

## WELCOME . . .

... to the tenth issue of "The Gregg Geo News". The Geo News is being published to provide current information on the services we offer, equipment & technologies we utilize and project experience.

The Geo News is distributed in electronic form which is emailed directly to you. If you wish to become a subscriber and are not currently on our mailing list simply visit our web site and register to receive email updates. You can also access this newsletter as well as previous issues of the Geo News through our web site in the [newsletter archives](#).

## 2011 CONFERENCE SCHEDULE

Gregg Drilling & Testing, Inc. is scheduled to participate in the following events in 2011. Make sure to visit Gregg's exhibit at these upcoming conferences.



March 23 - 25, 2011  
Las Vegas, Nevada

The 43rd Symposium on Engineering Geology and Geotechnical Engineering (EGGE) is an annual event designed to convene professionals to showcase innovative work in the fields of engineering geology and geotechnical engineering. For more information, please visit: <http://eggesymposium.com>

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## EMAIL SIGN-UP



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## 2011 CPT SHORT COURSES SCHEDULED



Geotechnical CPT short courses will be presented in both Northern and Southern California in April 2011. Cone penetration testing applications will be illustrated through discussions covering various case histories and worked examples of geotechnical investigations. Dr. Peter Robertson will be the instructor for these short courses.

### COURSE SCHEDULE/LOCATIONS:

FRIDAY - APRIL 8, 2011

Hyatt Regency  
HUNTINGTON BEACH, CALIFORNIA

WEDNESDAY - APRIL 13, 2011

Claremont Hotel  
BERKELEY, CALIFORNIA

### COURSE TUITION:

Early Registration:

\$195.00 per course  
(before March 18th)

Late Registration:

\$270.00 per course  
(after March 18th)

**ON-LINE REGISTRATION IS AVAILABLE - REGISTER EARLY & SAVE!**

For complete course details or to register on-line visit: [www.greggdrilling.com/seminars.html](http://www.greggdrilling.com/seminars.html)

## ROBERTSON'S REMARKS

### - How accurate is the CPT? -

Occasionally I am asked "How accurate is the CPT?" In short – generally it's more accurate than most other in-situ and laboratory tests for a wide range of soils. What do I mean by that? The other primary in-situ test for soils is the SPT, which (as we know) is not very accurate. There are many variables that influence the SPT (e.g. borehole disturbance, variable hammer/anvil energy, non-standard sampler, loose rod connections). For example, you may measure an SPT N value of 12, but if the energy ratio of the hammer/anvil system was 80%, the corrected  $N_{60}$  is 16. However, if the test were at shallow depth (< 10 feet) with an old hammer, the energy ratio could be as low as 20% resulting in a corrected  $N_{60}$  of 4. Hence, you measured 12, but you are not sure if the correct  $N_{60}$  is either 4 or 16! In soft clay the SPT has zero accuracy when you measure  $N = 0$ . *(Continued on following page)*



Dr. P.K. Robertson



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**April 11 - 25, 2011 - San Diego, California**

The United States Society on Dams (USSD) 2011 Annual Meeting and Conference provides the technical committees with the opportunity to examine relevant ideas to modern design and classical methods of analysis for concrete and embankment dams and levees. For more information, please visit: <http://ussdams.org>



**April 14 - 16, 2011 - Berkeley, California**

Cal-Geo Annual Conference - Gregg is excited to participate in this year's Cal-Geo Annual meeting. For more information, please visit: <http://www.cgea.org>



**April 20, 2011 - Long Beach, California**

ASCE Los Angeles Chapter Queen Mary Expo - Join Gregg Drilling on the Queen Mary for this one-day event for Geotechnical Engineers in Southern California.



**June 19 - 22, 2011 - San Francisco, California**

2011 RETC Rapid Excavation & Tunneling Conference & Exhibit  
Please visit the conference website for more information at: <http://www.retc.org>



**September 19 - 24, 2011 - Anchorage, AK**

The Association of Environmental & Engineering Geologists 54th Annual Meeting  
Please visit the conference website for more information at: <http://www.aegweb.org>

**Robertson's Remarks continued...**

The main advantage of the modern electronic CPT is that the test is operator independent. In essence, different testing companies can test the same ground and should measure the same CPT tip resistance ( $q_c$ ) profile to within the tolerances set by the electronic transducers, about  $\pm 0.1\%$  of the full-scale output (FSO) using available commercial equipment (e.g. ASTM Standard D5778). Most commercial cones have a maximum capacity or full-scale output (FSO) of about 1,000 tsf for the tip resistance ( $q_c$ ). These cones are designed to survive pushing through very hard ground (including soft rock). Hence, they have an accuracy of  $\pm 1$  tsf for  $q_c$ . In most soils, this is an excellent level of accuracy that is often better than  $\pm 1\%$  of the measured values, especially in sands where  $q_c > 100$  tsf. Research has shown that even university research laboratories cannot achieve this level of repeatability in simple triaxial compression testing of reconstituted samples.

When testing soft, fine-grained soils the accuracy will decrease as the measured CPT  $q_c$  decreases. To improve the accuracy of the CPT in soft soils, it is recommended to use lower capacity cones (i.e. cones with lower FSO). In soft, normally consolidated clay (such as Young Bay Mud soils near San Francisco), the measured  $q_c$  can be less than 5 tsf at shallow depth. In these very soft soils, a cone with a lower FSO (i.e.  $< 500$  tsf for  $q_c$ ) is required to obtain an accuracy of better than  $\pm 10\%$ . Caution is required when using lower capacity cones, since they can be overloaded if a hard/stiff soil layer is encountered. What is recommended at sites where the soils are soft and a high level of accuracy is required is to first push a standard high capacity cone to determine soil stratigraphy and to ensure that no hard layers exist over the depth of interest, then perform a small number of CPT's using a lower capacity cone to more accurately determine the shear strength of the soft soils.

Experience, has shown that the CPT friction sleeve resistance ( $f_s$ ) is less repeatable ( $\pm 0.5\%$  of FSO) than tip resistance ( $q_c$ ), due to differences in cone design and tolerances. Fortunately,  $f_s$  is not used to estimate many soil parameters other than soil behavior type (SBT) and the remolded undrained shear strength in fine-grained soils. Robertson (2009) discussed how to improve the accuracy of  $f_s$  measurements and that variations in  $f_s$  generally have a small influence on the estimated SBT for most soils.

Hence, the answer to the question, "How accurate is the CPT?" is that generally it's more accurate than most other in-situ and laboratory tests for a wide range of soils, but the user should be aware of the capacity of the cone relative to the strength of the soil tested. In general, the tip resistance accuracy is  $\pm 0.1\%$  of the cone capacity (FSO).