The 35th Annual Meeting of the Geothermal Resources Council (GRC) was a great success. Representatives from 32 countries around the world attended Field Trips, Workshops, Technical Sessions, and enjoyed networking and visiting exhibitors at the GEA Trade Show.

As a climax to the celebrations, distinguished colleagues in the geothermal community from around the world were honored at the GRC Annual Membership Meeting and Awards Luncheon.

Estela Smith Receives Special Award

First, Richard Campbell, president of the GRC, presented a special award to Estela Smith, the GRC Office Manager and organizer of the GRC Annual Meetings. As he handed her an engraved clock, he said, “Estela is such a treasure to the geothermal community and to the Geothermal Resources Council. She is hardworking, friendly, efficient, and just a really special person.

Estela replied “It has been an honor to be here at the GRC Annual Meeting for almost 20 years, and working at the GRC headquarters for about 31 years. It’s because of you that I am here. You all make it a pleasure to work at the GRC.”

The Joseph W. Aidlin Award recognizes outstanding contributions to the Geothermal Resources Council and to the development of geothermal resources.

2011 Recipient, Paul Brophy

Louis Capuano, Jr., a past President of the GRC presented the award to Paul Brophy.

“I can’t tell you how honored I am to be able to present the Joe Aidlin Award this year to my good friend Paul Brophy. He arrived in the United States in about 1980. He started with California Energy and did a lot of field geology work in The Geysers, the Cascades, and the Coso hot spring area. Paul was very instrumental in trying to get that first well in the Coso area but after all of the success he had, he decided to start EGS which stands for Environmental Geologic Survey rather than Enhanced Geothermal Systems, but he is kind of enhanced, you know,” Capuano added.

“My friend Paul and I have had a wonderful relationship over the years. I started on the GRC Board of Directors in the early 1990s and Paul joined in 1995. We have served together on many, many committees and have shared the podium at many workshops. Paul has served on the GRC Board of Directors continuously since 1995, serving as the President in 2007 and 2008. He has also served two terms on the International Geothermal Association (IGA) Board, serving as the Financial Chair. He presently serves on the Executive Board of the California Geothermal Energy Collaborative. He has also served on the Board of Directors of The Geysers Geothermal Association and has performed the duties of Membership Chairman. He is also, along with Marcelo Lippmann, the primary editor of the GRC special report The Geysers Geothermal Field, Update 1990-2010.

Estela Smith receives a gift of appreciation from Richard Campbell, president of the GRC.
Awards Luncheon

“The Joseph W. Aidlin Award is presented each year to the person we believe made the most outstanding contribution to GRC and the geothermal industry and I think that Paul is very deserving of this. He has always been an outstanding contributor to the GRC.”

Paul replied, “When I was a young student studying geology, back in the Jurassic as my son would say, I always wondered why people have just one career. It seemed to me that it would be a good idea to maybe have two careers. Well, of course the opportunity came in the early and mid-1990s, when our domestic industry was very slow. There wasn’t much happening and I thought about doing something else, something I could get as much enjoyment and satisfaction as I got out of working in the geothermal industry,” said Brophy.

“I did look around and I found nothing. I found that I enjoyed being in geothermal so much that it didn’t make a lot of sense to change, so I didn’t. It wasn’t because of the satisfaction one gets from doing geology, from solving geothermal problems, from the technical side of things. I realized that the reason why I didn’t make a change was because of the people in the industry. I just didn’t like the idea of not working with them.

“I thank the Geothermal Resources Council for this wonderful award. Thank you to everyone out there. Thank you for all the people whose paths have crossed mine in the last 25 years, 30 years, in this industry because when all is said and done, it’s the people in your life that really matter more than anything else.”

The Geothermal Pioneer Award is given for outstanding achievements in the development of geothermal resources. It recognizes the pioneering efforts of members of the geothermal community who have made lasting contributions to the industry, worldwide.

2011 Recipient, Trevor M. Hunt

Annual Meeting Chairman Sabodh Garg presented the award to Trevor Hunt. He said, “Trevor joined the Geophysics Division of the Department of Scientific & Industrial Research, New Zealand in 1966. Although he officially retired in 2002, he has continued his scientific work as an emeritus scientist with GNS Science.

“Geothermal systems are open systems, and it is important to characterize fluid and energy inflows and outflows, especially under exploitation. Starting in 1967, Trevor pioneered the use of repeat gravity surveys to monitor mass balance for the Wairakei Geothermal Field. His first paper on the subject was published in 1970. The technique has since been applied to numerous geothermal fields in New Zealand, Japan, the USA, the Philippines, and elsewhere.”

“Between 1994 and 2009, Trevor edited four special issues of Geothermics on geothermal systems in New Zealand. I had the great pleasure to work with him on a special 2009 Geothermics issue commemorating 50 years of power production at Wairakei.”

“Dr. Hunt has been a leader in international efforts to study environmental effects of geothermal development. In 2000, he was a lecturer on environmental issues at the United Nations University’s Geothermal Training Program in Reykjavik, Iceland. Trevor was a founding member of the International Energy Agency’s Geothermal Implementing Agreement, and was one of the leaders for the task called Discharge and Reinjection Problems.

“Trevor has also been very active in the International Geothermal Association. He was a member of the IGA Board of Directors from 1993 to 2001. He served as chairman of the IGA’s Technical Program Committee for the year 2000 and as chairman of the Publication & Information Committee for the 2005 World Geothermal Congress.”

Dr. Greg Bignall, a colleague at the Wairakei...
Awards Luncheon

Research Center in New Zealand, accepted the award for Dr. Hunt and passed on a message of thanks from him.

“I wish to thank the Geothermal Resources Council for this eminent and prestigious award. It is a very great honor and a privilege to be given such an award by a respected organization and especially one in another country. In science, only rarely is anything achieved solely by an individual and I wish to record my thanks to those people who have helped me develop the microgravity monitoring technique. Thank you and best wishes for the future of the geothermal industry.”

The Henry J. Ramey, Jr. Geothermal Reservoir Engineering Award recognizes outstanding achievements in the field of geothermal reservoir engineering.

2011 Recipient, Michael J. O’Sullivan

Dr. Roland Horne, Director of the Stanford Geothermal Program, made the presentation. He said “Mike O’Sullivan was my Ph.D. supervisor at the University of Auckland. He recovered from that experience to lead the research of more than 50 research students, many of whom ended up in leadership positions in this industry.

“He is famous to all of you because of his work in reservoir simulation, but it’s important to note that he’s done a great many other things in addition to that. His research career could perhaps be described in terms of mathematical modeling and he’s worked in estuary modeling and river flow modeling. Mike was one of New Zealand’s first environmentalists before it was, in fact, fashionable to be such a thing. He was also instrumental in the rebirth of the Geothermal Institute at the University of Auckland.

“In addition to having had the good fortune of working with Mike myself, I also had the good fortune to work with Hank Ramey, for whom this award is named, and one of the things that characterized Hank Ramey was not only his expertise in geothermal reservoir engineering and reservoir engineering in general, but his personal generosity and his interest in helping other people, and I believe Mike O’Sullivan has that same quality.”

Michael J. O’Sullivan, in thanking Dr. Horne noted that “Roland was my third ever Ph.D. student but possibly the best ever and I’ve maintained a friendship with him ever since. It’s very nice to have you presenting the award to me today. I’m particularly pleased to receive this award because I always held Hank Ramey in very high regard. He was a very fine reservoir engineer but also a wonderful human being and I’m deeply honored to receive an award in his name,” he concluded.

The Ben Holt Geothermal Power Plant Award honors outstanding achievement in the field of geothermal power plant design and construction.

2011 Recipient, Nobuhiko Hara

President of the Geothermal Resources Council, Richard Campbell, introduced Nobuhiko Hara. “Hara-san certainly is deserving of this honor. Ben Holt would be smiling down and pleased with the selection of such an honorable man to receive it.

“Hara-san was a senior principal engineering
Greg has worked on supercritical expansion in turbines, technology that is used in some binary-power plants today.

“Greg led work relating to the real-time measurement of gas in cooling towers at The Geysers, separating non-condensable gases with membrane technology and binary-heat exchangers. He has worked on biofilm scaling of geothermal plants. Greg, congratulations on receiving this well deserved award in appreciation of your work and I truly enjoyed working with you for 20 plus years,” said Mr. Renner.

Greg Mines replied, “Thank you. Thanks to the GRC. This was totally, totally unexpected. I never in my wildest dreams ever felt something like this would occur, but I am truly appreciative. Thank you very much.”
after most of the more promising territory had already been divvied up by the earlier arrivals. So after a few dry holes in Idaho, in the far fringes of The Geysers, the touchy-feely guys of Phillips nicknamed him Dry Hole Beale. However in Joe’s defense, he did quantitatively predict, prior to spotting some of these wells, how short of commercial they were likely to be.

“When Phillips exited the geothermal industry in 1985, Joe moved to Santa Rosa and became part of Freeport-McMoRan, ultimately to be the Calpine concession. His arrival happened to coincide almost to the month with the start of production declines in the southeastern part of The Geysers. It didn’t take very long after that for a true panic to sweep through The Geysers as the entire field started to plummet in production and former competitors all of a sudden saw some of the benefits of collaboration. Joe got a call from a guy named Wilson Goddard, who was working for the City of Clear Lake. They had a problem and they had a bunch of wastewater they had to get rid of. He called up Joe and asked if maybe he could pump some treated wastewater down some of Joe’s dry holes out there near Clear Lake. Joe said, ‘No, I’ve got a better idea here,’ and this one incident probably best defines the beginning of the Southeast Geysers Pipeline Project. It took a very large cast of individuals, companies, and government entities to see this pipeline project through and completed. It was followed by a second, even larger project but it’s pretty clear now that without these two projects, The Geysers would be producing on the order of half the 800 megawatts that it’s producing right now.

“Joe’s work on large-volume injection at The Geysers and the methods for determining its success provided much of the theoretical basis for large-volume injection projects.”

Joe Beall thanked his colleagues for their contributions to his career. “Throughout my tenure at The Geysers, I’ve had the great good fortune of being allowed a very long leash to more or less set my own agenda and seldom had to deviate from it. Because of that, working for various colleagues has been pretty much a pure pleasure. So to the GRC and to all the folks mentioned and to a whole lot more that I should have mentioned and didn’t, thank you.”

*The Special Achievement Award recognizes special or outstanding achievements in any aspect of geothermal energy development and related areas.*

**2011 Recipient, Jefferson W. Tester**

Dr. Brian Anderson, once a graduate student of Dr. Tester, praised his mentor. “It’s my absolute pleasure to introduce Jeff and to present him with this award. Jeff’s unbridled enthusiasm is infectious and it pervades not just the geothermal industry, but other energy industries as well in his passion for renewable, sustainable, and alternative energy sources. There really is no better champion for the geothermal industry than Jeff.

“Jeff has spent many years between MIT and Cornell University. He’s published extensively in the geothermal community as well as other energy industries, with over 200 publications and a number of books, including of course the influential publication, *The Future of Geothermal Energy*, for which he was the Chairman,” concluded Anderson.

Dr. David Blackwell said *The Future of Geothermal Energy* was well-received all over the world, and we should strive to implement its suggestions for the industry.

Dr. Tester said he had learned so much from so many dedicated scientists and engineers and several generations of enlightened and talented students. He talked about his own vision for the future of the geothermal industry.

“...there’s no better champion for the geothermal industry than Jeff.

Dr. Tester said he had learned so much from so many dedicated scientists and engineers and several generations of enlightened and talented students. He talked about his own vision for the future of the geothermal industry.

“I think we need to push towards a future that views geothermal energy as not just something, and this is the general public’s view now, that is an isolated resource, that is only found in a few places around the world where nature has been...
very kind to us.

“We need to think of geothermal in a much broader context, how it might be deployed at a larger scale. I believe in the idea of a continuum. We have a resource that has very high-grade hydrothermal systems we should be exploiting. There also is a multitude of variable grades, if you will, going down to low-grade EGS that needs to be developed as well, particularly if we’re going to have the kind of impact that we should. This means electricity as well as thermal use and for applications where we might not have to drill to high temperatures.

“That makes a lot of sense. We spend an enormous amount of our fossil resources right now providing thermal energy at essentially the boiling point of water, or less. So I think that although I’m among friends and people who deeply believe in geothermal, I think we have to go outside of this context. I think the community has to be more aggressive in the public domain and we have to continue to encourage the younger people.”

[For more photos of the Awards Luncheon, go to http://bit.ly/xnVW80]
The Geothermal Resources Council (GRC) announced honors for outstanding presentations, posters, and photography during the 2011 GRC Annual Meeting in San Diego. Congratulations to all the honorees.

**Outstanding Technical Session Presentations** (awarded by Session Chair)

[All of the Outstanding Technical Session Presentations can be seen at http://bit.ly/zhmuIF]


**Case Studies** – *Trials and Tribulation of the Oregon Institute of Technology Small-Scale Power Plant*, Boyd, Tonya (Toni) & Lund, John W.


**Drilling 3** – Information unavailable at press time.

**Drilling 4** – *System Design Alternatives and Their Influence on Geothermal Heat Recovery From Co-Produced Oil & Gas Wells*, Suryanarayana, P.V. & Sachdeva, Parveen & Ceyhan, Ismail & Ring, Gary.


**EGS 2** – Information unavailable at press time.

**EGS 3** – *Susceptibility of Granite Rock to scCO2/ Water at 200 °C and 250 °C*, Sugama, Toshifumi & Gill, Simerjeet & Ecker, Lynne & Butcher, Thomas & Bour, Daniel.


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“If you drill, you will hit a fracture. This is a very predictable idea and one totally unsustained by experience.”

– Peter Leary, Institute of Earth Science and Engineering, New Zealand, at his presentation on Wednesday morning.
Technical Sessions

EGS 7 – Reflection Imaging of EGS Reservoirs at Soulz et and Basel Using Microseismic Multiplets as a Source, Asanuma, Hiroshi & Tamakawa, Keita & Niitsuma, Hiroaki, Baria, Roy & Har ing, Makus.

EGS 8 – Optimized EGS Reservoir Stimulation Using Microseismic and Numerical Methods, Zhao, Xueping & Reyes-Montes, Juan Miguel & Andrews, Jennifer R. & Young, R. Paul.


Geochemistry 1 – Integrating Multicomponent Chemical Geothermometry with Parameter Estimation Computations for Geothermal Exploration, Spycher, N. & Sonnenthal, E. & Kennedy, B.M.

Geochemistry 2 – High Noncondensible Gas Liquid Dominated Geothermal Reservoir Kizildere, Turkey, Haizlip, Jill & Tut, Fusun.

Geology/Exploration 1 – Geothermal Potential of Transtensional Plate Boundaries, Bennett, Scott.

Geology/Exploration 2 – Project Hotspot: Insight Into the Subsurface Stratigraphy and Geothermal Potential of the Snake River Plain, Potter, Katherine E. & Bradshaw, Richard & Sant, Christopher J. & King, Jesse & Shervais, John W. & Christiansen, Eric J.


Geology/Exploration 6 – Geological, Geochemical, Geophysical and First Drilling Data From Tinguiririca Geothermal Area, Central Chile, Clavero, Jorge & Pineda, German & Mayorga, Catalina & Giavelli, Aido & Aguirre, Igor, Simmons, Stuart & Martini, Sebastian & Soffia, Jose & Arriaza,Raquel & Polanco, Edmundo & Achurra, Luciano.


Geology/Exploration 8 – Interpretation of 3D Magnetotelluric (MT) Surveys; Basement Conductors of the Menders Massif, Western Turkey, Kuyumcu, Ozgur Caglan & Destegul Solaroglu, Umut & Hallinan, Stephen & Turkoglu, Ersan & Soyer, William.


Geology/Exploration 10 – Natural Subsidence at the Rotokawa Geothermal Field and Implications for Permeability Development, Powell, Tom.


Geology/Exploration 12 – Correcting Bottom Hole Temperatures: A Look at the Permian Basin (Texas), Williston Basin (North Dakota), Anadarko and Arkoma Basins (Oklahoma), Crowell, Anna M.


Technical Sessions

Operations & Maintenance 1 – A Large Scale Steam Explosion at the Well Site of the Onikobe Geothermal Power Station, Akasaka, Chitoshi & Shimizu, Isao & Nakanishi, Shigetaka & Tezuka, Shigeo.

Operations & Maintenance 2 – Level Measurement Challenges in Geothermal Power Plants and Improved Solutions, Carroll, Patrick & Ershen, Cathy & Cushman, Tim.

Power Plant 1 – Air Cooling Options for Flash Plants, Louw, Roubax & Wallace, Kevin & Harvey, William.


Reservoir Engineering 1 – Pressure Transient Analysis of Fracture Zone Permeability at Soultz-sous-Forets, McClure, Mark & Horne, Roland.


Reservoir Engineering 3 – Correlating Reservoir Pressure Changes with Production and Injection in the Tiwi Geothermal Field, Republic of the Philippines, Menzies, Anthony J.


The Geothermal Resources Council invites you to present your latest technical work in geothermal research, exploration, development, and utilization at GRC’s 36th Annual Meeting September 3-October 3, 2012 at the Peppermill Resort in Reno, Nevada, USA. Our theme this year is “Geothermal: Reliable, Renewable, Global.”

More information is at geothermal.org/meet.html.

Anyone who wants to present a paper at the GRC Annual Meeting must submit a paper!

Please note: The GRC is no longer requiring an abstract to be submitted first. We are requiring completed draft papers as the first step. The Draft Paper submission deadline is May 4, 2012.
2011 Poster Session Winners

[To view additional photos from the event, go to http://bit.ly/zQA4eI]

Best Poster of the Year – Winner


Student Poster – Winner


Student Poster – Honorable Mention


The team from the Colorado School of Mines standing in front of their poster. (Left to right) Mitchell Bennett, Banks Beasley, Joyce Hoopes, Laura Garchar, Elisabeth Easley, and Rachel Woolf.
Tony Bennett, Operations Manager for EGS Energy Limited, served as master of ceremonies for a luncheon showcasing five geothermal companies in the United Kingdom. Representatives from each company described geothermal projects they have undertaken. The companies are Altcom, EGS Energy Ltd., Calidus Engineering, Fugro Seacore, and TigerX Studio. Their booth received the Large Booth: Best in Show Award from the Geothermal Energy Association. PHOTO BY J. HODGSON.
Photo Contest

Photo Contest Winners

In total, 58 photos were entered in the 32nd Annual Geothermal Amateur Photography Contest where they were judged for impact, relevance, composition, and technical quality.

In appreciation of their achievements, GRC awarded cash prizes to photo contest winners. GRC appreciates the creativity and quality of all contest submissions and looks forward to next year’s photo contest to be announced and showcased at the GRC Annual Meeting at the Peppermill in Reno, September 30 - October 3, 2012.

1st Place – Jim Stimac, *Pipe dreams (sunset)*.
Honorable Mention – Joe LaFleur, *Springtime at Surprise Valley Hot Spring*, located six miles east of Cedarville, in northeastern California.
Honorable Mention – Jim Stimac, *Drilling in the Southern Winter*, Tolhuaca volcano, Chile.

[To view all the entries go to http://bit.ly/zrcPKg]
Two interesting field trips bookended the 2011 GRC Annual Meeting held in San Diego. The pre-meeting trip featured a visit to the Imperial Valley, one of the most productive geothermal areas in the world. Highlighted were the geology and geothermal resources of the Salton Trough, including the Salton Sea Geothermal Field. In the evening, we dined in the desert at Camachos, a small, well known Mexican restaurant south of El Centro—visited two nights earlier by England's
Field Trips

Prince Harry, in town for Naval flight training. The field trip was led by Billy Thomas and Stuart Johnson.

The post-meeting field trip was a visit to **Coso Geothermal Field**, located to the northeast near China Lake, California. Coso is one of the largest US geothermal fields, producing electricity entirely inside the bounds of a Naval Research and Development Test and Evaluation Range. Geothermal production at Coso began in 1987. Discussed during the visit were the geology, exploration history, resource discovery and development, and geological, geophysical, and engineering techniques. The field trip was led by Andy Sabin.

“We were privileged to get access to this significant geothermal facility,” Malcolm Ward said. He is standing to the left and slightly behind leader Andy Sabin—at center back wearing sunglasses and a cap. “We saw not only fascinating and unique geology, but several generating facilities dotted amongst basalt flows and rhyolitic domes.”