas to guiding the Association's committees in the coming years.

Aside from new leadership, the SPC's biggest news relates to the Needs Assessment. What is the status of the Needs Assessment? We're glad you want to know!

The Needs Assessment study by the Loyalty Research Center was completed in April 2013, and the results were presented to the Board of Directors (Board) in May. Following that presentation, the Board participated in a Strategic Leadership workshop lead by Leading Associations. In August, the Board approved the Strategic Leadership report from that workshop. We quickly set in motion a plan to conduct another workshop at the Board Meeting during the Seattle Annual Meeting, to develop implementation plans for each of the four Focus Areas that were defined as critical for AEG's success in the future. These four Strategic Focus Areas are summarized below. Each Focus Area has an ad-hoc committee with multiple tasks assigned and timelines for completion. Much of the work is underway, but there will be plenty of heavy lifting to do in the future. We would like to thank the Board, our staff and all of the members who answered the call to volunteer for an ad-hoc committee to ensure a successful future for not only our Association, but also our profession.

## Strategic Focus Area #1

### Dale Andrews and Dave Bieber, Co-Chairs

#### Governance Structure – Board of Directors

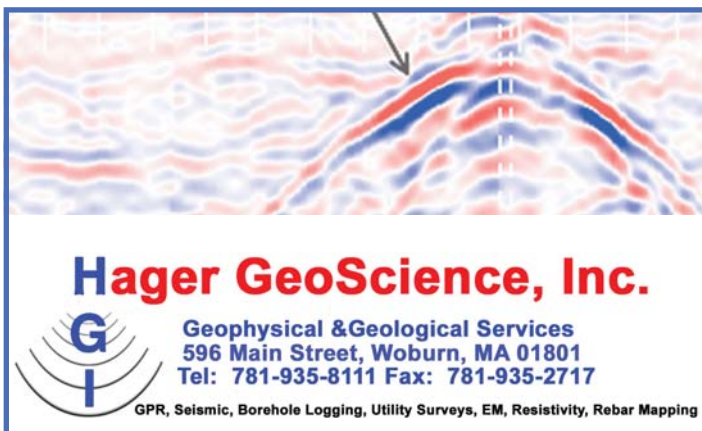
##### The Story:

As a Board we feel our governance structure is not effective. At one time it may have been the best model for us, but it is no longer serving AEG successfully. There is a struggle of loyalties between Association-level and Section needs. Asking Section Leaders to serve as Board Members is asking a lot and forcing a conflict of focus and volunteer time availability. Our pipeline and accountability are lagging. Board meetings are tactical, not strategic, and we are simply ratifying recommendations rather than providing value to AEG Members. Staff and Board roles and responsibilities are not defined well enough. We are struggling to follow through with the strategies we do identify. To address these concerns and be a force for positive change, we are committed to the following outcomes.

##### Outcomes:

Create an efficient and useful Board of Directors structure that works to provide inspired and effective leadership for AEG.

1. Evaluate, create and move to implementation—a governance structure so the Board is strategically oriented and provides nimble leadership and decision making.
2. Develop systems and procedures for successful implementation of the new Board of Director structure.



- Necessary bylaw revisions
- Pipeline/bench strength
- Board versus staff roles and responsibilities
- Section versus Association-level loyalty
- Job descriptions and expectations for Board members
- Reward and recognition for Board members

## Strategic Focus Area #2

**Paul Hale and Patty Bryan, Co-Chairs**

### Resource Alignment – Finances, Committees, Programs, Staff\*

\*Resources include: volunteers, technical working group leaders, committee leaders, program leaders, overall operations, cash and investments, physical plant, headquarters (which is Phoenix AMC or “Becky’s group,” COO, Corporate Relations Director and our Meeting Manager), other contract staff (accounting services, investment advisor, website host, *NEWS* layout, publications printing, legal, vendors associated with annual meetings) and affiliated societies.

#### The Story:

We feel our overall resource alignment is not effective. Volunteer leaders are asked to do too much and are burning out. Our volunteer pipeline and accountability are lagging. Staff and committee roles and responsibilities are both not defined and, when defined by practice, not utilized or are “work around” processes. There are limited resources (time and money). We cannot be all things to all people. Rather than be a mile wide and an inch deep, we need to focus our resources where they are maximized on what we do best and our passions. We are committed to effectively execute on fewer, more focused and higher-value services, while aligning staff, volunteer, financial and marketplace resources.

#### Outcomes:

Redevelop AEG resource uses with regard to: committees and committee structures/duties; say “no” to low return on investment (ROI) programs; effectively realign volunteer/committee, staff and financial resources to match capacity.

1. Evaluate resources and services to ensure proper alignment.
2. Identify new services that are needed, “sacred cows” that should be eliminated, and support critical programs.
3. Develop systems and procedures for successful committee and staff operations.
  - Effective service guidelines and expectations for staff and staff leaders
  - Job descriptions and expectations for committees and committee leaders
  - Pipeline/bench strength
  - Committee versus staff roles and responsibilities
  - Reward and recognize volunteer leaders

## Strategic Focus Area #3

**Adair Gallisdorfer and Duane Kreuger, Co-Chairs**

### Value Proposition and Member Benefits

“Camaraderie through applied geology – uplifting the profession”

#### The Story:

What we offer to Members is critical. There are limited resources (time and money), therefore, we cannot be all things to all people. Rather than be a mile wide and an inch deep, we choose to focus our resources on areas where what we do best and our passions intersect, and relentlessly pursue those areas. We will purposefully stop doing things that take away from this essential focus. To effectively execute on fewer, but more focused and higher-value services, we are committed to the following outcomes.

#### Outcomes:

AEG will establish a focused value proposition for the organization that delivers on its promises.

1. Define and ensure a clear membership proposition that aligns with our brand.

## Strategic Focus Area #4

**Roz Munro, Chair**

### Communications

#### The Story:

We are busy and are tasked with many duties. We have limited capacity, which combined with a broad focus, can lead to deadlines and responsibilities being missed. Communication needs to be effective. Not simply more communications are needed, but more clarity is needed in our internal communications. Technology is underutilized. We should be more open (transparent) to our membership and stakeholders about who we are, and the “why’s” behind our decisions. External audiences are missing (not hearing) what we’re saying. We need to improve our strategic focus for communicating, and to do so, we are committed to the following outcomes.

#### Outcomes:

Transparency, clarity and focus will permeate all aspects of AEG communications to external audiences and internal leadership.

1. Utilize the identified aspirational culture elements to build the AEG brand.
2. Communicate the story to Board, committees and staff so everyone understands and is energized.
3. Align resources (time, money, technology) to provide effective internal and external communications of the redefined purpose, brand and future plans.

So there you have it, the outline for the ambitious but achievable goals and changes. Remember, we are doing this for you, for us, our Association, and the profession. Please don’t hesitate to contact any one of us if you have any suggestions or ideas. All AEG Members have equal ownership in charting our future. We’ll continue to report to the Membership in upcoming editions of the *NEWS* and the Insider. Stay tuned.

## Student & Young Professional Support Committee

Nathan Saraceno, Past Co-Chair

The Student & Young Professional Support Committee (SYSPSC) was my first volunteer experience with AEG at the national level. I joined SYSPSC only a few short years ago, after hearing the committee was looking for new members. I had been involved with AEG before—attending Section meetings and even an Annual Meeting—but my experience with this committee has opened my eyes to the benefits and camaraderie that AEG provides.

SYSPSC has been responsible for, or has assisted in, developing and maintaining numerous services in the past several years. These include tips on interviewing, résumé writing, creating a personal business card, and ideas for Chapter fundraising. One of our most recognizable programs is the Student/Professional Networking Reception, held at the Annual Meeting every year. The most recent of which hosted over 70 attendees, who talked about careers, coursework, fieldwork, and a variety of other topics.

SYSPSC has created grants to benefit both Student Chapters and young professionals. The Student Chapter Grant is funded through the AEG Foundation, and is awarded to two Student Chapters every Fall and Spring. The Fall 2013 grants, worth \$250 each, were awarded to the University of Alaska at Fairbanks and the University of Utah Student Chapters. Congratulations! The Young Professional Travel Grant is awarded to up to two professional members, under the age of 35, who will be attending their first Annual Meeting. The grants are worth

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\$500 each and this year went to Corey Ladner of Mississippi and Robert Leyland of South Africa!

SYSPSC has been publishing a new installment of our “Things Your Advisor Didn’t Tell You” series in every issue of the *AEG NEWS* since the original article in the March 2013 issue. Slideshow versions of each list are created and posted on the AEG website. These lists are meant to be both informative and fun, and have generated some great discussions on AEG’s social media pages! This issue’s article, “Top 10 Field Gear Items MacGyver Would Carry” can be found on the next page.

In addition, we’ve created a new recruitment poster with the help of Jeannie Pallotta which can be provided free of charge to anyone willing to post it in their department! The poster can be requested by contacting **Becky Roland** ([aeg@aegweb.org](mailto:aeg@aegweb.org)) or you can download a high-resolution pdf via AEG’s webpage.

The AEG website hosts all of the documents mentioned above (and more!) on the Student Chapter Details, Student Resources, and Visiting Professionals Program pages, as well as elsewhere. If you have trouble locating these or other information, feel free to contact SYSPSC Chair, **Adair Gallisdorfer** ([agallisdorfer@yahoo.com](mailto:agallisdorfer@yahoo.com)).

These are just some of the many projects I found myself working on in the past several years. However, what makes this committee special—at least to me—is that it is made up of members who are not only dedicated, but are energetic and fun. I don’t recall a phone conference where we haven’t found the time to laugh! And it doesn’t stop there. Involvement with SYSPSC opened up doors for me to become involved in many more aspects of AEG. I can now honestly say that AEG is full of members who genuinely care not only about advocating for their profession and for the future of AEG (both very admirable), but about each other and supporting our colleagues.

If you are looking for a way to network on a national scale, advocate for your profession in engineering and environmental geology, help bring support to young students through seasoned professionals, or simply make some lifelong friends, I encourage you to join an AEG committee. You won’t be sorry!

I have recently accepted the position of Co-Chair of the Strategic Planning Committee (SYSPSC). **Adair Gallisdorfer** ([agallisdorfer@yahoo.com](mailto:agallisdorfer@yahoo.com)) will remain as Chair of SYSPSC. Please contact Adair if you’d like to join this active, and fun, committee, or if you’d like more information about programs/services for our student and young professional members.

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## Top 10 Field Gear Items MacGyver Would Carry

Adair Gallisdorfer, SYPSC Chair

Every geologist knows to carry a rock hammer and a Brunton Compass into the field. Online reviews for common technical items are endless, and many geologists have their own personal preference. But we want to know what seasoned field veterans bring to make their work efficient and fun. What unusual items do they carry? Or what unconventional uses have they found for their common gear? Here are our favorite tips from fellow field hounds that MacGyver himself would be proud of.

1. **Bubble Wrap:** For all the times you find a mineral or rock that you want to add to your collection and want to protect it from breaking. It also can be used to pop the bubbles for simple stress relief.
2. **Duct Tape:** For mending broken boots and backpack straps, securing a bandage to a blister that otherwise won't stick, re-sealing a bag of chips. The possibilities are endless!
3. **Zip Lock Bags:** These are great not only for the obvious food storage, but bags of all sizes are handy for sample collection, covering your notebook or map in the weather, and waterproofing all sorts of items.
4. **Five Gallon Bucket:** In addition to being useful for washing brushes during mud rotary drilling, this versatile tool can be used to lug around equipment, as a seat during lunch, and as a makeshift cooler to be filled with ice and your favorite beverage.
5. **Rock Hammer:** In addition to its primary purpose, who amongst us hasn't driven tent stakes with ours? Plus it can also double as a climbing aid on steep slopes, beer opener, and a defensive tool against wild animals.
6. **Backup Power Sources:** For the 21st century geologist, our phones, cameras, and laptops not only help us organize and improve our work, but maintain our sanity after too many days in the pit. Can double as a paperweight on windy days.
7. **Turkey Baster:** For removing water from flush mount well vaults, it can also be used as a makeshift squirt gun for long summer days on a drill rig.
8. **Rope:** With as many practical uses as duct tape, it's easy to forget about rope's fun uses, like making a rope swing, or practicing your lassoing skills on pesky ravens.
9. **Empty Coffee Can:** Use one to collect and store samples, or to your toilet paper to keep it dry in wet weather
10. **Dental Floss:** Not only does this small item keep annoying bits of food from overstaying their welcome, floss can also be an emergency shoelace if one breaks, or emergency thread.

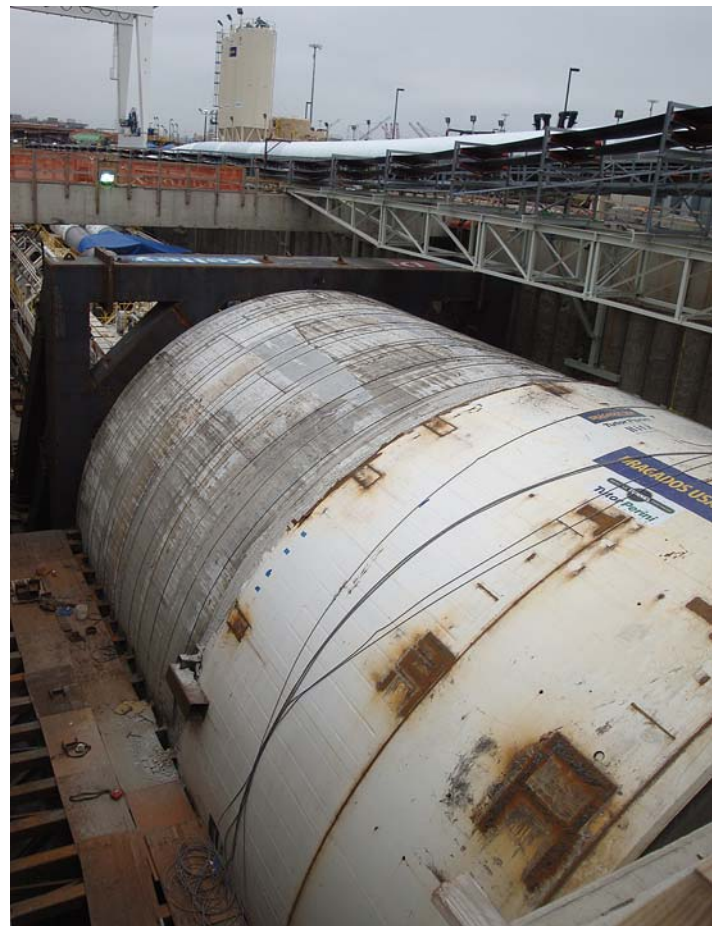
Have a tip of your own to share with us? Send your suggestions to **Adair Gallisdorfer** at [agallisdorfer@yahoo.com](mailto:agallisdorfer@yahoo.com); use "Things my advisor didn't tell me" in the subject line. Or send us a message on any of our social media sites: Facebook (AEGweb), Twitter (@AEGweb), or LinkedIn (Association of Environmental & Engineering Geologists – AEG).

## Technical Work Group – Tunneling

### 2013 AEG Annual Meeting Hosts Huge Tunnel Event

Richard Escandon, PG, CEG, and Alan L. Howard, PG, CEG, Co-Chairs

From a tunneler's perspective the 2013 AEG Annual Meeting was a huge success including both a well-attended technical symposium and a visit to the world's largest Tunnel Boring Machine (TBM). AEG's Tunneling TWG hosted the two-part symposium dedicated to tunnels and tunnel-related topics. Thirteen abstracts were accepted, and presentations were made on projects from New York to California in a wide range of soil and rock conditions to appreciative audiences over a two-day period. Of course, Seattle—where the world's largest TBM is currently excavating the SR 99 Alaskan Way Viaduct Replacement Tunnel—was included.



Tunnel boring machine shield and segments

Presentation topics included deep geotechnical borings, geotechnical instrumentation and monitoring, estimation of in situ stresses from borehole breakouts, utilization of rock mass interaction matrices in NATM tunneling, sequential excavation methods (SEM) for tunneling as an alternative to cut-and-cover methods, and both traditional and new concepts for tunnel site investigations. Case history presentations were made on the Second Avenue Subway in New York; the Brightwater Conveyance System in Seattle, Washington; the Alaskan Way Viaduct



Inside Seattle's Bertha - the worlds largest TBM

Tunnel in Seattle, Washington; Caldecott Tunnel Fourth Bore, Oakland, California; and the New Irvington Tunnel, Sunol, California. Two tunnel rehabilitation presentations included a water conveyance tunnel in the Sierra Foothills of California and the Jensen Railroad Tunnel near Rock Island, Oklahoma.

One of the highlights of the conference was the field trip to the Alaskan Way Viaduct Replacement Tunnel south portal where participants were given an overview of the project by representatives from the design, construction and project management staffs. Field trip participants were then given a tour of the south portal staging area where TBM tunneling operations were just getting underway. At 57-1/2 feet in diameter (nearly six stories tall) the TBM is currently the largest tunnel boring machine in the world. The \$80 million-dollar TBM is approximately 326 feet in length including shield and trailing gear. Thanks to good planning and a labor dispute with the local longshoreman's union, the TBM was only about 20 feet into the heading at the time of the AEG meeting. All field trip participants were able to crawl around inside the belly of "Bertha," the nickname given to the TBM after Seattle's first female mayor, Bertha Knight Landes.

Many thanks are due to Tony Stirbys and Red Robinson for coordinating and hosting the field trip. And an additional shout out goes to Red for being the primary force behind organizing the Tunnel Working Group (TWG) to plan this opportunity for tunnelers to convene in Seattle and share stories and experiences.

Abstracts and PDF copies of selected presentations are available and can be requested from the Tunneling TWG if interested by emailing **Richard Escandon** ([rescandon@kleinfelder.com](mailto:rescandon@kleinfelder.com)) or **Alan Howard** ([ahoward@brierleyassociates.com](mailto:ahoward@brierleyassociates.com)).

# AEG Awards

## Solicitation for Nominations for 2014

AEG is honored to have so many members contributing to the success of the organization and helping to advance our profession. AEG has established a number of awards to recognize these individuals and honor their service. If you know a member who fits this description, please nominate them. If you have questions, contact us or go to [www.aegweb.org/about-aeg/awards](http://www.aegweb.org/about-aeg/awards) for more information.

Nominations must be supported by descriptions of the individual's accomplishments and/or service to the industry, or the publication's merit (as appropriate to the award). The AEG Award Committees, at their discretion, selects the final candidates from the nominees for an award. The award selection recommendations are sent to the President or Board of Directors, depending on the award, for confirmation.

Please send or email your nomination to AEG at the following address: AEG, PO Box 460518, Denver, CO, 80246. For questions, please call 303-757-2926 or email [aeg@aegweb.org](mailto:aeg@aegweb.org).

**All award nominations must be submitted to AEG by March 15!**

## 2014 AEG Award Categories

### ■ Honorary Member

Recognizes those persons whose careers have exemplified the ideals of AEG

### ■ Claire P. Holdredge

Recognizes a member who has produced a publication within the previous five years that is judged to be an outstanding contribution to Environmental and Engineering Geology

### ■ Floyd T. Johnston Service

Recognizes a member for outstanding active and faithful service over a minimum of nine continuous years

### ■ Douglas R. Piteau Outstanding Young Member

Recognizes a member age 35 or under who has excelled in the following areas: technical accomplishment, service to the Association, and service to the Engineering Geology Profession

### ■ Karl & Ruth Terzarghi Outstanding Mentor

Recognizes outstanding individuals for their achievements as mentors throughout their careers

### ■ Robert L. Schuster Medal

A joint award from the Association of Environmental & Engineering Geologists and the Canadian Geotechnical Society that recognizes excellence in geohazards research in North America

### ■ Outstanding Journalism

Recognizes outstanding contributions from a journalist who promotes the field of Environmental & Engineering Geology

# Response to Selection for 2013 Claire P. Holdredge Award

*Allen Hatheway, RG, PE*

**I** am hugely indebted to the Association for bestowing this honor on me. There is a story...

Back in the summer of 1989, construction of the Mississippi River suspension bridge halted when the contractor encountered coal tar eleven feet below the mud line of "Big Muddy." The toxics were exposed within the sheet-pile coffer cell of the Burlington, IW, suspension tower. Stanley Brothers stopped its bridge construction and I was referred, by the late Sverdrup Engineers, to Iowa DOT (the construction agency for the Iowa-Illinois partnership) as a person who might be able to work out the details of responding to this wholly unexpected, toxic situation.

Suffice to say that I knew virtually nothing about historic manufactured gas plants at that instant. But I learned fast and came away from the assignment with a deep interest in gasworks as an appropriate teaching vehicle for my two upper division hazardous waste courses at the University of Missouri (first courses in the UM system, 1981).

Soon I was confirming my earlier observation that an academically well-prepared geologist was the universal answer to competent site and waste characterization for "uncontrolled hazardous waste sites." This was soon reinforced by my growing observation that derelict gasworks (and other coal-tar sites) were being approached in a "willy-nilly" fashion, and that gasworks remediation was flooded with misconceptions and many fostered "attitudes" and "falsities," that did not meet the test of history, good science or good remedial engineering.



Allen Hatheway in the field at Tiffany Springs-Platte Co-MO c. 1995

That was 24 years ago...and into that swirl I plunged.

After twelve years of near obsessive observation, visitation, data collection/recording and assessment, I was ready to attempt to make my statement, which to date, has been the only sole-author compilation of coal-tar cleanup imperatives. In fact, the subject of this year's Claire P. Holdredge award is a book entirely free from association with the generally involved utility industry, or funding or other involvement of the U.S. Environmental Protection Agency.

This is a book written as testament that geologists possess the critical skills for planning, conduct, and assessment for honest and protective derelict site remediation where public safety and environmental protection are honest goals. We are the people who can deliver our usual work product, specification of the site and waste conditions necessary for consideration in the design and construction of remediation.

Thank you, Colleagues!

## Late-Breaking News:

### Vapor Intrusion: The Conference January 23-24, 2014

The Carolinas Section of AEG will hold *Vapor Intrusion: The Conference – Legal, Technical and Regulatory Perspectives* at the Embassy Suites in Cary (suburban Raleigh), North Carolina. The conference program will present perspectives on vapor intrusion from professionals from a variety of backgrounds. CEUs will be offered. Speakers include regulators from five states, Henry Schuver of the U.S. EPA, John Boyer of ITRC, and Lenny Siegel of the Center for Public Environmental Oversight. **Registration form will soon be available on the AEG website.**



PHOTO BY ALLEN V. SHAW



Matt Morris with presenter Loren Laskey, NYP Section Chair, and Greg Hempen, who accepted the award for Allen Hatheway in absentia.

## Announcing the 2013-2014 Richard H. Jahns Distinguished Lecturer

# Gregory (Greg) L. Hempen, PhD, PE

The Richard H. Jahns Distinguished Lecturer in Applied Geology is awarded jointly by the Environmental and Engineering Geology Division (EEGD) of the Geological Society of America (GSA) and AEG. The purpose of the lectureship is to remember the accomplishments of Dick Jahns and to promote student awareness of Applied Geology. It has been jointly awarded annually since 1988.



Greg is a geophysicist/geological engineer, consulting for URS Corporation's St. Louis Office. During his entire career, Greg has held only one title, Geophysicist. He specializes in all types of vibration mitigation from earthquakes, blasting and pile driving, and recommending appropriate geophysical studies for complex sites. His 40-year+ career includes a long tenure at, and retirement from, the St. Louis District, Corps of Engineers.

Greg has conducted business for all levels of government: federal, state and local. He worked closely with consulting firms managing studies on federal projects. He now works in the private sector, but continues studies for federal and state offices. His duties have included: site assessment of dam sites, regional earthquake studies for federal dam sites, probabilistic and deterministic appraisal of potential earthquake impacts, varied geophysical studies for different projects' concerns (from archeological to environmental transport to groundwater to rock weaknesses), blast mitigation while effectively achieving the blasting goal, environmental mitigation, and the dreaded "other duties, as assigned."

Greg received a BS in Geophysical Engineering from St. Louis University; a MS in Geo-Engineering from the University of Minnesota, Minneapolis-St. Paul; and a PhD in Geological Engineering from the University of Missouri-Rolla (now Missouri University of Science & Technology). He is a Registered Professional Engineer in Missouri and Registered Professional Geologist in Arkansas and Missouri.

Greg has authored a variety of publications, which share the understanding of procedures instead of keeping proprietary control of methodologies. Greg has been an adjunct professor at all the engineering universities in the St. Louis area. He has taught Environmental Science classes and Geotechnical Engineering courses. His longest running class was offered once a year, "Seismology and Seismic Design" (CE 530A), Civil Engineering Department, Washington University of St. Louis, from 1989 to 2004. Greg had taught at several Corps of Engineers' professional training courses.

Several causes have gained Greg's attention over the years. He has long been active with AEG (President, 1989-90), and GSA's EEGD. He had a minor role in developing the administration of the Jahns' Lectureship. He is also active with several other professional organizations. Greg has been involved with the pursuit of several important public issues, including Geologists' Registration,

public disaster preparedness, and building-code adoption. He has served on state commissions, and is presently serving on two Missouri State organizations.

Some of the accolades that Greg has received are: the Otto Nuttli Award from the St. Louis Section of the American Society of Civil Engineers, October 2011; a Professional (Honorary) Degree from Missouri University of Science & Technology, December 2010; award with the Army and Corps team for the Embrey Dam removal, May 2004; Johnston Service Award from AEG, October 2002; Achievement Medal for Civil Service, December 1998; and, 1991 Regional Outstanding Engineer from the Missouri River Region of the Society of American Military Engineers.

## Schedule a Jahns Lecture in Your Area

Like past Jahns' Lecturers, Greg is interested in visiting as many university departments as possible. Visits will be arranged for trips to particular areas to cover as many schools as possible during a given weeklong period. Greg plans to travel two separate weeks per school calendar month through October 2014. There is an interest in visiting departments in all fields of Applied Geology, including Geology, Environmental Science, Hydrology, and Environmental, Geological and Geotechnical Engineering. As important as the actual lecturers may be, it is still more important that some free time be available for students to ask their career questions. Please understand that the interest to visit as many schools as possible may not allow for a visit on a school's preferred day.

AEG Sections and other professional groups can arrange for the Jahns Lecturer to speak at meetings while in the area for university visits. Please consider helping to contact university departments and professional groups for the topic presentations noted below. Abstracts are available online via [www.aegweb.org](http://www.aegweb.org). Please contact Greg at [Greg.Hempen@URS.com](mailto:Greg.Hempen@URS.com) to discuss a presentation for your organization.

### Hello??? Are you ready for the Big One?

The presentation discusses the application of recent research to the paleoseismic and historic events of the New Madrid Seismic Zone. It considers some actions to inform the public of appropriate preparedness in that region.

### Kaboom! (or whoosh?)

The talk considers the application of mitigation research at unusual blasting sites, such as a natural gas pipeline near a quarry, removal of the Embrey Dam (Rappahannock River near Fredericksburg, VA), and blasting of submerged, or near water-side, structures.

### What's my line? Site assessment!

The presentation on the applied geologist's most important duty—site assessment—develops how geophysics may advance the information at a site and reduce the risk of unanticipated site conditions.

### You're going to drink THAT water?!

The talk weighs the challenges of reducing groundwater impacts at old, low-level radioactive waste sites. The issues are not only the problem of assessing waste transit, but also convincing the public of what is known and unknown, and of a detailed, proper remediation.



# AEG Annual Meeting – 2013

## Seattle, Washington

PHOTOS BY ANDREA LEIGH PTAKE

Co-Chairs of the successful 2013 Annual Meeting: Kathy Troost & Mark Molinari



Past Jahns Lecturers: Scott Burns and James McCalpin

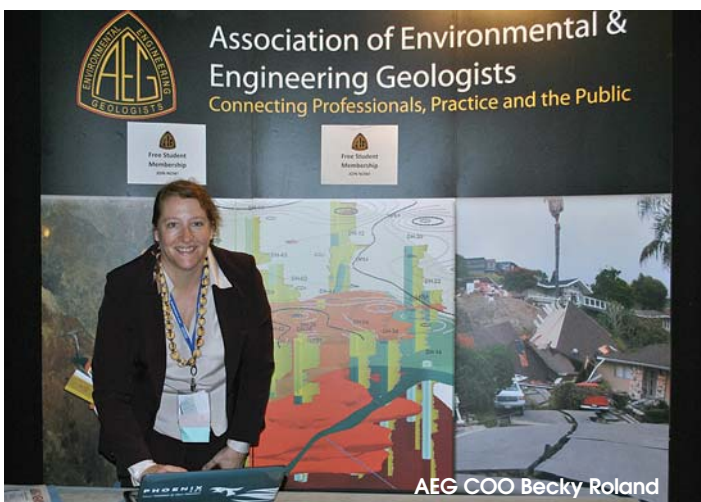


2013 OEEG Award Presentation

AEG COO Becky Roland with Meetings Manager Heather Clark



**WEDNESDAY:**  
Opening Sessions and Awards Presentations



AEG COO Becky Roland

Silent Auction Chair Donna Schmitz with Student Volunteer Emily



PHOTOS BY ANDREA LEIGH PFAK



▲ Outgoing President Matt Morris thanked his EC members with a gift of noise-cancelling headphones.

▲ The President's Luncheon saw the change in command as Matt Morris passed the gavel to Gary Luce for 2013-14.

**THURSDAY:  
Tech Sessions,  
Luncheons, Breaks,  
the Silent Auction  
& Exhibitors**



▲ Keynote Speaker Dr. Brian Atwater (L) chats with members after his well-attended talk at the Opening Session on Wednesday.

▼ L to R: TOP: Past President Darrel Schmitz, Nick Saines and AEG NEWS Editor Anna Saindon and BOTTOM: Exhibitors drew interested crowds during session breaks.



◀ **THE AEG FOUNDATION SILENT AUCTION WAS A HUGE SUCCESS.**  
TOP LEFT: Marie Garsjo and Patty Bryan sign up for a chance at one of the auction items. TOP RIGHT: Another incredible quilt produced by Jane Gill-Shaler and members of her quilting club  
LEFT: Jacqueline Mariave Mitchell accepts a check for \$7,400 from Auction Chair Donna Schmitz and Foundation President Patty Bryan

PHOTOS BY ANDREA LEIGH PTAK



▲ L to R: AEG Foundation Board Members Eric Chase, Patty Bryan, Briget Doyle and Special Publications Chair Bill Smith



▲ Meeting attendees chat during a session break with Roland French of Zonge International.



▲ L to R: 2012-13 Jahns Lecturer James McCalpin catches up with Oliver Barker of the AEG South Africa Section.



▲ Member-sponsored snacks made Session Breaks more enjoyable.



▲ The representatives from Italy's Maccaferri show of their wares to an interested meeting attendee.



▲ Slope Indicator's booth attracted a number of interested attendees who took the time to explore the Exhibitors Hall.

# AEG's 1st Annual Earth Science Fair

*Jules Johnston, K-12 Committee Co-Chair*

AEG hosted its first annual Earth Science Fair for middle and high school student at this year's at the Annual Meeting. The projects presented by the students were exceptional in both the depth and detail of their investigations, especially when considering the young age of the participants. This event brought in quite the crowd from the conference attendees who were excited to discuss the geological research conducted by the young scientific investigators. We treated the students and their families to a small reception where we awarded prizes to all participants. We awarded Amazon gift cards of \$150 for 1st place, \$100 for 2nd place, \$50 for 3rd place, and \$25 for the middle school participants. A prize was awarded to Zack Halma's Earth Science classroom that included 20 rock and mineral test kits.

The Committee thanks the volunteer judges for this year's science fair. The students will be providing a written summary of their project reports to be published on the AEG's website.

## **1st Place – How does the angle and orientation of a hillside affect the formation of Terracettes?**

*Investigated by 12th grader Zack Halma from Sunnyside High School in Sunnyside, WA*

## **2nd Place – Using Fossils from the Mojave Desert to Reconstruct a Miocene Period Ecosystem**

*Investigated by the 11th grade siblings, Hannah and Zachary Larsen from Riverside, CA*

## **3rd Place – M9 Subduction Earthquakes as a Basis for Soil Liquefaction Analysis**

*Investigated by 11th grader Katherine Landoni from Sequim High School in Sequim, WA*

## **Middle School Participation Award – Crater Proportions on Mars Not Associated with Thermal Inertia**

*Investigated by 8th grader Helen Carson from Issaquah, WA*

## **Middle School Participation Award – Formation of Stalactites and Stalagmites**

*Investigated by 6th grader Ryan Lillie Pearce from View Ridge Middle School in Ridgefield, WA*

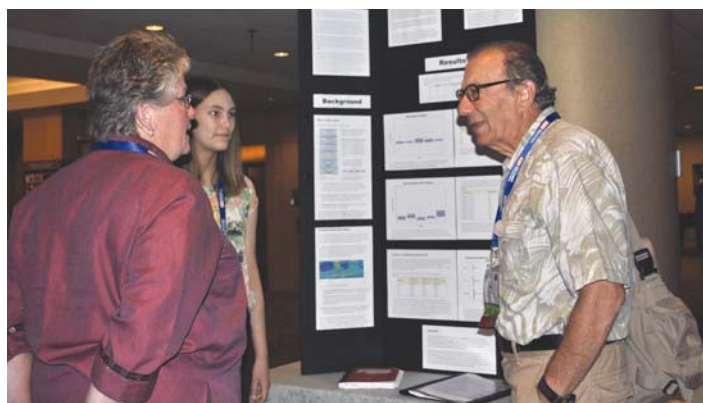
AEG's K-12 Committee has started discussion on how to increase participation for next year's Earth Science Fair to be held at the AEG Annual Meeting in Scottsdale. If you are interested in volunteering for next year's Earth Science Fair please notify Jules Johnston at [jamjohnston@plateaugeoscience.com](mailto:jamjohnston@plateaugeoscience.com). We would like to thank Portland State University, Eastern Washington University, Wendy Gerstel, and Galan McNelly for sponsoring the 1st Annual AEG Earth Science Fair. If you would like to become a sponsor for the 2nd Annual Earth Science Fair, please contact Jules Johnston at the email above.



◀ 2013-14 President Gary Luce flanked by AEG's first Science Fair participants, L to R: twins Zachary and Hannah Larsen, Zach Halma, Ryan Lillie Pearce, Katherine Landoni and Helen Carson

BELOW: Fair exhibits attracted much interest.

CENTER: Zach Halma with K-12 Co-Chair Jules Johnston.



PHOTOS BY ANDREA LEIGH PIAK

## Field Trip #1 Mount Rainier

Jim Vallance pointing out evidence of lahars ▶

▼ BELOW FROM TOP:  
Pat Pringle doing the  
"Pringle Peacock"  
PHOTO BY CHRIS MAGIRL

Mount Rainier and  
the Nisqually Glacier



## Guest Tour #2 Ferry to Bainbridge Island and Tour of Bloedel Reserve

◀ One of the many pristine  
lakes on site.

▼ BELOW FROM TOP:  
Taking a rest after walking  
through mossy trees.

The fall flowers enjoyed the  
perfect weather.

Scenic view overlooking the  
Bloedel home

PHOTOS THIS PAGE BY ANNA SAINDON  
UNLESS NOTED OTHERWISE



**NEWS OF THE ASSOCIATION – 2013 ANNUAL MEETING**



◀ Abdul Shakoor (C) – the 2013 Terzaghi Mentor surrounded by current and past students from Kent State University.



▲ CENTER: Past Presidents gathered at the President's Reception before the banquet.  
 ABOVE, L to R: AEG's newest Honorary Member, Terry West with his wife, Shirley, and Dick Gray,



▲ TOP TWO: Poster sessions attracted a ton of interest during the Session Breaks and the First Annual Poster Reception.  
 ▲ ABOVE: AEG Past President Jenn Bauer with Paul Hale Co-Chair of the 2015 AEG Annual Meeting to be held in Pittsburgh, PA.  
 ◀ 2012–13 President Matt Morris raises a glass to toast AEG's Past Presidents at the reception before the Banquet.



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### 8 Keynote Speakers

- Mark Cassidy, *Sustainability in an Era of Increasing Energy Demand: Challenges for Offshore Geotechnics*
- Youssef M.A. Hashash, *2012 Hurricane Sandy Along the US East Coast: A Geotechnical Perspective*
- Dennis R. Hiltunen, *Some Recent and Emerging Topics on Seismic Wave Based Methods for Geotechnical Site Characterization*
- Sandra L. Houston, *Characterization of Unsaturated Soils: The Importance of Response to Wetting*
- Roman D. Hryciw, *Innovations in Optical Field and Laboratory Soil Characterization*
- Sibel Pamucku, *Geosensing for Developing Sustainable Responses to Environmental Hazards Underground*
- Rodrigo Salgado, *The Mechanics of Cone Penetration and its Application to CPT Interpretation*
- William A. Wallace, *Working to Engineer Infrastructure Resiliency in a Changing Operating Environment*

### 3 Award-Winning Lectures

- Terzaghi Lecturer – J. Carlos Santamarina
- Peck Lecturer – Youssef M.A. Hashash
- Seed Lecturer – W. D. (William Daniel) Liam Finn

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# Honorary Membership Awarded to Dr. Roy Shlemon

The South African Institute for Engineering and Environmental Geologists

October 2013

*A Personal Tribute by Oliver Barker, Past Chair of the South Africa Section and Past President of SAIEG*

**M**y association with Roy goes back to 1997 when, as a newly inducted Chair of the AEG South Africa Section, I was challenged to locate a speaker to continue the long-standing relationship between the U.S. and South Africa (SA), which went back into the 1980s when **Chris Mathewson, John Williams** and others visited us here during our dire days of sanctions. In the process, I was directed to **Eldon Gath**, then President of AEG. Eldon, never to say no to an opportunity, identified Roy as a potential speaker and course leader.

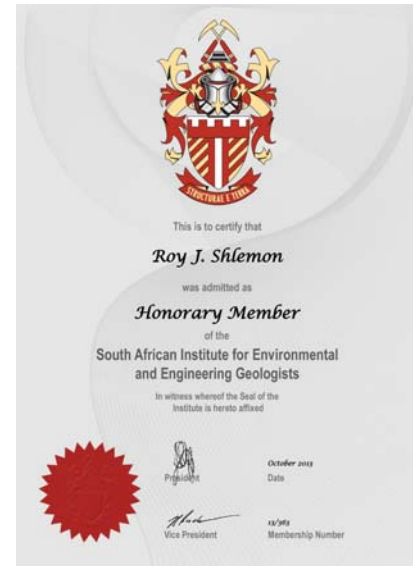
Eldon proposed that both of them would come out. Eldon would award **Tony Brink**, our most famous engineering geologist, Honorary Membership in AEG and speak at the meeting. Roy also agreed to speak and then, with Eldon and myself, run a short course on Practical Aspects of the Role of Environmental and Engineering Geologists in the Rural and Urban Setting. The course was held in Johannesburg and Cape Town in late July and early August of 1997 and was well attended.

Since 1997, Roy has been a repeated point of reference for several of my colleagues involved in Quaternary geology. More recently, he engaged with Dr. Marco Andreoli in some lengthy discussions regarding structures in sands and Quaternary sedi-

ments overlying basement in the Vaalputs area where South Africa has a low level nuclear waste repository.

The generosity of both spirit and pocket, which Roy continues to show has no equal in AEG or SAIEG, and following a proposal from the SA Section, SAIEG had little difficulty in awarding Roy Honorary Membership of SAIEG.

SAIEG is to be commended for agreeing to bestow this award on Roy. It is hoped that it will come to symbolise the ever-growing synergy between engineering and environmental geologists in South Africa and the U.S.



Roy Shlemon (L) enjoys a beer at a social hour during the AEG South Africa Section Meeting c. 1997.



L to R: Oliver Barker and Eldon Gath during the AEG South Africa Section Meeting c. 1997.

BELOW: Attendees at the Cape Field Trip that coincided with the meeting.





# Impressions from AGI's Geoscience Congressional Visits Day

*Rick Kolb, Past Advocacy Committee Co-Chair*

**T**he American Geosciences Institute organizes the Geoscience Congressional Visits Day (CVD), which is held yearly during September in Washington, DC. **Becky Roland** has attended these in the past, but she felt strongly that practicing geologists would be the best advocates for our profession. The Advocacy Committee has taken her recommendation, recruited AEG members to attend, and provided financial support. **Brad Worley** of the Carolina Section participated in this year's Geoscience CVD on September 17–18, as he has in the past. Brad was accompanied by **Phyllis Steckel** of the St. Louis Section, **Ken Neal** of the Washington State Section, and AEG COO **Becky Roland**. Below are their thoughts and impressions from the CVDs.

If you are interested in attending a future Geoscience CVD, or the Science-Engineering-Technology CVD held in the spring in Washington, D.C., email Advocacy Co-chairs **Dan Vellone** at [Daniel.vellone@ma.usda.gov](mailto:Daniel.vellone@ma.usda.gov) or **Rick Kolb** at [rick.kolb1@gmail.com](mailto:rick.kolb1@gmail.com).

## Tue., Sept. 17: AGI CVD Briefing

The first day serves two purposes. CVD veterans get a chance to catch up with AGI acquaintances and DC regulars. For the newbies, the first day is essentially “training” that covers current budget concerns, how to conduct a Congressional visit, and familiarizing with the core “message” for the visits on the following day. AEG's core message to Congress is that “steady Federal investments for earth and space sciences will provide for public health and safety as well as support economic and national security.” This seems broad, but CVD participants are taught to first deliver the core message and after that introduction, try to “bring the message home” with an explanation of why and how continued funding of geoscience-related programs will help the Congress member's home state and district. At the end of the session, each Congressional office visited is left the GEO-CVD “leave-behind” materials. AEG members included the AEG “one-pagers” that describe both the geo-environmental and geotechnical aspects of AEG as well as contacts for the Association.

That evening, we attended a USGS Coalition reception, honoring Representatives Ken Calvert (R-California) and Peter DeFazio (D-Oregon) in recognition for their strong support of the USGS.

## Wed., Sept. 18: Congressional Visits

### Phyllis Steckel's Story:

I live in Washington, MO. Last September, I crawled out of my comfort zone and flew to Washington DC. And other than sharing a name, these two places have absolutely nothing in common.

I was a tenderfoot at the Geosciences CVD. This was my first year, and I was not sure of what we were going to do, or what in the world possessed me to sign up for it. But on Tuesday, September 17, a group of about 70 of us from various geoscience professional societies met for training. We learned a bit about



Senator Patty Murray (D-WA) with Ken Neal

what we would face the next day including the culture, pace, tradition, technology, and expectations of folks on The Hill.

As the only Missourian in the geosciences group, I was paired with the only Illinoian in the group—Melissa, a veteran. Our states share a lot of similar geographies, geologies, resources, and issues. The two of us hit it off immediately, and Melissa's experience was my ace in the hole. Soon we were traipsing off to hit the bricks in the nation's Capitol, almost looking like we knew what we were doing.

We had six meetings in five hours. We kept on schedule, meeting with staffers of both Missouri senators, both Illinois senators, and one Illinois congressional representative. Our last meeting was face-to-face with my Missouri congressional representative. By then, we had hit our stride. We actually engaged, explaining that geoscientists are often problem-solvers, even in below-the-radar states like Missouri and Illinois. Earthquake hazards, water resources, rare-earth elements, sinkholes and karst, sand and gravel, coal mining, energy resources, flood hazards, environmental cleanups, and engineering geology—we hit them all in about 14 minutes and related them all to benefits in Missouri and Illinois. We even wove our message in with a few pending bills and relevant committee assignments. We made a point to make “The Ask”—requesting support for a specific vote and not necessarily expecting to get it.

By 3:30 that afternoon, we were done. It was over. And I was done in. I should be ready for another round next year.

Practical advice? Eat breakfast. Take lots of business cards.

## NEWS OF THE PROFESSION

Know how to start a meaningful conversation, and know how to end it. Don't monopolize or get too technical. Listen. Ask for questions. Don't expect any agreements (everything is political here). Smile at everyone. Take a taxi whenever possible. And wear comfortable shoes, because a tenderfoot's tender feet will need extra care.

I'm back in Washington, MO again. And it looks pretty good.

### Ken Neal's Account:

Our Washington State delegation included Zoltan Szuts, a University of Washington Research Associate in oceanography and climate, and me. We were escorted by Meg Gilley, a Public Affairs Intern with the American Geophysical Union, who also had ties to the University of Washington.

We began Wednesday morning by attending a constituent coffee hosted by Senator Patty Murray, who discussed her frustrations with the ongoing budget battle. We then met with Megan Thompson, Legislative Assistant for Representative Derek Kilmer (D-6th District); Jennifer Cash, Legislative Assistant for Representative Denny Heck (D-10th District, and Ken's representative); Tyler Kruzich, Professional Staff Member, and Anna Sperling, Legislative Assistant to Senator Murray (D); Colleen Schell, Legislative Correspondent for Senator Maria Cantwell (D); and Whitney Riggs, Legislative Assistant to Representative Doc Hastings (R-4th District).

During our meetings, we discussed the importance of maintaining consistent, reliable funding for research and monitoring of volcanic and seismic processes and related hazards, as well as weather/climate forecasting. We emphasized the importance of maintaining knowledgeable staff and operable equipment, and stressed the fact that equipment maintenance was far less costly than replacement, or the potential health/safety risks associated with loss of monitoring programs. We also discussed geologist licensure in Washington, my perspective on current U.S. Forest Service issues based on my 17 years working there, substandard bridge ratings and potential design/construction-related employment, ongoing cleanup issues at Hanford, Zoltan's frustration with attempting to obtain research grants in the U.S., and his work on ocean circulation. Our comments were welcomed by each staff member, who emphasized that their respective legislator supported the funding of science programs.

### CVD Veteran Brad Worley's Musings:

Having attended CVDs for years now, I can say that each one has its own unique feel, depending on the current political climate in DC. Being on the verge of a government shutdown, I wondered how we would be received on "the Hill" this year. I was surprised that each office still slowed down enough to listen to the visiting geoscientists.

Being from North Carolina, I was accompanied by the only other North Carolina GEO-CVD attendee, Dr. David Lindbo, N.C. State University. Dr. Lindbo is also the national president of the Soil Science Society and a fellow CVD veteran. We were accompanied by Rachel Jankowski, Administrative Assistant in the Soil Science Society's Washington, DC, office.

We first met with Representative Richard Hudson's (NC-8, R) office. This was GEO-CVD's first visit to this office and I have to say that they were very receptive and happy to gain the contact information for geoscience-related issues. Next we met with a Representative Renee Ellmers' (R-2nd District) office. They seemed happy to have gained contact information for geoscience-related legislation. The third meeting of the day was in

Representative G.K. Butterfield's (D- 1st District) office. This was the GEO-CVD's first visit to this office. They were very open to our primary message and offered continued support for geoscience initiatives. Our fourth meeting was in Senator Kay Hagan's (D) office. Geoscientists are always well received in Senator Hagan's office since her daughter has a PhD in the geosciences and works in the oil industry. Our fifth meeting was Representative David Price's (D- 4th District) office. Price represents the district within North Carolina that contains part of the Research Triangle, as well as several large universities. Their office always welcomes geoscientists and is eager to get any updated contact information for the AGI member associations. Our last visit of the day was to Representative Mike McIntyre's (D- 7th District) office. Due to recent redistricting, I now live in NC Congressional District 7 and GEO-CVD had never visited their office. I was glad to offer our services as contacts for any geoscience issues they may encounter.

In the past I have been the only AEG representative attending the CVD, so I was thrilled to have Ken Neal, Phyllis Steckel, and Becky Roland in D.C. as well. This means that more than 30 Congressional offices, from different parts of the U.S., met someone from AEG and were given AEG contact information. This is a vast improvement over past CVDs! It is important that AEG members continue to attend Congressional Visits Day. This is one of the best ways to bridge the gap between practicing scientists and legislators.

### Becky Roland's Closing Remarks

I would like to first thank Ken, Phyllis and Brad for taking the time to represent AEG on the Hill. I know that it is not a typical day for any of them to be meeting with national legislators to promote our organization and profession, and they each did a phenomenal job.

I had the privilege of completing four meetings accompanied by a graduate student from University of Colorado who receives federal funding for his research. We met with office staff for Representatives Michael Coffman and Jared Polis, and staff for Senators Mark Udall and Michael Bennett. One of the most impressive things about meeting with staffers is how incredibly bright these young people are. They are committed to providing our leadership with as much information as possible on issues ranging from budget to military to geoscience. Some have degrees in geoscience, but some receive their information from organizations like AEG. Either way, they each appreciate knowing more about what our profession does and how we contribute to public health and safety.

Our visits were especially timely, as we were just two weeks out from the largest flood event recorded in the State of Colorado. It gave us an opportunity to promote the contributions our members will be making towards flood recovery.

I encourage everyone to consider participating in these Congressional Visits. AEG is fortunate to be a member of AGI, which will train you on how to conduct a visit and help you define your message to concise and memorable. It really is much easier than you would think. AGI staff makes the appointments, provide logistical guidance, and support you throughout the visits.

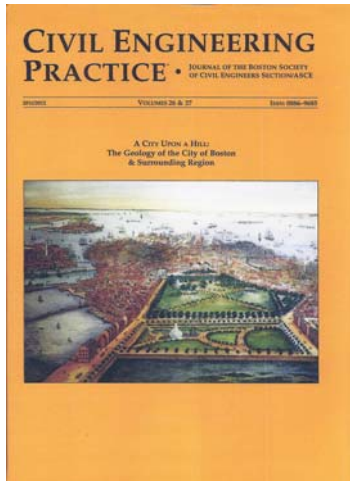
We need to make sure that our legislators know AEG is available and can provide experts on geoscience topics whenever needed. We need to be vocal, and we need your participation!

# Book Review

## *City Upon a Hill: The Geology of the City of Boston & Surrounding Region*

Authored by long-time members of AEG's New England Section, **Dave Woodhouse** and **Pat Barosh**, the book was published by the Boston Society of Civil Engineers with the support of the AEG Leggett Fund. It is an updated and comprehensive revision of the 1991 Geology of Boston, Massachusetts, an original part of the AEG Cities of the World.

With the design and construction of the three-mile-long depressed Central Artery/Tunnel (the Big Dig) along the waterfront that included the new Ted Williams Tunnel beneath Boston Harbor, a revelation occurred in understanding the city's complex geology. The new buildings and tunnels constructed in the downtown and Copley Square area, along with the development of the Seaport area of South Boston provided added insight into Boston's



geology. The book contains a comprehensive description of the regional geology, geology of the Boston Basin, and the geological influences on major building foundations.

Tables that include all the major buildings constructed since the 1960s with their foundation types and the specifications/geologic conditions for 33 tunnels are presented as a reference for the reader. Over 300 figures are provided which reinforce the understanding of the new geology. Of particular interest are the figures that include the complex geology of the entire Central Artery. These reveal the previously unknown meltwater and stream channels in the sediments and the large presence of glaciomarine deposits that had been described as till-like leading to an over-estimation of their bearing capacity. The book is currently available through the BSCE and Amazon.

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# Geotechnical Drilling Demonstration

*Christina Dance, Student Liaison; Jennifer Shields, Social Media Chair; Marie Garsjo and Don James*



October 26th was a great day in Texas for the Section's Dallas-Fort Worth Chapter members and a few potential members! Twelve professionals and eleven students attended a free demonstration on Geotechnical Drilling sponsored by the Chapter. Brent Thomason, of Texplor Drilling, supplied a CME 75 drill rig and two drillers. DFW Chapter members **Kevin Coleman**, **Christina Dance**, **Marie Garsjo**, **Don James**, **Jerry McCalip**, and **Jennifer Shields** put the presentation together and starred in the performance. All but two of the students had never seen a rig up close, much less watch one in operation. They watched the process from start to finish, pushing split spoons and pulling rock cores. As Brent and the AEG presenters demonstrated the equipment and logging techniques, the other AEG professionals scattered out among the students, providing a welcoming atmosphere for group-wide questions and answering individual questions.

Brent gave a brief tour of the drill rig and its tools, including drill bits, Shelby tubes, split spoons samplers, and the Texas cone penetrometer. The students also saw bentonite in "action," watching the bentonite pellets swell as water was added. After the walk around the drill, the group relocated to let the rig set up, presenting a great opportunity to learn about the logging process performed by an engineering geologist. Don described who typically logs the borings, what they need to prepare for the field, their typical duties and tools, staging, organization, and procedures to follow.

The presenters covered many topics during the demonstration: safety, researching the site in the office, choosing a drill site, and getting utility clearances. The importance of locating all the utilities was emphasized, then re-emphasized. During the fieldwork portion of the presentation, they discussed drill types, the information to be recorded on the log, the multitudinous soil and rock classification systems available, and proper borehole abandonment. Don spoke about further geotechnical tests that can be conducted at a drilling site, as well as about the differences between engineering and environmental drilling. Much



Kevin Coleman, center

more careful sampling is required for environmental work. About 15 feet of Cretaceous limestone core was recovered, requiring water for drilling that was not used with Shelby tubes and the Standard Penetration Test. Don also demonstrated how to determine whether a crack in the rock was an existing fracture or caused by the drill action, for the purpose of calculating the Rock Quality Designation (RQD) of the bedrock. Many a "clam break" (breaks in the rock at clam shells) was apparent, yielding multiple souvenirs for the students to take home to remind them of this experience.

The DFW Chapter was proud to assist in bringing this opportunity to its members, and is pleased that it was such a success. A special thanks goes out to Texplor Drilling and all the AEG members that helped make the field trip happen. Watching the drill rig in operation and the daily life of an engineering geologist in the field was a true learning experience. The ability to answer students' questions by AEG professionals on site is what AEG is all about "Applied Geology Rocks!"

DFW Chapter  
Geotechnical  
Drilling  
Demonstration's  
Student and  
Professional  
participants



# Blasting Aesthetic Cut Slopes in Rock

Robert A. Cummings, PE

## Introduction



certain rock excavation projects on land having special scenic or recreational characteristics may be required to meet aesthetic criteria promulgated by agencies external to the core roadway construction team. Such agencies commonly are land administrators whose primary role is the preservation of historical or recreational opportunities, such as the Bureau of Land Management, the National Park Service, the U.S. Forest Service, or local governmental agencies with similar responsibilities. But, they can also be landowner representatives, such as divisions of highway development departments or private landscape architects.

Those driving the aesthetic attainment directive may not look at the project the same way as the design engineer or contractor. From the perspective of the design engineer or contractor, the imposition of unfamiliar and sometimes vague design and construction criteria by external entities can be problematic. Fortunately there are tools that wed geology, construction engineering, rock engineering techniques, and visual analysis to alleviate and streamline the process of aesthetic attainment.

Most large-scale rock excavation projects begin with mechanical excavation using ripper-equipped dozers, hydraulic excavators, and hydraulic breakers ("hoe-rams"). On small, tight sites, machine excavation work may be supplemented with hydraulic splitters or even expansive grouts. In weaker rock where flatter slopes are desired, the entire excavation process may be completed using machine tools like these. However, on large rock cuts in competent rock, such as for highway developments and large buildings in mountainous areas, the process usually involves the use of explosives.

## Blasting Basics

When blasting is proposed, some project administrators become apprehensive, picturing a series of violent and uncontrollable episodes that result from a mysterious process akin to alchemy. The fact is that modern, proper blasting techniques introduce controlled quantities of energy to fragment the rock with negligible damage to the surroundings.

To understand the capabilities and limitations of blasting techniques it is necessary to first understand blasting terminology:

**Burden:** The pattern distance to an existing free face, or to an internal free face formed by an earlier-firing blast hole, taken in the direction of intended rock movement. Burden is a measurement of the "work" done by each blast hole.

**Spacing:** The pattern dimension perpendicular to the burden. The spacing is greater than or equal to the burden except along the controlled blast line.

**Stemming:** Inert material such as crushed rock, sand or drill cuttings, placed above the explosive column in blast holes to reduce venting of detonation gases.

**Subdrill:** The distance to which blast holes are drilled below the nominal grade intended, in order to assure that breakage between holes remains below the necessary grade.

**Controlled Blasting:** Blasting that employs a carefully controlled and aligned row of holes that are of smaller diameter and more closely spaced than the main production holes, in order to develop a specific fracture or shear plane at a desired location.

**Presplitting:** Controlled blasting in holes spaced closer than their burden and initiated before the adjoining production holes, so that the rock is forced to split between holes with minimal to no other expression of breakage.

**Cushion Blasting:** Controlled blasting in holes spaced further apart than presplitting, initiated after the main production blast holes but in sequence with the overall blast, whereby the resulting slope is "cushioned" from the shock of the production blasting by the cushion holes. "Trim" blasting is technically a form of cushion blasting in which the slope is trimmed by firing the controlled holes in a separate event, although in present usage the terms trim blasting is often used for cushion blasting.

**Buffer Holes:** Smaller, more lightly loaded production holes adjacent to and fired immediately prior to the controlled blast holes, designed to reduce heave and back break behind the intended limits of blasting, and establish a more precise burden for the controlled holes.

Millisecond delay blasting techniques allocate specific amounts of blast energy to definable subdivisions of rock within the overall blast volume. This reduces the overall shock developed and therefore the disturbance to the surroundings, and assures the control of blast propagation while allowing for the fact that broken rock takes up more space than intact rock. A properly designed firing sequence allows the rock to move into the space created by earlier-firing holes, in the general direction desired by the blaster.

The role of the production blast holes is to attain fragmentation of the main rock mass. The energy density required for this is related to the weight of explosive product per unit volume of rock blasted, and is termed the powder factor. The powder factor is the starting point for most production blast designs, but is refined based on the strength and detonation velocity of the explosive product selected. There are many different explosive formulations available, depending on what the application requires in terms of shock energy, water resistance, heave (so-called "bubble energy"), sensitivity, moldability, detonation velocity, and other factors.

Commercial explosives detonate, meaning that their rate of decomposition exceeds the velocity of sound in the product. Most large-scale production blasting, for reasons of cost and ease of safe handling, employ blasting agents, the most common of which is ANFO (ammonium nitrate and fuel oil), but also includes booster-sensitive emulsions and slurries where higher detonation velocities are required or ground water is present (ANFO dissolves and is rendered insensitive in water). Blasting agents require a booster or high explosive to detonate. Blasting agents may be delivered in bulk form (trucks) or bags, or may be packaged in plastic "chubs." High explosives include products like dynamite, water gels, emulsions, slurries, boosters, and blends that can be initiated with a blasting cap.

## PROFESSIONAL CONTRIBUTIONS

When a blaster lays out a pattern, he considers the strength and structure of the rock, the depth to which the blast holes can logically be drilled, constraints offered by the surroundings (power lines, homes, sensitive or riparian areas, highways in use by traffic, and so on), production volume requirements, access, working room, fragmentation demands, drillability, ground water, and—last but not least—the requirements of the slope to be left behind. It can be a complicated process of assessing tradeoffs.

When blast holes are loaded with the required quantity of explosives, the booster or first charge placed is affixed with a detonator. The detonator is manufactured so as to initiate a set time after a signal (electrical or shock pulse) arrives. Most construction blasting uses nonelectric (“nonel”) detonators, in which the initiating pulse propagates from the surface down to the detonator through a flexible plastic tube lined with reactive material. Some construction blasting uses detonating cord to distribute the surface pulse to the detonator connectors, or to surface delays. Detonating cord employs a core of PETN and fires at 24,000 ft/sec, for all practical purposes instantaneously, and therefore differs from safety fuse, which burns, rather than detonates. Surface nonel delays consist of less-powerful detonators with different time delays built in (usually increments of 9, 17, or 25 milliseconds) that connect nonel detonator down lines or detonating cord. All this allows the blaster to choose from a range of blasting sequences that will direct the rock where he wants it—for the most part—gravity permitting. Lately, programmable digital detonators have become available that allow the blaster to design his own timing sequence apart from the set intervals of the pyrotechnic detonators described here, and at far greater accuracy. Digital detonators have found the greatest acceptance for surface mining and only high-volume construction blasting because of these detonators’ high unit cost—about 4–5 times the cost of pyrotechnic (electric or nonel) detonators.

### “Aesthetically Pleasing” Cut Slopes Developing Rational Criteria

For rock cut slopes, aesthetic criteria have often been expressed in contract documents and environmental assessments using language such as: “reflect the form, line, color, and texture of natural formations,” natural-appearing cut slopes,” “roughened cut slopes,” and “mimic natural land forms.” Although this may be meaningful to landscape architects and others who have an intuitive understanding of the desired finished product, construction contractors and engineering designers find such language imprecise and confusing. The engineering community may see attempts to “naturalize” rock cut slopes as opening the door to slope instability and liability exposure. These individuals prefer slopes excavated using techniques that minimize rock disturbance and produce a planar, uniform, and engineered appearance.

Even though “natural appearing” cut slopes may not conserve rock mass integrity and construction economy as much as rigorously controlled cut slopes, there are aesthetic enhancement techniques that can acceptably balance the visual characteristics with rock slope stability and economy. The key is to develop a working partnership between the project design engineers and land management agencies to make the aesthetic criteria deterministic, rational, biddable, and constructible. Together, they must define who exactly is to be served by the improved aesthetics, what their visual perspective is, and how much enhancement is appropriate.

## Characteristics of Aesthetic Enhancements

In nature, stable, natural landforms almost always comprise flatter slopes than highway departments wish for their rock cuts. Where the natural landscape is sufficiently rugged that it incorporates cliff faces and natural rock slopes approximating the desired cut slope angles, the condition of the natural rock slopes is generally much more degraded than is desired in the highway cuts. For these reasons, cut slopes cannot be made to exactly look “natural,” even if that is what is required in construction bid documents.

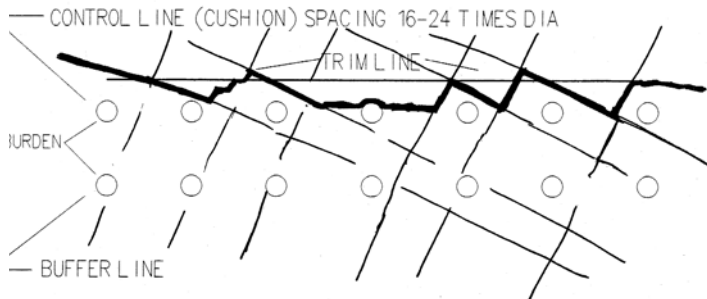
To the construction bidder, this means that, at the very least, he will not have to make the cut slopes truly “natural.” More problematically, a bidder may also believe that since the required “natural” appearance is not strictly attainable, under the pressures of actual construction the door will be open to negotiate a far lesser degree of compliance. Often, to the dismay of many (including the other, unsuccessful bidders whose estimates reflect a nobler intent), he is correct. To avoid this, measurable physical characteristics must be identified and developed as acceptance criteria. All stakeholders must commit to accepting the standard of aesthetic attainment attributable to the criteria expressed in the bid documents. The designer and Owner must commit to inspection, measurement, and enforcement of aesthetic criteria as stridently as for more traditional elements of inspection. Modifications should be tolerated only if geologic conditions differ materially from those represented in the bid documents, meaning that geological descriptions and reports should have a place in the bid package.

Aesthetic criteria must be outgrowths of a visual prioritization process, which will identify, define, and rank aesthetic enhancements according to their level of benefit to different classes of facility users. This process is normally carried out by a landscape specialist working as part of the design team, with oversight by the land administration agency. Through the visual prioritization process, the team recognizes the various levels of visual impact and agrees to eliminate from consideration those visual impacts that are not significant.

### The Short Range Perspective

Only in the short-range view are the texture and fine features of the cut slope important. Serving the short range view means incorporating textural enhancements at the rock fabric scale, such as ledges, slope roughening, planting pockets, and boulder salvage. They should only be employed where the visual prioritization shows that their advantages, in terms of adding a natural context, outweigh their inherent disadvantages in terms of added construction cost and complexity, and the increased risk of exposing rock blocks to future instability.

The duration of view, and the perspective of the viewer, determines the importance assigned to the short-range perspective. For example, a rational visual prioritization process for a highway job will focus on the perspective of vehicle occupants. Vehicle occupants passing by a road cut at highway speed are not as likely to notice a few hole traces, machine scars, or small ledges as is the construction inspector standing at center line viewing the freshly excavated cut. Drivers and their passengers are much more likely to notice and be affected by the appearance of the road cut termini and profile, which are visible for a much longer period of time. Textural enhancements may be more appropriate on curves where oncoming traffic holds the view for a long period, but the dimension of the enhancement must be considered relative to the length of view.



**Figure 2.** Rock breakage concept with cushion blasting

Rock cut slopes may have to be flattened to accommodate ledges, pockets and similar irregularities without increasing local instabilities. This affects economy, safety, and slope performance. It may have environmental impacts if the embankment toes need to move into sensitive areas to accommodate the additional excavated material.

Textural enhancements are most appropriate in masses of hard rock with moderately spaced (1 to 3 ft) fractures (Figure 1—see cover).

In poorly fractured, massive rocks (fracture spacings more than 6–10 ft or so), there are few opportunities for ledging and pocketing along natural joints. In massive material the contractor will have to resort to carving artificial ledges and pockets into the rock. This can be effective visually, but if not done with focus on the geology and topography, it can lead to exactly the artificiality that the treatment is intended to remedy. In such cases a smooth surface would be preferable. In heavily fractured or strongly weathered, soft rock, ledges can be formed with equipment, but may not be stable or will develop a rounded or humped appearance. In those cases the ledge dimensions should be reduced except where the slope can be flattened enough to exaggerate the features.

Textural enhancements are specified in the construction documents as a range of ledge widths, ledge areas, or pocket quantities, unless stratification, faults, or other specific geologic features that will define ledge locations can be accurately projected to the finished slope location. To guide bidders, the plans should show conceptual details, sketches, or photographs of similar features, and should define the quantity of ledges expected between roadway stations. If planting pockets or ledges are pay items, contractors are much more committed to perform them. During construction, the specific locations and extents of ledges are chosen by the construction contractor, checked by a geotechnical professional and approved by the Resident Engineer.

The ability to develop roughened slopes exhibiting ledges usually means that some degree of rock mass disturbance and overbreak must occur during initial excavation, and this can lead to long-term slope deterioration. By positioning and loading the buffer holes so as to control the burden on the controlled holes, cushion blasting can be designed to remove rock selectively, reducing the overbreak so that only the closest fractures to the nominal slope are affected (Figure 2).

It is critical to avoid the temptation to blast randomly, forming a general zone of loosening along the desired slope line, and then to form ledges by excavating selectively within that zone. Specialized controlled blasting techniques should be used, followed by machine excavation, and supported by a process of continuous review and improvement.

As noted above, the inclusion of textural enhancements should be considered rationally and carefully, not just because of cost impacts, but because they can increase safety risks. Roughened



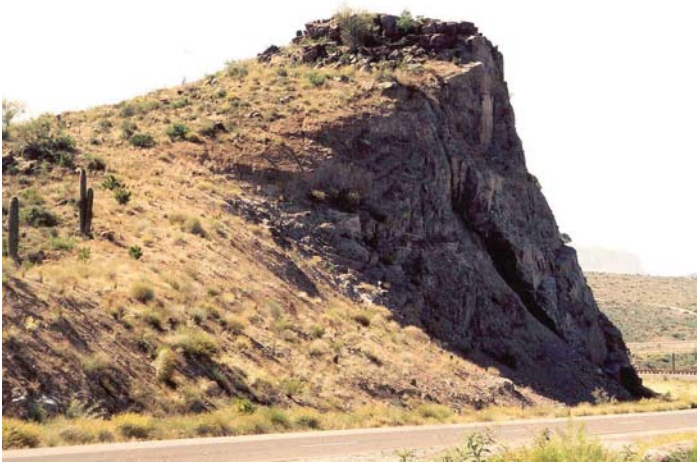
**Figure 3.** Slope in basalt that was blasted using a cushion technique that reduced back slope disturbance but left a few drill hole traces. However these traces are not apparent from the vehicle occupants' perspective.

slopes with ledges and pocketing are more likely to bounce falling rocks. The slope flattening necessary to create ledges tends to promote the horizontal rock deflection component. Furthermore, when textural enhancements are employed, it is generally on projects where rock fall control elements like catch benches and rock fences are out of the question. It is very important to thoroughly scale rock slopes that incorporate ledges for planting pockets, and to aggressively round the slope crests.

One way to limit rock fall migration, while still providing effective aesthetic enhancements, is to specify a graduated schedule of desired ledge widths indexed to cut height and slope angle, according to the principle that ledges can be safely wider, and slopes can be flatter, where rock cuts are lower. To reduce rock launching and rock fall, ledges should be narrower or absent in the higher portions of rock cuts. On highways, this approach provides effective visual enhancement, because vehicle occupants hold the view of the cut end longer than the middle. Providing additional ledge width at the end of a cut presents opportunities for revegetation, and also helps warp the cut slope into the natural terrain. The slope layback associated with additional ledge width at a cut end is not as costly, because the portion of the slope affected by the layback is not as tall. Overall, this presents a good combination of economy, visual enhancement, and safety.

Often, the textural enhancement criteria specify that evidence of the construction technique be eliminated or prevented. Evidence of construction usually means blast hole traces and the marks left by construction machinery. In order for blast hole traces to be omitted from the final cut slope, it is necessary that the rock containing the blast hole traces be removed along with the rest of the production rock. To allow this, overbreak from blasting must extend behind the last row of blast holes, and/or the angle of the finished slope must be flatter than the last row of blast holes. In massive rock, the blast hole spacing may be close to or less than the fracture spacing, in which case blast hole traces are almost unavoidable. The most common sources of undesirable machine scars are corner bits on bulldozer blades, teeth on excavator or loader buckets, and ripper shanks. These marks are avoidable except in soft/massive rock. Where the rock is soft and massive, it may be necessary to remove the machine scars by rubbing with a plate bucket attached to an excavator or loader, or, preferably, using a high-pressure water spray.

## PROFESSIONAL CONTRIBUTIONS



**Figure 4.** Major slope warping accomplished by step drilling on the flanks, transitioning to cushion blasting in the steeper, central portion



**Figure 5.** Accentuated rounding. Note how the rounding extends behind the nominal catch point, giving a smoother, natural transition.

The visual significance of blast hole traces and machine scars must be considered in terms of the degree of slope roughness attained. Often, the importance of blast hole traces is overstated; not all blast hole traces are deleterious. Blast hole traces that may be evident when the cut is viewed from a stationary position out in a roadway may not be apparent from a different and more relevant perspective (Figure 3).

For rest areas, parks and so on, this may not hold true, which should be reflected in the visual assessment. The bid documents should specify a level of blast hole trace reduction that is in accordance with the visual prioritization, taking into account the overall slope roughness, the rock mass fracture spacing and blockiness, and the perspective of the viewer. In most cases blast hole traces need not be completely eliminated or removed. Requiring complete elimination of blast hole traces can mean rock mass disturbance that is not desirable for safety, economy, or slope performance, but if the visual prioritization shows that blast hole traces must be removed, chipping with a hoe ram, excavator bucket, or pneumatic hammer will be required, at considerable expense in both time and cost.

### The Long Range Perspective

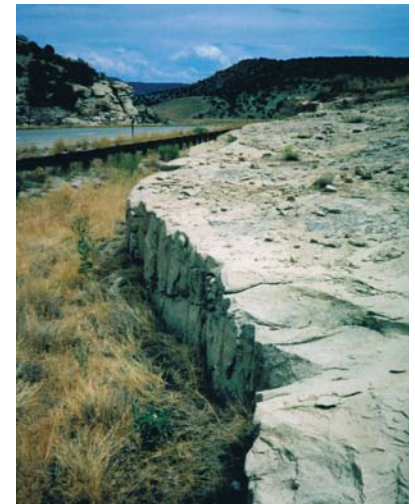
Probably the most effective method of making rock cuts fit into the natural terrain is to incorporate slope variations



**Figure 6.** Drainage layback, in this case with ledding and machine scar removal using a plate bucket, followed by staining

**Figure 7.** BELOW: Presplit techniques along a non-planar line add visual interest and disguise the presence of hole traces.

and grading features that cater to the long-range perspective. These techniques include major slope warping; expanded slope rounding; laybacks at intercepted drainages; ditch width transition variations; varying the slope angle and revealing important geologic features having topographic expression (such as erosion-resistant dikes or sills, or, in sedimentary terrain, ledge-and-slope topography); false cut embankments and median berms; and the application of rock stain.



Major slope warping (Figure 4) consists of varying the slope angle at the cut ends to provide a smoother transition to the natural terrain.

The warping can be defined through a slope offset and angle table, contour grading plans, or by providing an equation relating cut slope height, distance, and slope angle. Most contractors are familiar with the staking techniques involved, which are standard for golf courses, industrial parks, and landscaped open space.

Standard details often omit crest rounding in rock, but expanded slope rounding (Figure 5) can impart a natural appearance to slopes that otherwise would look planar and artificial.

Incorporating the rounding is simply a process of expanding the rounding radius on the detail, and adding lightly loaded satellite blast holes to the pattern behind the nominal trim line. The rounding zone does not present rock-launching features and is an opportunity for ledges and revegetation.

A very suitable landform replication technique in cut slopes is the creation of drainage intercept laybacks (Figure 6).

Rock cuts often pass through a series of ridges, without daylighting except at the ends. The topographic lows intercepted by



the cut may be considered candidates for drainage intercept laybacks, even if no streambed or stream sediment exists. Providing drainage intercept laybacks is an extremely effective technique visually, because it breaks up the uniformity produced by the cut slope design template, and because it recognizes natural landform processes.

Larger scale enhancements are not only effective visually, in that they represent topographic variations that occur in the natural terrain, but they also can be shown on project grading plans, so the economics are improved. An effective visual enhancement can even be accomplished using presplitting, simply by varying the slope contour (Figure 7).

When these enhancements are shown on the plans, the quantities of excavation can be captured within the overall rock excavation pay item; consequently, the construction of these features stems from the competitive bidding process.

## Controlled Blasting For Aesthetic Enhancement

A full discussion of blasting techniques is beyond the scope of this paper so only selected concepts will be introduced here. Options range from ordinary production blasting techniques, where the slope configuration is entirely defined by over break, to controlled “smooth blasting” techniques, such as presplitting, where the slope configuration is entirely defined by the position of the drill holes.

The general arrangement of controlled blasting is shown in Figure 8 (production holes omitted). The diagram is general, but illustrates that both presplit and cushion hole approaches are drilled at angles, in order to control the resulting slope. The loading guidelines given on Figure 8 are starting points; actual loads should be selected based on rock mass competence and friability, and may in some cases fall outside those ranges.

Cushion blasting strikes a balance between slope roughening and minimized back slope disturbance. Various cushion blasting approaches can be used, differing according to the cushion hole spacing, the buffer standoff distance, loading density, and detonation timing. The best approach is to use buffer holes to control the degree of burden experienced by the cushion blast holes. Cushion blast holes are essentially trim blast holes, but set at wider spacings with slightly higher charge densities. It is essential to conduct a test blasting program, and to continuously assess the relationship between the pattern used and the results obtained.

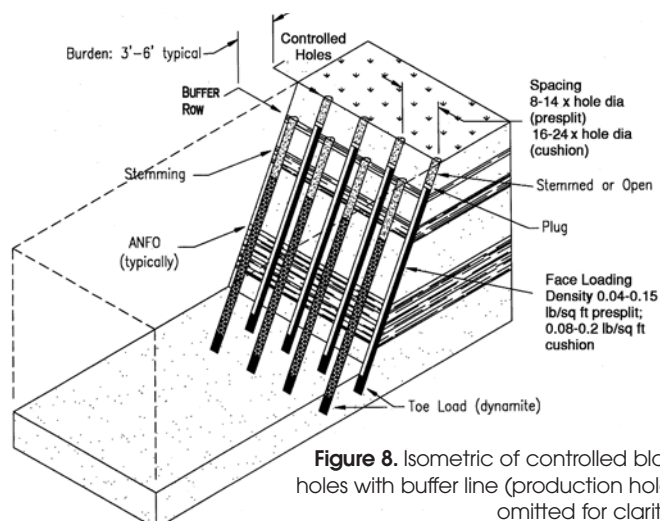


Figure 8. Isometric of controlled blast holes with buffer line (production holes omitted for clarity)

Flatter slopes can be formed with step drilling. In step drilling, the holes forming the future slope are drilled vertically and are deeper as the pattern progresses from the catch point to the intended slope toe. Because step drilling relies on back break between holes to form the finished slope, it is not technically a “controlled” blasting approach. However, where cuts must be developed at slopes flatter than about 0.7:1 (H:V), the use of sloped controlled blasting holes is difficult and usually unwarranted. Step drilling tends to produce a rougher slope with more pockets, but more slope disturbance. To reduce back slope disturbance, a pay item can be established to reduce the pattern dimensions, using lighter, distributed charges.

In massive rock where drill traces absolutely cannot be tolerated, or in sliver cuts with poor access to the crest for drilling, horizontal hole drilling may be worthwhile. This method prevents drilling complications, because hole orientation, location, and depth accuracy are both critical and difficult to attain. Suitable depth control may not be possible without face profile scans. Special drilling equipment is needed that is capable of the vertical reaches required. Explosive loading into horizontal holes is more complicated, requiring either packaged product or pneumatic loading of bulk product, and special stemming procedures to prevent ejection and rifling.

## Conclusions

Aesthetic attainment on rock cuts must rationally evaluate what is necessary visually and what is not. A few drill hole traces are generally not deleterious visually and evidence improved slope stability and reduced rock mass disturbance. In cooperation with the land administration agency, the highway department should use visual simulations and visual prioritization to arrive at measurable, objective criteria for slope roughness and drill hole trace retention.

Criteria for visual enhancement fall into the short range and long range perspectives. The short range perspective includes textural enhancements that are important if the viewer is nearby and will hold the view for an extended period. Consideration should be given to accentuating ledges and pockets on the ends of cuts to reduce the potential for rock launching and obtain more visual benefit. The long-range perspective is generally viewed over a longer travel time. The long range perspective is best served through enhancements that mimic natural land forms such as slope rounding, slope warping, and slope laybacks at drainages. Finishing with rock stain can reduce the color contrasts to make the rock blend in better with the surroundings. The excavation variants can be shown on the plans and included in the earthwork estimates so that the work is accomplished at a competitive unit rate.

Several blasting approaches are available for the creation of enhanced cut slopes in rock. The choice will depend on rock fracture density, rock hardness, and designed slope angle, as well as aesthetic criteria. Controlled “cushion” blasting has been effective in creating rugged cut slopes with natural appearing ledges and pockets, but needs careful design and continuous evaluation starting with a test blasting program, to be effective in changing geologic conditions. Special tightened step drilling and horizontal drilling can be used to advantage where slope angle or access requires them. Horizontal holes offer the potential for elimination of hole traces in massive rock, as long as the depths of the holes can be adequately controlled.

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# Overcoming the Challenges of DNAPL Remediation in Fractured Bedrock – A Novel Approach

*George Maaloufi Dan Bryantii, Patrick Sandersoni, Bill Slackiii, and Noboru Toyamaiv*

**R**emediation of a chlorinated solvent DNAPL plume in groundwater presented several challenges due to: 1) the nature of the contaminant in the source area as heavier than water, 2) its occurrence in low permeability saprolite and fractured crystalline bedrock, and 3) an extremely shortened remediation timeframe selected by the owner. After completing a Remedial Investigation/Risk Assessment/Feasibility Study (RI/RA/FS), Rogers & Callcott Environmental was tasked with identifying an aggressive remedial approach to meet these challenges. Working with Geo-Cleanse International, a novel remedy was developed and implemented in a large pilot scale in 2011. Based on the success of the pilot study and the FS, a Record of Decision (ROD) was issued for full scale implementation.

## Background

The site is a former manufacturing facility located in the Inner Piedmont geologic block of Upstate SC, in an area characterized by the metamorphic and igneous rocks of the Six-Mile and Paris Mountain Thrust Sheets and the Table Rock Plutonic Suite (Figure 1). Hydrogeology of the site is characterized by a dual groundwater system comprised of a saprolite aquifer and a fractured crystalline bedrock aquifer.

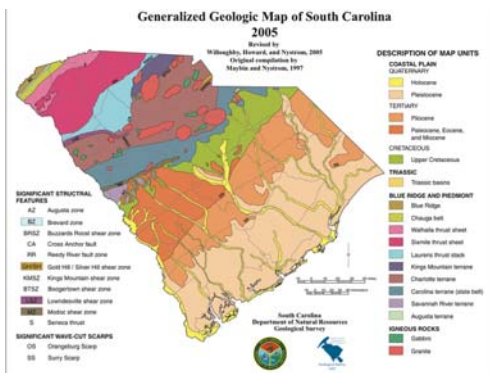


Figure 1. Geology of South Carolina

The saprolite/partially weathered rock zone ranges in depth from 2.5 to 35 feet below ground surface (ft bgs) and is primarily comprised of silty sand and sandy silt derived from the weathering of the underlying bedrock. The upper bedrock exhibits varying degrees of fracturing and weathered zones in a matrix of mica schist and gneiss, feldspar gneiss and granite. The depth to rock ranges from 6 to 90 ft bgs. Groundwater moves in a southwestern direction towards a surface water discharge area (Figure 2), and ranges from approximately 5 to 60 ft bgs. The average groundwater seepage velocity is approximately 60 ft/year.

It is estimated that approximately 1,365 gallons of trichloroethylene (TCE) were released between the time the facility was constructed in 1991 and the discovery of the release in 1996. Site investigations revealed a groundwater plume of TCE and the breakdown product cis-1,2-dichloroethene (cDCE) that covers approximately 16 acres, with concentrations historically greater

than 250 mg/L in the source area and up to 96 mg/L in the mid-plume area. Approximately 140 tons of shallow impacted soil were excavated from the source area during the removal of the TCE storage tank and associated sumps and piping. Several interim remedial measures were applied to address the remaining impacted soils in the source area and mitigate off-site plume migration. These measures effectively met their goals recovering approximately 85% of the total estimated quantity of discharged TCE. The recovered amounts were attained by soil removal and shallow soil vapor extraction (SVE) in the excavation (9%), in-situ thermal desorption (ISTD) in the vadose zone, saprolite and bedrock aquifer within the limits of the source area (70%), and groundwater pump and treat along the downgradient property boundary (6%). Despite the success of the interim remedies, groundwater modeling demonstrated that additional removal is required to meet the aggressive remediation goals of reaching drinking water Maximum Contaminant Levels (MCLs) within one decade as directed by the owner, greatly reduced from the initial modeling results of seven decades.

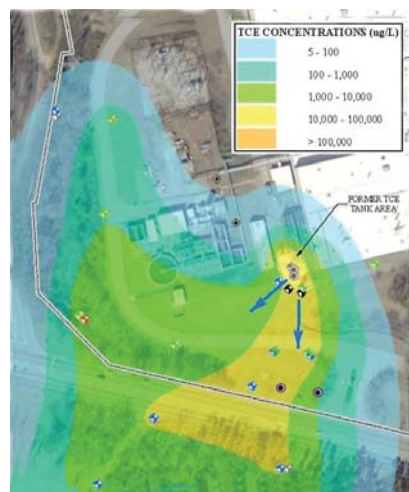


Figure 2. TCE Plume showing source area and groundwater flow direction

## Remedial Approach

A remediation strategy was developed to meet the various technical and schedule requirements for a particularly challenging site characterized by relatively high source area concentrations, low permeability saprolite (Figure 3) overlying highly transmissive bedrock (Figure 4), low natural attenuation, large plume area with limited accessibility, and a very aggressive remediation timeframe. The strategy included a novel combination of technologies coupling an aggressive source-area remedy for quick source mass removal with a long-lasting series of low maintenance plume area barriers to address long-term advection and diffusion of TCE from inaccessible areas, thereby shortening the lifespan of the plume. We integrated in-situ chemical oxidation (ISCO) using potassium permanganate (KMnO4) in the source area, with in-situ chemical reduction (ISCR) using zero valent iron (ZVI) barriers in the downgradient plume area. A large scale pilot study of the remedial approach was implemented in mid-2011 by hydraulically injecting reagents as high-solids slurries to



Figure 3. Low permeability saprolite



Figure 4. Transmissive bedrock

distribute large reagent volumes effectively within specific and focused target zones in the saprolite and fractured bedrock. Modeling and monitoring were conducted as part of the design and implementation as a basis for reagent requirements, injection point horizontal and vertical spacing, scale-up for future expansion of the treatment, and to ensure that the antagonistic reagents do not interact and destroy each other.

## In-Situ Chemical Oxidation

Permanganate is a chemical oxidant that is capable of destroying a variety of contaminants, particularly unsaturated chlorinated solvents such as TCE. The active oxidant is the permanganate anion ( $MnO_4^-$ ), which is a strong and persistent oxidant in the subsurface. Permanganate is a soluble salt, supplied either as potassium (solid form) or sodium permanganate (liquid form).  $KMnO_4$  has a modest solubility (approximately 2% under practical environmental conditions, with an equilibrium solubility of approximately 6%). Permanganate oxidation of TCE does not generate hazardous intermediates or breakdown products. Furthermore, permanganate can chemically diffuse into fine-grained soil and bedrock, thus it can inhibit back-diffusion of VOCs from low-permeability matrices. Based upon these factors, hydraulic slurry emplacement of solid  $KMnO_4$  was selected to provide an aggressive remedy for the source area. This injection method provides the ability to deliver large oxidant volumes in a time-efficient manner in a relatively low permeability formation. The emplaced slurry then provides a high-permeability zone within a low-permeability formation, which draws groundwater preferentially into the permanganate-filled structure. As groundwater moves through the permanganate-filled zone, the oxidant will slowly dissolve over periods of months to more than a year and destroy the TCE and

breakdown products in the groundwater. In addition, permanganate will diffuse and advect with groundwater. This allows vertical and horizontal migration of permanganate away from the slurry emplacement zones and through the aquifer.

## In-Situ Chemical Reduction

The use of ZVI for groundwater remediation is well established (see recent review by Lo et al., 2006), with applications at well over 150 sites around the world since the early 1990's. The ZVI (a strong reductant) reacts with TCE and its breakdown products through electron transfer. Dechlorination is relatively rapid and complete, with no hazardous intermediate products, producing ethane and ethene as the final carbon containing compounds (Sivavec and Horney, 1995; Orth and Gillham, 1996; Fennelly and Roberts, 1998). Ethene/ethane mass balance of 80% and higher have been reported from closed system tests with chlorinated ethenes and ethanes (Sivavec and Horney, 1995; Fennelly and Roberts, 1998; Roberts et al., 1996). Like potassium permanganate, ZVI is also a granular solid that can be injected with hydraulic slurry emplacement, providing high-permeability zones within the low-permeability matrix to draw groundwater into the treatment zone, and additionally can provide treatment for many years with a single application. These characteristics make ZVI very favorable to address the downgradient plume area, which is located offsite, across a busy thoroughfare, and in a heavily wooded area. In contrast to permanganate, however, ZVI will not diffuse from the emplaced zone and thus cannot migrate outside the immediate treatment area; this is advantageous because groundwater discharges to a stream at the downgradient edge of the plume.

## Combining an Oxidant and a Reductant in One Remedy

One of the primary concerns with coupling these seemingly antagonistic technologies was the possibility of permanganate migrating downgradient from the source area and reaching the ZVI, resulting in nonproductive degradation of both reagents and shortening the ZVI lifetime. However, there was very little potential for the permanganate treatment in the upgradient source area to impact the ZVI barrier in the plume due to the distance between the areas, groundwater velocity, and soil oxidant demand for the permanganate. Groundwater that has been treated by permanganate has an elevated oxidation-reduction potential (ORP), which will persist after the permanganate has degraded below detectable levels. The ORP is a very general measure of the overall electron activity in the groundwater and reflects a wide range of chemical species and reactions. Similar to attenuation of permanganate, the elevated ORP will also attenuate due to the reaction with aquifer solids (Barcelona and Holm, 1991), but is more complicated to model because the reaction kinetics are affected by the wide range of chemical species involved. Given the anticipated permanganate attenuation rate, the ORP of groundwater entering the ZVI treatment area was not anticipated to be elevated due to the permanganate. Other permanganate reaction byproducts (such as chloride and sodium) do not react significantly with the ZVI.

## Injection Mechanics

Traditional injection methods of liquid reagents had been tested at this site but proved to be unsuccessful due to the nature of the low permeability soils and random fracturing. Hydraulic slurry

## PROFESSIONAL CONTRIBUTIONS

emplacement, the selected method for the pilot study, is a process in which a fluid is introduced at a pressure sufficient to overcome the in-situ confining stress and the material strength of the formation, in order to mechanically induce or enhance fluid flow into the formation. Slurry can be injected at multiple discrete depth intervals within a boring. Injections are conducted at discrete depth intervals as opposed to pressurizing the entire borehole, in order to focus the nucleation stresses in a horizontal plane. The injection is begun by first cutting a “kerf” through the casing, and into the exposed borehole wall. The kerf is cut with a water jet or water blaster at a pressure of up to 10,000 psi (which in weathered saprolite has been shown to extend 6-8 inches into the soil) transforming the borehole from a pressurized cylinder to a pressurized disk. A slurry is prepared using tanks and mixing systems on a support trailer and then injected into the formation. Stress induced by the injection pressure accumulates in the hoop formed by the kerf in the horizontal plane, nucleating a horizontal emplacement. Once the emplacement is nucleated, the initial horizontal form influences the course of propagation briefly, but soon natural forces become significant and the final form of the emplacement can be quite irregular. This process is repeated for each vertical treatment interval.

## Field Implementation

The permanganate component of the pilot test targeted a portion of the source area and the ZVI portion targeted a mid-plume location located near the property boundary (Figure 5). The treatments each targeted the vertical interval from the water table in the saprolite to approximately 10 ft into bedrock, covering the zones in which impacted groundwater is found.

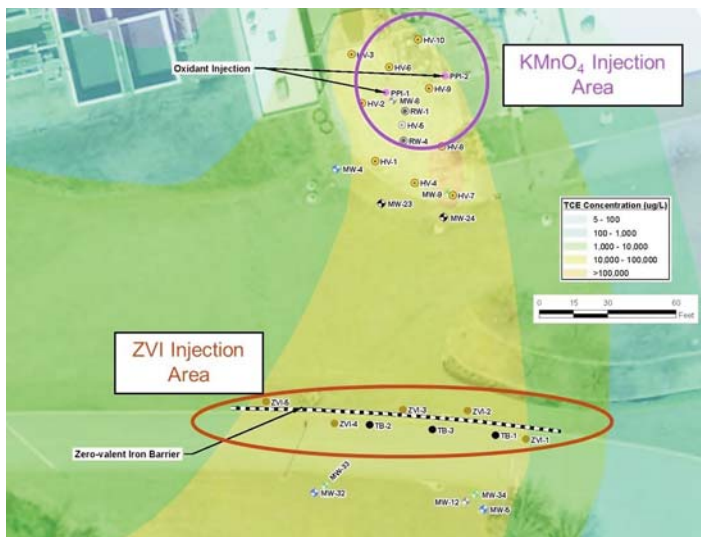


Figure 5. Pilot study plots showing plume prior to treatment

A total of five soil borings were utilized for the ZVI slurry injection. One of the locations was constructed with a 4-inch-diameter, Schedule 40 PVC casing that was grouted into place. Injection in the remaining four was conducted through open boreholes that were completed as screened wells for potential future monitoring within the barrier. The locations were oriented in a line perpendicular to the direction of groundwater flow. The boring locations were installed with a horizontal spacing of approximately 30 ft. The ZVI was injected into four to six discrete depth intervals within each boring. The vertical spacing was

selected based upon hydrologic modeling of groundwater capture into the permeable slurry emplacements. This approach was believed to be a very conservative design intended to ensure both horizontal and vertical overlap between emplacements. A granular form of ZVI was utilized rather than micro-scale or nanoscale form, due to the much longer lifetime in the subsurface. The amount of ZVI required was based upon three main factors: initial concentrations of VOCs entering and exiting the barrier, the travel velocity of the VOCs, and the length and vertical thickness of the treatment zone. The ZVI slurry was prepared by blending the ZVI with guar gum in an aqueous matrix, which thickens the slurry to suspend the ZVI in the fluid (Figure 6). An enzyme is included in the slurry, which slowly breaks down the guar gum over a period of hours following injection in order to expose the ZVI to react with the groundwater. Approximately 73 tons of ZVI were emplaced into the five boring locations forming a 150-ft barrier line.



Two locations were utilized for the KMnO<sub>4</sub> slurry emplacement application. Based upon the results of the ZVI injections, it was determined that constructing the borehole with the PVC casing was the optimal design. Therefore, the two locations were constructed with 4-inch diameter, Schedule 40 PVC casing that was grouted into place. The locations were approximately 25 ft apart, which was considered a conservative spacing. The KMnO<sub>4</sub> product that was emplaced was RemOx®-S, manufactured by Carus Corporation. Sand was blended into the permanganate in a 50/50 ratio by weight (Figure 7) in order to reduce “crusting” due to manganese dioxide precipitation; the sand selected has a grain size distribution nearly identical to that of the KMnO<sub>4</sub> in order to minimize grain sorting and associated permeability reduction during injection. The permanganate slurry was prepared using bentonite to suspend the solid permanganate in the slurry, rather than guar gum as used with the ZVI, because permanganate reacts with the guar gum. Tests and calculations demonstrated that the very small amount of bentonite utilized was insufficient to measurably reduce the permeability of the emplaced slurry. The amount of KMnO<sub>4</sub> required for the pilot test was based upon residual contaminant mass estimates and permanganate oxidant demand bench tests. The amount of permanganate utilized reflected the combined total of the soil oxidant demand plus the VOC oxidant demands, which was 14 tons of KMnO<sub>4</sub> and sand blend. Permanganate was emplaced at five vertical intervals in each boring location.



## Monitoring

The monitoring program included groundwater sampling events prior to, during and after the emplacement of each reagent; tiltmeter monitoring during the injections; and post-injection soil borings adjacent to the injection locations to determine reagent distribution.



The monitoring program in the permanganate and ZVI areas were slightly different, reflecting the different influence of each reagent on groundwater chemistry. The groundwater analytes in the permanganate pilot test area consisted of VOCs, color, ORP, specific conductivity and pH. Permanganate imparts a distinctive light pink to purple color to groundwater, which provides direct evidence of reagent distribution and is easily observed in the field (Figure 8). The groundwater analytes in the ZVI pilot test area consisted of VOCs, ferrous iron, ORP, specific conductivity and pH. The ZVI does not impart a characteristic color to the groundwater, so reagent distribution was evaluated by monitoring water levels during the injection and by advancing soil borings after the injection was conducted. Three soil borings were advanced and soil cores were analyzed with a magnetic susceptibility meter to quantify the presence of ZVI, visually examined for the presence of ZVI particles, and a magnet was used both on core sections and in the borings to collect ZVI particles to evaluate the physical distribution of the ZVI. The ZVI particles collected from the borings were analyzed by X-ray diffraction to confirm their identification. Tiltmeters were used to measure surface deformation during the ZVI pilot test. The tiltmeters can measure surface deflection to a resolution of 5 microradians (five units of vertical movement per 1,000,000 units of lateral distance). The tiltmeters were stabilized prior to the each emplacement event. As each emplacement was propagated, minute deflections in the earth surface (reflecting formation of the emplacement) were recorded by the tiltmeters. The tiltmeter data were then analyzed by plotting deflection as a function of time during the emplacement process. The resulting data were utilized to calculate vectors whose orientation and length represent the direction and magnitude of the tilt, respectively for each tiltmeter.

## Results

The source area pilot test proved to be very effective at reducing VOCs and exceeded the design goals by treating approximately half of the source area with two injection wells. Permanganate was physically observed (based upon the distinctive pink



Figure 9. KMnO<sub>4</sub> persisting in saprolite at depth two years after injection

to purple color of the reagent in groundwater) at 11 of the 15 monitoring well locations in the pilot test area, at distances of up to approximately 40 ft from the emplacement boring locations, immediately following emplacement. As of the second quarter of 2013, almost two years after injection, permanganate was still observed in eight locations. Two years after injection, KMnO<sub>4</sub> persists at depth (Figure 9), and the overall TCE concentrations remain 97.5 - >99.9% below the baseline concentrations in six of the monitoring wells, 26–84.6% below baseline in three wells and returned to or exceeded baseline in the six remaining wells (Figure 10). Concentrations were reduced by up to five orders of magnitude, in one case from 82,000 g/L to non-detectable. Permanganate was not observed in any of the wells located outside the pilot test area; therefore, the permanganate did not come into contact with the ZVI, which was a primary concern.

The ZVI pilot test also yielded very positive data. Each ZVI slurry emplacement boring achieved a radius of influence of at least 15 ft based upon sampling data (visual evidence, magnetic

Figure 10. Changes in TCE concentrations

| Well # | Pre-ISCO                      |                                | Highest Removal Achieved Post ISCO |                |            | Post-ISCO Removal Through 2nd Quarter 2013 |                |
|--------|-------------------------------|--------------------------------|------------------------------------|----------------|------------|--|----------------|
|        | Baseline Concentration (ug/L) | July 2011 Concentration (ug/L) | Concentration (ug/L)               | Percent Change | Date       | Concentration (ug/L)                       | Percent Change |
| HV-9   | 82,000                        |                                | <1.0                               | >99.9          | 3/8/2012   | 10.2                                       | >99.9          |
| MW-4   | 5,300                         |                                | 12.4                               | 99.8           | 5/23/2013  | 12.4                                       | 99.8           |
| HV-6   | 6,900                         |                                | <1.0                               | >99.9          | 2/23/2012  | 21.3                                       | 99.7           |
| HV-2   | 12,000                        |                                | 1.6                                | >99.9          | 2/20/2013  | 86.1                                       | 99.3           |
| HV-3   | 4,400                         |                                | 6.7                                | >99.8          | 2/20/2013  | 58.6                                       | 98.7           |
| RW-4   | 57,000                        |                                | <5.0                               | >99.9          | 9/13/2011  | 1,420                                      | 97.5           |
| HV-1   | 39,000                        |                                | 12                                 | >99.9          | 9/13/2011  | 6,010                                      | 84.6           |
| MW-24  | 83,000                        |                                | 23,300                             | 72             | 5/28/2013  | 23,300                                     | 72             |
| HV-7   | 110,000                       |                                | 81,600                             | 26             | 5/30/2013  | 81,600                                     | 26             |
| HV-4   | 49,000                        |                                | 24,000                             | 51             | 8/19/2011  | 48,900                                     | 0.2            |
| MW-23  | 58,000                        |                                | 41,000                             | 29             | 8/18/2011  | 61,500                                     | -6             |
| RW-1   | 14,000                        |                                | <2.0                               | >99.9          | 11/21/2011 | 16,100                                     | -15            |
| HV-10  | 3,300                         |                                | 32                                 | 99             | 9/12/2011  | 3,920                                      | -19            |
| HV-8   | 79,000                        |                                | 52,000                             | 34             | 8/19/2011  | 121,000                                    | -53            |
| MW-9   | 49,000                        |                                | 90,100                             | -84            | 12/13/2012 | 138,000                                    | -182           |



Figure 11. ZVI in soil cores from test boring

susceptibility and X-ray diffraction analysis of ZVI particles in soil from the three soil borings advanced after the emplacement (Figure 11), and indirectly based upon tiltmeter data reflecting surface deflections. The inorganic geochemistry results from groundwater downgradient of the treatment barrier also reflected the influence of ZVI. Groundwater ORP is particularly sensitive to the ZVI and decreases were observed in all four monitoring wells (two in the saprolite and two in the bedrock) located approximately 30 to 40 ft downgradient from the ZVI barrier location. The groundwater pH and specific conductivity also reflected transient shifts associated with ZVI applications, which can also be influenced by the soil buffering capacity and other factors in addition to the ZVI.

The VOC concentrations in the groundwater downgradient from the ZVI barrier also exhibited significant reductions. The TCE concentrations were reduced by 80 - 100% relative to the

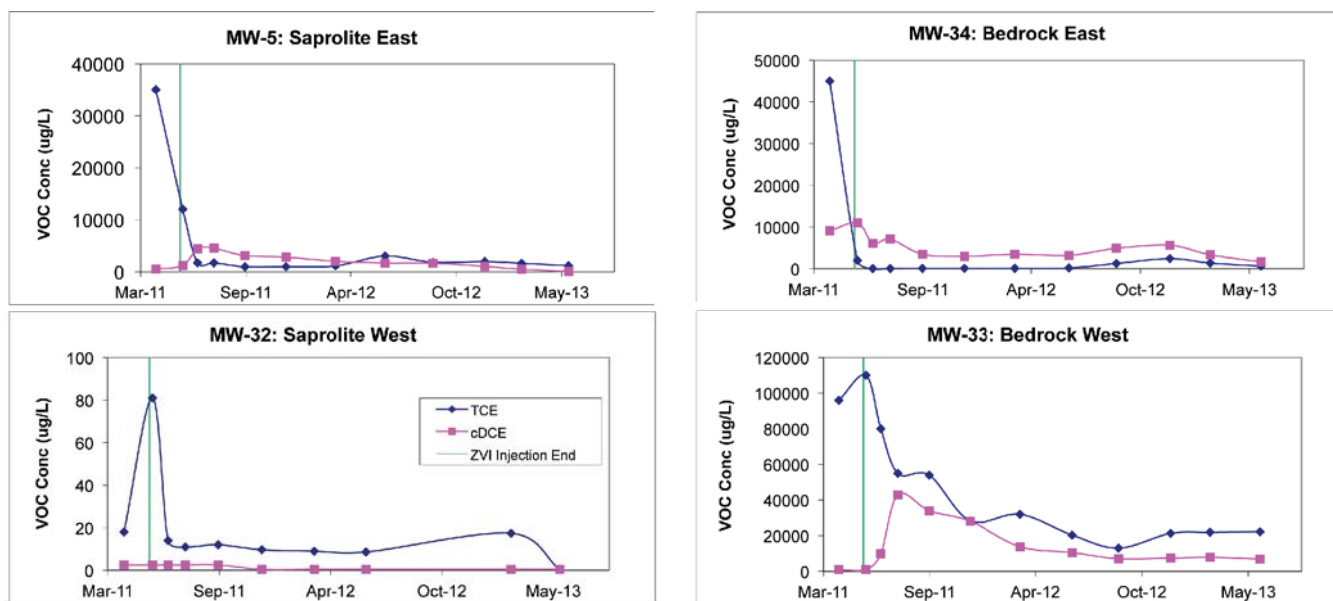
baseline concentrations in the four downgradient-monitoring wells (Figure 12). In the second quarter of 2013, two years following injection, the TCE concentrations were reduced from approximately 35,000 g/L to 1,150 g/L and from 81 g/L to <1.0 g/L in the two saprolite-monitoring wells. The TCE concentrations in the two bedrock wells were reduced from approximately 110,000 g/L to 22,200 g/L, and from 45,000 g/L to 620 g/L. cDCE, formed from ZVI degradation of TCE, initially increased following the injection; however, additional post-injection sampling has shown a subsequent decrease as a function of time in all the wells and dropping below baseline concentrations in three of the four wells 1–22 months after injection.

### Full Scale Remedy

Following two years of quarterly monitoring for VOC and inorganic chemical parameters and based on the results of the feasibility study, a full scale-up of the successful pilot studies was determined to be the major part of the final remedy in a Record of Decision. Construction of the remedy began in July 2013 and includes the installation of 13 additional performance-monitoring wells, nine permanganate injection wells in the source area, and 64 ZVI injection wells. The remedy incorporates additional treatment in both pilot study areas to affect more complete treatment. The KMnO4 pilot study area is being expanded to include the entire source area. The ZVI pilot study barrier scale-up consists of additional injections within, and extending the tested plot and adding two more barrier lines to split the plume into four smaller sections, thereby significantly reducing its life. The additional reagent amounts planned for the scale-up are 38 tons of permanganate/sand mixture and 597 tons of ZVI.

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Figure 12. Post-injection concentrations



\*Note: All samples reported < RDL are plotted at a value of half of the RDL.

In this series, we present the opinions of the author as he explores the issues that are important in the implementation and operation of statutory licensure for geologists. The author's opinions are not necessarily those of the Association of Environmental & Engineering Geologists or any other organization or entity.

# LXVIII: The Future of Licensure for Geologists

Robert E. Tepel, PG, CEG, and Past President AEG

## Introduction

**I**n the U.S., professional licensure for geologists began in Arizona in the 1950s. The big boost for licensure came with the implementation of licensure for geologists in California in 1969. The California law became a point of reference for licensure laws that followed in several states. Some of its language and concepts were carried into the licensure laws of Arkansas and some of the southeastern states that followed. Arkansas and Georgia reproduced California's engineering geology certification provisions but never implemented them. (One of the original Arkansas board members told me that this was because they did not know what engineering geology was.)

With the long-delayed implementation of the Louisiana licensure act (effective January 1, 2014), the number of U.S. jurisdictions with licensure for geologists stands at 31 (thirty states plus Puerto Rico). See the map and matrix at [www.asbog.org](http://www.asbog.org) for details.

What is the future of licensure for geologists in the U.S.? Will all states eventually adopt licensure? What state laws are subject to legislative attack?

## Status of Licensure in the U.S.

Although 31 jurisdictions have licensure for geologists, the extent to which it applies to all geologists and all geologic practice varies considerably. Virginia has a state board but licensure is essentially optional. In the other jurisdictions, licensure is mandatory in principle, but there are many exemptions for selected areas of geologic practice. The most common exemptions are for petroleum/energy geology practice and mineral resource development practice. The new Louisiana act requires licensure for environmental geology practice but also apparently exempts unlicensed petroleum geologists who practice environmental geology insofar as it is related to petroleum geology (see the act text posted at [www.lbopg.org](http://www.lbopg.org).)

## Limiting and Challenging Factors

The 31 jurisdictions that have licensure for geologists contain over 80% of the population of the U.S. A glance at the ASBOG map shows that the states without licensure can be grouped into states with small and sparse population, and populous states (Maryland, Massachusetts, New Jersey, New York, Michigan, and Ohio) that have areas of dense population. Sparse population tells us that relatively few people are affected by geologic hazards, and the presence of hazards (risk factor) to both individuals and government (which owns much valuable infrastructure) might also be low. Low risk translates to low recognition of the risk that does exist, and low potential demand from the populace for

licensure for geologists. While some of these states have large energy resources, and their development carries risks to the population, environment, and infrastructure, there is little reason to expect that licensure for geologists will be deemed a societal necessity by their state governments.

The more populous states without licensure (Maryland, Massachusetts, New Jersey, New York, Michigan, and Ohio) have all been considered by concerned geologists as likely benefitting from licensure. Bills have been written or drafted, or the idea floated, in all of them. Massachusetts and New Jersey have environmental regulations that qualify geoscience practice as to

**“The future of licensure for geologists in the U.S. rests more on defending current laws than on adding additional states.”**

environmental concerns, but other geohazards are not recognized as significant, so licensure for geologists in those states is unlikely to happen. Bills have been introduced, or come close to introduction, in Maryland, New York, Ohio, and Michigan, but not acted upon.

In the less populous states, a bill was introduced in Hawaii a few years ago, but failed to gain support, and a proposal to license geologists in Colorado was killed during sunrise review.

Western states do have significant economic geology activity or potential, specifically petroleum or precious metals. Many economic geologists are opposed to professional licensure because of their political philosophy and the perceived inconveniences of licensure. Without support from the profession, licensure will not be implemented in those states.

Considering all these limiting and challenging factors, the potential to add new states to the list of states with licensure for geologists is low. Only Michigan, Ohio, and New York seem to be possible candidates.

## Future Legislative Challenges

Where licensure for geologists exists in the U.S., it is continuously subject to attack from the political left, which tends to take the position that professional licensure is foisted on the public by the professions as a way to establish a monopoly to raise costs to the consumer, and from the political right that takes the position that professional licensure is an unnecessary layer of government bureaucracy that interferes with a citizen's right to determine the risks they will take in their lives and their right to contract with whomever they please for professional services and advice.

## ISSUES IN PROFESSIONAL LICENSURE

The future of licensure for geologists in the U.S. rests more on defending current laws than on adding additional states. Being ready to defend existing laws is of critical importance, and that means close monitoring of activities in the state legislatures. Developing cordial, professional, business-like relations with state boards and their executive staff will keep geologists and their associations informed about the status of licensure and opportunities and threats that occur. Having alternatives ready for presentation is always a political value. For geologists, one alternative to traditional state-level boards is the self-regulatory organization (SRO); examples are the Delaware engineers act and the several Canadian provinces that regulate both engineering and geology through SROs. The economic feasibility of this approach is unknown, but it can be a point of discussion that might lead to the preservation of licensure.

## THE HOMEFRONT

### Carolinas Section

Alex Rutledge, Chair

The Carolinas Section is running full steam ahead as 2013 comes to a close. In the past few months, we had two Section meetings. The first was a collaborative meeting with ASCE and took place in Asheville on September 20. **Larry Murdoch**, PhD, a professor in the Environmental Engineering and Earth Sciences Department at Clemson, spoke about the *Three Faces of Fracking*. The second meeting was held at Natty Greene's Pub and Brewing Company in Greensboro, North Carolina on October 17. Dr. Richard K. Spruill, an Associate Professor of Geology and Hydrology at ECU, spoke on the Current Activities and Future Plans of ASBOG. Both meetings were well attended, with 28 students from across the Carolinas and Virginia at Dr. Spruill's talk!

Following elections, the new board was announced and introduced at the Asheville meeting: **Alex Rutledge** is stepping up into the Chair position, allowing **Paul Weaver** to finally move into the Past Chair spot, after volunteering numerous hours over the past four years during his tenure. The Carolinas Section is very appreciative to Paul for his hard work and dedication. **Madeline German** moved into the Vice Chair spot and **Susan Kelly** became the new addition to the group as the Section Secretary. **Briget Doyle** will remain as the Section Treasurer while she also serves on the AEG Foundation Board. Briget announced during the August board meeting this would be her last year on the Section board, as she would be continuing on with the Foundation and wanted to allow other Members the opportunity to serve.

The Section was well represented at the AEG Annual Meeting in Seattle. Additionally, we won another Section of the Year award making this the third in five years—way to go Carolinas Section! Also, Paul Weaver's proposal for hosting the 2019 Annual National meeting in Asheville, NC, was accepted by the Board of Directors. We are looking forward to the opportunity to show all of our AEG friends this special part of the world.

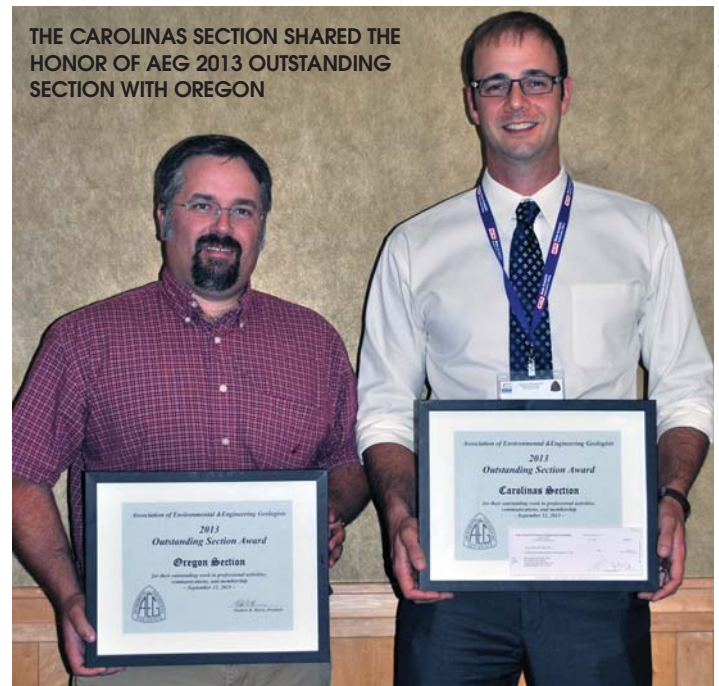
We currently have 28 sponsors for the Carolinas Section for 2013. **Jane Gill-Shaler**, who has been a fantastic Sponsorship Coordinator for many years, stepped down over the summer. **Rick Kolb** volunteered to take over and has been busy getting our existing sponsors renewed and recruiting new ones; sponsor renewal notices were sent out in October. Due to the generosity of our sponsors, we will continue to be able to fund our outreach programs to students, our profession, and to the general public.

What is your Section up to?  
We want to know!

Don't forget to submit your  
Section's Homefront by  
January 31, 2014 for the  
March 2014 issue.

**Jennifer Thomas** is producing our quarterly section newsletter, *GeoNews*. The latest issue was published in the Fall of 2013, and provides Section Members with Section and other AEG news updates, a summary of our section financials, geology-related articles, and a place to advertise for our sponsors. Current and past issues of *GeoNews* can be downloaded from our website.

The social committee had a successful outing to Tobacco Road in Durham, NC, to watch a Durham Bulls game. The field trip to the mountains was postponed. Our outlook for future field trips is bright, with **Sue Buchannan** agreeing to tackle the role of Field Trip Chair. **Rick Kolb** is gearing up for another successful year with new schools for the Visiting Professionals Program. Our Section is sponsoring the biannual Redox conference scheduled for March 4–5, 2014, in Raleigh, NC. Additionally, a small committee led by Rick Kolb is planning a regional Vapor Intrusion conference to be held in Raleigh, NC on January 23–24, 2014. The proceeds of the conference will benefit the Carolinas Section.



Representatives from both Sections were on hand to accept their awards at the President's Luncheon at the Annual Meeting. L to R: Darren Beckstrand of Oregon and Carolina's own Alex Rutledge

ANDREA LEIGH PTAKE



## New York – Philadelphia Section

Mia Painter, Newsletter Editor

The NYP Section has a bumper crop of new folks joining our core group here in the “New York-New Jersey-Philadelphia” Section. In August, we held a Planning Meeting to bring all the new volunteers from the Section together to brainstorm ideas for next year. Our current group includes Chair **Loren Lasky** (NJDEP); **Bill Gottobrio** (ERM), our new Vice Chair replacing **Thom Waldron** after many years of service; **Mia Painter** (Schnabel Engineering) taking over as our Newsletter Editor; **Amanda Forsburg** (Langan) who will be our Continuing Education Coordinator and will assist **Rose DeLorenzo** (Matrix New World Engineering) as Secretary; **Pradeep Ulikashi** (Converse Consultants), our new Student Outreach Coordinator; and **Niall Henshaw** (Parsons), our new Field Trip Coordinator who will also work with Pradeep on reaching out to students. Thank you to everybody who volunteered, and we always welcome more help. A special thanks and farewell to outgoing Newsletter Editor **Charlie Wildman**, who left the Second Ave Subway Tunnel project to specialize in the advanced brewing field.

**Bill Gottobrio**, **Loren Lasky**, **George Marshall** (retired), and **Matt McMillen** (Bucks Geophysical) represented the NYP Section at AEG’s September Annual Meeting in Seattle. The weather in Seattle was uncharacteristically sunny throughout, highlighting beautiful Mount Rainier on the horizon.

We kicked off the fall meeting season in October in Somerset, NJ, with a presentation entitled, *The Effects of Geologic Conditions on Geothermal Heat Pump Systems in New York City*. It was presented by three members of the NYC Department of Design and Construction, Office of Sustainable Design: **Alex Posner**, PG; **Brett Miller**, PE; and **Dennis Askins**, PG. Our December meeting included a presentation entitled, *Arsenic and Old Lakes* by Tom Belton, NJDEP. Our mid-February 2014 meeting is shaping up to focus on sustainable approaches to LNAPL removal. We look forward to a great year of meetings, presentations, and increasing the involvement of students in the NYP Section, with the possibility of starting a Student Chapter in a local colleges/university.

## North Central Section

Rita Keefe, Secretary

The busy summer season is behind us. Some of you might be aware that on May 16, 2013, the Illinois Pollution Control Board added the indoor inhalation exposure route to the Illinois EPA’s risk-based cleanup methodology called the “Tiered Approach to the Corrective Action Objectives,” 35 ILL. Adm. Code 742 (TACO). The several amendments became effective on July 15, 2013.

Our first meeting back after the Summer break was held on October 15 at the Parthenon in Chicago, where we welcomed Joyce Munie from Illinois EPS. The topic of her presentation was *New Vapor Intrusion and TACO Amendments*. She offered us tips on and information about navigating through the TACO tiers and managing indoor inhalation exposure routes. The amendments are intended to minimize the exposure to building occupants from volatile chemicals, contaminants from the soil and/or groundwater. Munie did an excellent job covering the basic transport mechanism and explaining new tables and equations.

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The November meeting addressed two geophysical methods—ground penetrating radar (GPR) and multi-channel analysis of surface waves (MASN)—in *Use of Geophysical Surveys to Access and Mitigate Void Formation over a Sewer Failure at the Charles B. Wheeler Airport-Taxiway G, Kansas City, Missouri*. **Douglas Lambert**, who presented, conducted an exploratory investigation using both methods beneath a reinforced concrete taxiway at Charles B. Wheeler Downtown Airport. The site had experienced flooding for several months from the Missouri River adjacent to it. As a result, a sinkhole formed at the north section of a “run up pad” and a 60-year-old storm sewer collapsed. Of concern was that other locations in this area might have experienced voids due to downward erosion of sediment into the storm sewer system. By using the two methods, GPR and MASN, a void was located and depth calculated. This eliminated the need for an extensive excavation of the area. By combining the interpretation of both methods, a better result was achieved and a potential catastrophic failure of the taxiway run-up pad was averted.

On a lighter note since no one has given me any interesting field trips they’ve participated in, I will recount the one I just had. I went on a weeklong excursion to some National Parks, which happened to fall during the shutdown. I found several parks couldn’t keep the “visitors” out since public highways went through them (i.e. Death Valley, CA. and Mt. Charleston, NV). The Bureau of Land Management couldn’t close Rhyolite, NV, a ghost town, either. Though while there, I did sense the ghost of governments past.

## Oregon Section

Stephen Hay, RG, CEG, Secretary

The Oregon Section began the 2013–14 year with the election of Section Officers in September. Results are as follows: **Darren Beckstrand**, RG, CEG, Chair; **Linda Mark**, RG, Chair Elect; **Adam Reese**, RG, CEG, Treasurer; and **Stephen Hay**, RG, CEG, Secretary. Past Chair **Robin Johnston**, RG, remains very active with the Oregon Section board. **Mike Marshall**, RG, and **Scott Braunsten**, GIT, continue their amazing and diligent work as Program Chair and Newsletter Editor, respectively. Also dutifully and graciously serving on our Oregon committees are **Keith Olson** (Webpage Editor), **Ruth Wilomoth**, RG, CEG (Membership Chair), and **Erin Dunbar** (Field Trip Chair). We still have positions open for Program Co-Chair, Legislature Chair, and Visiting Professional Program (VPP) Chair for Oregon Section members.

A large number of professionals and students represented the Oregon Section at the AEG National Meeting in Seattle. Section members presented and/or attended technical sessions and participated in field trips and short courses. Congratulations to the Oregon Section and Carolina Section as co-winners of the AEG Outstanding Section of the Year Award! In addition, our own **Dorian Kuper**, AEG Past President, was recognized during the Awards Luncheon for her 30 years of membership in AEG. We thank Dorian for her past and continued commitment to the Association at both the local and national levels.

The September Section meeting featured guest speaker **Tom Badger**, LG, with the Washington Department of Transportation (WashDOT). Tom's presentation, *The 2009 Nile Valley Landslide – from Past to Present*, provided a detailed account of the October 2009 catastrophic failure of the Nile Valley Landslide. This landslide destroyed more than 2,500 feet of State Route 410 near the community of Nile, WA, and blocked the Naches River. An extensive geotechnical field program and subsequent analysis was completed by WashDOT to determine mitigation alternatives. Construction was completed in August 2012 and included highway relocation and re-channelization of a half-mile-long section of the Naches River.

**Troy Fowler**, associate senior biochemist with Hart Crowser, was the featured guest speaker at the October meeting. Troy's talk entitled *Bioremediation Fundamentals and Application* focused on the fundamental processes involved in bioremediation. He outlined the processes that environmental practitioners must follow in order to identify anomalies and update site understanding in real-time during project implementation. Troy described bioremediation case studies demonstrating that this technology can decrease the amount of time necessary for remediation, which results in project cost savings.

October was a busy month for the Oregon Section and included the much anticipated retirement celebration for **Scott Burns**. The event was held October 24 at Portland State University and included over 400 attendees. Suggested attire for the event was to dress like a geologist or how a geologist should dress. The celebration included wine (since Scott loves wine) and much merriment. Speakers included members of the PSU faculty, community members, and Oregon Section Members **Adam Reese** and **Tom and Dorian Kuper**. Scott was awarded the PSU President's Award by President Wim Wiewel. Charlie Hales, Mayor of Portland, proclaimed October 24th 2013 "Scott Burns Day." At the request of the PSU Athletic Director, attendees witnessed Scott score 10 free-throw shots in a row. All funds raised benefitted the

newly established *Scott Burns Student Scholarship*. Prior to Scott amazing the crowd with his basketball skills, it was announced that the scholarship had reached \$100,000. We wish Scott the best in his retirement pursuits and expect that we will still see his continued activity at both the local and national levels of AEG. A special thanks to Section Members **Robin Johnston**, **Mike Marshall**, **Scott Braunsten** (and his wife Megan), **Matt Brunengo**, and Kate Mickelson who spent many long hours as members of the organizational committee for this memorable event!

By the time this article is published we will have had two additional meetings. In November, Bill Steele with the Pacific Northwest Seismograph Network (PNSN) will discuss the Earthquake Early Warning Project. Bill is currently touring the Pacific Northwest introducing this project to businesses, utilities, and public agencies. In December, we will be holding a joint meeting with the Oregon Association of Environmental Professionals (OAEP). PSU Geology Professor, Jim Jackson will be the guest speaker at this meeting and will deliver a presentation on fracking.



Scott Burns amazes the crowd with his free-throw skills during his retirement party at Portland State University on October 24.

## Portland State University (PSU) Student Chapter News

Tiyana Casey, Student Chapter President, Hilary Whitney, Student Chapter Secretary

The Chapter is back to work after enjoying summer vacation and the 2013 AEG Annual Meeting held in Seattle. The Chapter helped to send 12 students to Seattle, making us the university with highest number of student volunteers at the conference, Go Vikings!

The PSU AEG Student Chapter would like to congratulate **Ann Stansbear**, past Student Chapter President, on graduating with her bachelor's degree this last spring. We welcome **Tiyana Casey** as the new President. Rounding out the new officers for the 2013–14 school year are **Kassie Lindsey** (Vice President), **Adrienne Nichols** (Treasurer), **Hilary Whitney** (Secretary), **Topher French** (Outreach Coordinator), **Jon Barnes** (Field Trip Coordinator) and **Karla Farley** (IT Technician).

We recently held two successful events in October: our annual Fall recruitment event (*Terroir* Night) and a Field Camp Workshop. Thanks to the help provided by **Scott Burns** and **Kat**

**Bernard**, the recruitment event was a success with 36 attendees; 12 new members registered on the spot. The Field Camp Workshop facilitated by our own officer **Kassie Lindsey** helped geology students learn about the different options for Summer 2014 field camps and how to apply to the various programs. To give students a better understanding of the requirements and purpose of field camp, the workshop also included a segment on past field camp experiences, shared by geology graduate students **Megan Masterson**, **Heather Hurtado** and **Hilary Whitney**.

We are currently recruiting professionals to speak at our annual AEG Career Night in February and also to help lead field trips at local engineering and environmental consulting firms. If anyone is interested or would like more information, please contact **Hilary Whitney** at [haw4@pdx.edu](mailto:haw4@pdx.edu). Thank you all for your support in the AEG Student Chapter at PSU!

## Rocky Mountain Section

*Denise Garcia, Secretary*

### Meeting News

Our September meeting was a successful first meeting back after summer break. **Dan Johnson** with Tetra Tech presented a talk entitled *Slippery Slope Mitigated*. Johnson delivered a very interesting talk regarding a side slope failure that occurred in 2009 at the Ralston Reservoir northwest of Denver in the foothills of the Rocky Mountains. He described how the massive landslide showed potential to undercut the box inlet flume, and reduce Denver Water's means to fill the reservoir, which could impact water supply to portions of the City of Denver. Monitoring, field investigation, modeling, and stability analyses were performed to develop a remediation approach.

We also voted on positions for the Section Board of Directors. **Diana Cook** will serve as Chair this year and **David Glater** will replace her next year. **Denise Garcia** will continue as Secretary and **Jill Carlson** will continue as Treasurer and Webmaster. Our non-voting positions include **Linda Hadley** as Newsletter Editor and **Kami Deputy** as chair of the Field Trip Committee. In addition, the Rocky Mountain Section is seeking a Legislative Representative for each of the states in our section (Colorado, Wyoming, New Mexico, Montana, and South Dakota). The Legislative Representative would continuously monitor legislation that affects our profession in their state and report this to AEG. Please contact our Section Chair if you are interested or know someone who might be good for this role.

At our October meeting, **Gregory Hempen**, the 2013–14 Jahns Lecturer, presented a great talk entitled *You're Going to Drink THAT Water?!* Greg described the hydrogeologic characteristics and remedial actions at low-level radioactive waste sites in St. Louis. He discussed how the investigations and remediation were complex due to long waste histories at the sites and prior influences of man, varied geomorphic locations, and major influence from surface water and groundwater. He described the importance of an interdisciplinary approach to remediation of the sites and discussed utilizing preferential pathway surveys for investigation. He also touched on how significant effort may be necessary to convince the public that the known and unknown risks are acceptable, and that the resolved remediation is detailed and proper.

At our November meeting, **Jeffrey Coe** with the USGS gave a very interesting talk describing debris flow monitoring results from Oregon.

## Sacramento Section

*Chase White, Secretary*

After taking July off with no Section activities during this peak-of-the-summer time, the Section held our August dinner meeting at a new venue in midtown Sacramento—well, new for the Section anyway—the Old Spaghetti Factory. Anne Rosinski of the California Geological Survey gave a summary presentation of the California Earthquake Clearinghouse ([www.californiaeqclearinghouse.org/](http://www.californiaeqclearinghouse.org/)) and explained its purpose and need for more participation and support from AEG members. Following dinner, **Dr. Sandy Figuers** of Norfleet Consultants gave a presentation entitled *A Cautionary Tale of Why Engineers Need Geologists: The Devil Is in the Details, and That No Good Deed Goes Unpunished*. The talk provided a summation of the history and Dr. Figuers' experience with an intriguing landslide project in a hillside residential subdivision in Southern California.

Among the more than 500 attendees of the AEG Annual Meeting in Seattle were several Sacramento Section members including **Pete Holland**, **Holly Nichols**, **Drew Kennedy**, **Chase White**, **Bill Fraser**, **Bruce Hilton**, **Eric Chase**, **Robert Sydnor**, and **Teresa Butler**.

On October 29th the Section held its annual joint meeting with the Sacramento Section of the ASCE Geo-Institute at Aviator's Restaurant in Sacramento. Tony Shakal, of the California Geological Survey, hosted the meeting and gave a presentation on the California Integrated Seismic Network – Center for Strong Motion Data. Also announced at the meeting were plans for drafting and publication of a new California-practice-oriented AEG volume to supplement the previously published volumes on Engineering Geology Practice in Southern California (1992) and Northern California (2001). Our Section Past-Chair, **Garry Maurath**, was presented with an award by **Eric Chase** on behalf of AEG for his years of dedicated service to the Section, AEG, and the profession at-large.

## St. Louis Section

*Stefanie Voss, Editor*

The St. Louis Section held an end-of-summer picnic at Greensfelder Park in St. Louis County on August 18. Members enjoyed fossil-hunting, hiking, and hamburgers. **Edie Starbuck** with the Missouri Geologic Survey presented *The Eureka Quadrangle Map*, where the park is located. Many thanks to **Phyllis Steckel**, St. Louis Section Secretary, for organizing the event, and **Mike Roark**, St. Louis Section Treasurer, for his expert grilling skills.

The first meeting after the summer break was at the Wolf Public House on September 5. **Dr. Norbert Maerz**, Professor of Geologic Engineering at MS&T, discussed the Fayfa Mountain Rockfall Mitigation in Saudi Arabia and shared his team's cultural experiences in the country. The meeting was well attended by professionals and students.

On September 17–18, Phyllis Steckel traveled to Washington DC to participate in the Geoscience Congressional Visits Day (CVD). She visited with staffers from all four senators from Illinois and Missouri, and one congressional representative from Illinois. She also was able to visit in person with her congressional representative from Missouri—who was duly impressed with how the Alyeska Pipeline performed in the 2002 Alaska earthquake, a project on which she worked in the 1970s.

## THE HOMEFRONT

On October 16, the Section held the second meeting at The Wolf in Ballwin. **Richard Steckel** with the Center for Aviation Safety Research, Saint Louis University, presented *A Beginner's Guide to Unmanned Air Vehicles, Aircraft, and Remotely Piloted Aircraft – Applications to Geoscience Field Studies*. He discussed the possible applications of this cutting edge technology to data collection for geology and engineering projects.



Attendees of the St. Louis Section Picnic at Greensfelder Park.

PHOTO BY ANGELA ROARK

## San Francisco Section

*Sarah Kalika, Chair*

This fall, the Section elected a new slate of officers with a mixture of new and familiar faces. **Sarah Kalika** was promoted to Chair; **E. Morley John** joins us as Vice Chair; our Secretary remains **Maggie Parks**; and our Treasurer remains **David Abbott**. We'd like to thank our past Chair, **Tom Barry**, for his years of service to our Section and wish him good luck in his new job at the California Division of Oil, Gas, and Geothermal Resources.

We had a great turnout at the Annual Meeting in Seattle, with 18 people from our section in attendance and 13 presentations by members of our section. Our Field Trip Chair and UC Berkeley Student Chapter President, **Julien Cohen-Waeber**, won the Marliave Scholarship this year. Congrats!

Our September meeting, at Sinbad's Restaurant in San Francisco, featured outgoing Jahns Lecturer **Dr. James McCalpin** who presented **The Mountains are Falling Apart: A Spectrum of Mass Failures from Landslides through Deep-Seated Gravitational Spreading (Sackung), to "Unfolding" of Folds**.

Our November meeting was a joint meeting at Scott's Seafood in Oakland with ASCE's San Francisco Geo-Institute. It featured **Donald Wells** and **Jim French** of AMEC and René Vignos of Forell/Elesser Engineers who presented *Renovation and Seismic Retrofit of California Memorial Stadium (or How to straddle the Hayward Fault with a Historic Structure)* about the recently completed retrofit of the home of the Cal Bears—the stadium at UC Berkeley.

Our December event was a joint Holiday Mixer at Scott's Seafood in Oakland with the Bay Area Chapter of the Groundwater Resources Association and the Northern California

Professional Environmental Marketing Association. It featured refreshments, networking, and a raffle to benefit City Slicker Farms, a non-profit based in West Oakland.

Our January meeting will be held at Peony Restaurant in Oakland and feature a presentation by our Vice Chair, **E. Morley John** of Kleinfelder. She will present *Constructing a Driven Pile Foundation through a Closed Landfill, Underlain by Young Bay Mud and Undulating Franciscan Melange Bedrock*.

As always, check our Section website for the latest news, meeting information, local job postings, and events: [www.aegsf.org](http://www.aegsf.org).



Marliave Scholar Julian Cohen-Waeber (San Francisco Section) with members of the Marliave family at the 2013 Annual Meeting.

## Southern California Section

*David L. Perry, Chair and Darrin Hasham, Secretary*

The Southern California Section held three well-attended dinner meetings this past summer. Our July meeting was held at the Double Tree Club Hotel and Restaurant in Santa Ana. Dr. Miles Kenney, PG, Consultant Geologist, presented *Preliminary and interim Quaternary Structural and Stratigraphic Evaluation of Cheviot Hills/Century City Area Including Beverly Hills High School and Proposed Los Angeles County Metropolitan Transportation Authority Subway Locations, California*. The evaluation was based on data from extensive exploration for the planned LA Metro subway, an education facility along the proposed subway alignment, and geomorphic analyses. The results of the recent election of section officers were announced during the July meeting: **David Perry**, CEG, Senior Engineering Geologist with AMEC will serve another term as Chair; **Shant Minas**, PG, Project Geologist with Applied Earth Sciences went from Treasurer to Vice Chair, our former Secretary, **Edmond Lee**, CEG, Project Geologist with GeoConcepts, Inc will serve as Treasurer, and **Darrin Hasham**, CEG of Kleinfelder, was elected as Secretary.

Our August meeting was held at Victorio's Ristorante in North Hollywood. Ben Turner, PE, formerly of the geotechnical consulting firm Shannon & Wilson and currently a PhD student in geotechnical engineering at UCLA, presented on geologic aspects of two ongoing research projects: *Friction Losses in Tieback Anchors used for Landslide Stabilization, and Deep Foundation Performance in Laterally Spreading Ground*. The

Southern California Section was well represented at the National Meeting in Seattle with ten abstracts presented by our members.

In October we returned to Victorio's Ristorante. We benefited from the recent relocation of our speaker, **Sean Harvey**, CEG, from the Bay Area office of Brierley Associates to Southern California. Sean was a former Chairperson of the Rocky Mountain Section. He presented on tunnel mapping and geologic conditions encountered in the Caldecott Tunnel Fourth Bore. The tunnel was mined using the Sequential Excavation Method (SEM) of tunneling. The SEM involves an observational approach to tunneling in which experienced geologists are utilized to map tunnel advances, evaluate ground behavior and recommend primary and secondary ground support based on actual ground conditions as they are encountered.

Two of our Section members were recently in the Rocky Mountain Front Range area of Colorado to observe damage related to the August 9, 2013, flash flood and the flooding event caused by the sustained September storms. **Dr. Jeffrey Keaton** of AMEC was leader of a small team of scientists evaluating the geotechnical effects of the August 9 flash flood in Manitou Springs (near Colorado Springs) under the banner of the Geotechnical Extreme Event Reconnaissance (GEER) Association. The one-hour storm dropped nearly 1.4 inches of precipitation on slopes that were burned in the Waldo Canyon Fire in June 2012. **Dean Francuch**, of Shannon & Wilson, Inc. was in Boulder providing construction oversight of emergency repair of several Union Pacific Railroad fill embankments. Dean presented on a geotechnical investigation on the recently active and destructive White Points Landslide, San Pedro at our November meeting.



Damage to old U.S. Highway 24 west of Manitou Springs caused by flash flooding from a storm on August 9, 2013, falling on slopes burned by the 2012 Waldo Canyon Fire

PHOTO BY JEFF KEATON

## Inland Empire Chapter

*Douglass Johnston, Chair*

The third quarter for the Inland Empire Chapter was somewhat on the quiet side as we only offered one official event during the month of July. We allowed our officers and members to take a "vacation" during the month of August to let everyone enjoy the last of summer break before kids get back to school. During the month of July we also secured a new board of officers who will officially take the reins at our October 2013 yearly kick-off meeting. Our chapter sent a few southern California members to AEG's annual conference in Seattle during the week of September 15, hence the lack of an official monthly meeting.

Our July event was an evening diner meeting held at the Temecula public library in southern Riverside County. The technical presentation was provided by Dr. Keith Meldhal, professor at Mira Costa College in Oceanside, California. Dr. Meldahl's presentation was based on his second book entitled *Rough-Hewn Land: A Geologic Journey from California to the Rocky Mountains*. His work has focused on the western portion of the continental U.S. and how the subduction of the Pacific Plate below the North American Plate and the evolution into a transform plate boundary has created the spectacular landscape of the western U.S. Dr. Meldhal is a very entertaining and inspiring speaker. This was a very well received talk and follow up discussion by a smaller group of AEG members. It seems that summer vacationing was already in full effect!

After holding elections during the month of July our chapter is would like to recognize and announce our 2013/2014 board of officers. Chair **Dave Gaddie** is a seasoned certified engineering geologist (CEG) with over 30 years of experience working throughout southern California. He is currently working as a part time consultant. This is his first time as serving as the Chapter Chair. Dave has been involved with our AEG chapter since its inception in 2005 and has been serving as the chapter's treasurer for the past four years.

Vice Chair **Jeff Fitzsimons** is a CA certified professional geologist (PG) who is working towards his CEG license. He currently works for the consulting firm John R. Byerley, Inc. in Bloomington, San Bernardino County CA. This is Jeff's first full-time appointment to the board; however he provided our Chapter with part-time efforts towards this past year as we were working with only a partial board of officers. Treasurer **Mark Doerschlag** is also a seasoned CEG working for the consulting firm Aragon Geotechnical, Inc. in Riverside, CA. This is Mark's first time being appointed to our board of officers. Secretary **Shaun Wilkins** works as a project level geologist for the consulting firm Petra Geotechnical, Inc., in Costa Mesa, Orange County, CA. Shaun is currently getting ready for his PG exams during 2014. This is also Shaun's first appointment to our board.

With three more fantastic presenters already lined up, we expect that the fourth quarter of 2013 to be a really great end to the remarkable AEG year that our chapter has enjoyed. The overall attendance and enthusiasm we have seen from our local geological community over this past year promises to carry over well into 2014.

# Texas Section

*Christina Dance, Secretary; Eric Walston, Chair; and Marie Garsjo*

## AEG Texas Section 2013 Fall Meeting: Geology and Operations of the Sabine Mine with Site Visit

The AEG Texas Section Fall Meeting, October 12, in Hallsville, TX, included lectures and a coalmine tour. The trip into the mine began at The North American Coal Corporation Sabine Mine's business office, covering a small footprint on their land holdings of over 60,000 acres. We had three extremely informative presenters all holding various positions at the Sabine Mine: Andy Hawbaker, Jon Laverty, and Eric Anderson. Hawbaker, an engineer, focused on the operations of mining coal and the machinery they use. Members were allowed to go on site with the dragline and down into the pit to examine the stratigraphy, gather samples, and ask questions about the early Eocene coal seams. Laverty, an engineer, discussed the regional geology, stressing the difficulty of mining a sand unit, the Carrizo Sand, as well as a major local structural feature due to the Sabine Uplift. He also spoke about the importance of computer modeling and its use with interpreting drilling results and mine planning processes. Anderson, the environmental manager, focused on environmental regulations of surface mining.

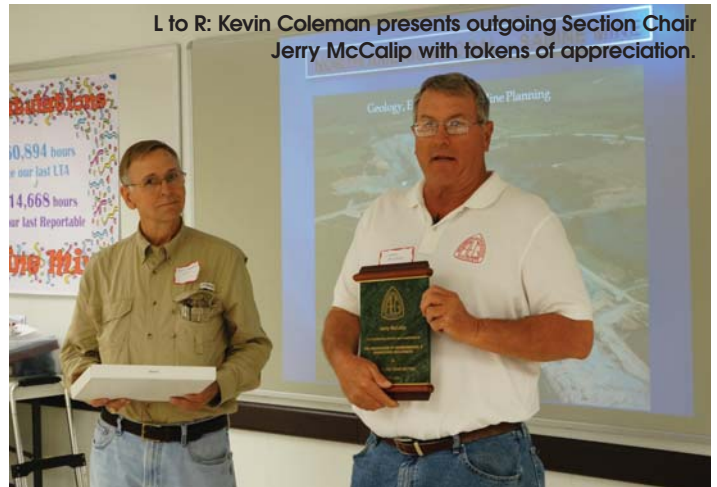
The meeting was a great success with lots of positive feedback from attendees, made up of 31 professional members, and 14 student members who traveled from three different Texas universities and regions. All of the attending student members were generously sponsored by our professional membership.

Lastly, we ended our business meeting with a show of appreciation for our outgoing Chair, **Jerry McCalip**, for all of the time and commitment he gave to the Texas Section, especially during the last two years.

We are looking forward to an equally successful Winter 2014 Meeting in Houston on January 18!



Texas Section Student Members from UTSA, SFA, & UTA



L to R: Kevin Coleman presents outgoing Section Chair Jerry McCalip with tokens of appreciation.



Texas Section Members at the Sabine Mine

# Washington Section

*Sabine Datum, Editor*

Not only was September 2013 the 50th birthday of the Washington Section, but also the site for AEG's Annual Meeting, September 8–15. The meeting featured many of our Section members leading field trips, teaching short courses, and presenting in technical sessions. The Keynote technical speaker was Dr. Brian Atwater, USGS and University of Washington (UW), who spoke on Geologic Estimates of Subduction Earthquake Size. Thank you to everyone who participated, to our generous sponsors, and also to the many volunteers who made the meeting a great success!

A short course on *Design and Construction of Steel Sheet Piling Structures* put together by ASCE and held on November 7, 2013. Richard Hartman, PhD, PE, a leading international expert in the design and construction of steel sheet pile structures presented. The course was covered topics ranging from design concepts, to practical field problems, through recent product advancements in the design and manufacturing of steel sheet piling. Course attendees were eligible to receive 0.7 Continuing Education Units (CEU) or 7 Professional Development Hours (PDH).

A new study suggests the next big quake on the Seattle fault may cause devastating damage from landslides, greater than previously thought and beyond the areas currently defined as prone to landslides. Published online on October 21, 2013, in the *Bulletin of the Seismological Society of America* (BSSA), the

research offers a framework for simulating hundreds of earthquake scenarios for the Seattle area. The authors of the study are **Kate Allstadt**, PhD candidate at UW, John Vidale of UW, and **Art Frankel** of the USGS. The study was funded by the USGS and is available online at [www.bssaonline.org/content/early/2013/10/15/0120130051.abstract](http://www.bssaonline.org/content/early/2013/10/15/0120130051.abstract). It will be published in the December print edition of BSSA, the peer-reviewed journal of the Seismological Society of America.

## Section Meetings

A joint meeting of AEG and ASCE was held in Seattle and featured **Boris Caro Vargas**, General Manager of Soldata, and **Justin McCain** with Seattle Tunnel Partners, who spoke on *How to Monitor the Impact of the Largest TBM Project Ever Built – Overview of the Alaskan Way Tunnel Monitoring Program*. Soldata graciously offered to host the bar for this event and all drinks were free.

The October meeting was held in Seattle and featured **Michael King**, LG, LEG, with the Hydrodynamics Groups. Michael spoke on Compressed Air Energy Storage at the Norton Mine, Norton, Ohio, and included a photo tour of the underground mine. For more details about this and other past meetings please visit our section's webpage archive at [www.aegwashington.org/archive.php](http://www.aegwashington.org/archive.php).

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