GeoWatch

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News – GeoSIG Expanding

We are glad to announce the further expansion of the GeoSIG world-wide network of partners to South Africa (TiltTech CC), Honduras (Agromet) and Bangladesh (Paragon Techno Services Ltd.) which will allow for GeoSIG to provide directly high-quality services, advice and assistance through our local partners in these countries.

Japan Disaster

The recent tragic disaster in Japan is a painful reminder that although the timing and magnitude of a disastrous earthquake may be predicted with a certain probability, their direct and secondary effects present unforeseen and serious risks. This catastrophic calamity is making all Nuclear Power Plant (NPP) owners to question every aspect of their safety procedures as well as optimising them further to levels beyond the existing stringent rules and regulations.

The average share of NPPs in the overall electricity production in countries having NPPs is approximately 20% and in some cases covering more than 75% of some of those countries' overall energy needs [1]. Such important energy production assets require also lucid and up to date maintenance and operation procedures as well as highly reliable safety mechanisms.

It is estimated that, worldwide, 20% of nuclear reactors are operating in areas of significant seismic activity [2]. Many more are being built or planned to be built in highly active seismic zones.

The 11th March 2011 Honshu Earthquake has demonstrated the importance of the safe emergency shutdown of an NPP in case of detecting a potentially damaging ground motion. Although some ancillary facilities for an emergency shutdown such as power generators or reactor cooling system had failed due to secondary effects of the earthquake, the seismic instrumentation proved to be working satisfactorily to detect the respective ground motion and initiate a safe shutdown.

The basic purpose of the seismic instrumentation in an NPP is to provide the relevant information (recorded data, alerts for Operating Basis Earthquake "OBE" and Safe Shutdown Earthquake "SSE", event reporting) so that the seismic response of the safety-significant plant features can be evaluated promptly after an earthquake. With the proven modern technology the instrumentation should offer additional benefits to the operators such as background noise supervision and seismic signal checks as well as full testing and event simulation facilities. Depending on the topology of the system valuable information about response differences between installation sites and even the behaviour and state of health of the structural components can be determined. All of these functionalities contribute in to the improved sustainability of these critical assets.

Seismic instrumentation of some of the active NPPs may well be as old as the plants themselves. In the meantime there have been many improvements in the underlying mechanical, electronic and computer technology, the understanding of the seismic risk, the evaluation methods of ground motion, the communication and data transfer methods, the data analysis and interpretation algorithms. Over all these years majority of these improvements have already been tested and verified to yield more reliable results when compared to older components and methods. Therefore utilizing all of these new components and methods a significant improvement in terms of accuracy and reliability with fully automatic operation can be achieved in the seismic monitoring systems in NPPs.

It goes without saying that modern and up-to-date seismic monitoring instruments will help in bolstering the first line of defence against earthquakes. GeoSIG over the years have successfully implemented state of the art turn-key systems in more than 65 NPPs in Europe, the USA and Asia. We can draw from our experience over the last 15 years to help with:

- Review of existing Seismic Monitoring Instruments
- Consultation on updating/upgrading/replacing existing equipment
- Design, manufacturing and deployment of new systems

We know that the old saying according to a Japanese proverb "shikate ga nai" (there is nothing that can be done) when facing natural disasters is not an option and we know for a fact that the Japanese have achieved huge advances in preparing for such disasters.

In conclusion it is all about learning from such unfortunate disasters by revisiting the existing systems or reviewing the design of new ones to make sure they measure favourably against the latest technology, practices and experiences.

[1] World Nuclear Association, http://www.world-nuclear.org/info/nshare.html
[2] World Nuclear Association, http://www.world-nuclear.org/info/inf18.html

Upcoming Conferences

GeoSIG will participate as an exhibitor in several major conferences of international importance for the industry this year. The next two events are already knocking on our door. Visit our booth at the 79th ICOLD Annual Meeting in Lucerne, Switzerland from May 30th to June 1st as well as at the EURODYN2011 8th International Conference on Structural Dynamics in Leuven Belgium.

Press Releases – From both sides of the US-MX border: GMS NetQuakes Applications

Several media have turned the spotlight to what continues to be a project of major importance and prestige for GeoSIG: The NetQuakes project of the United States Geological Survey (USGS), for which GeoSIG developed and supplies the instruments.

The Radio Station KPCC from Southern California in cooperation with the National Public Radio network has broadcast a programme with the title "Volunteers moved to help in earthquake study". For NPR News, KPCC reporter Alex Cohen interviews Geophysicist Douglas D. Given from the USGS, who outlines the functioning of this seismic system, and visits homeowner Chuck McDaniels in Arcadia, California who is hosting a NetQuakes recorder. "Until you go to the garage, you wouldn't know that Chuck Mc Daniels' home is part of an innovative seismic system.", comments reporter Alex Cohen on the idea of high-technology scientific equipment being installed in random Californian suburbs. The respective homeowner describes the instrument: "It's blue and it's bolted to the floor of my garage, about the size of a loaf of bread I would say." Its simple design catches the eye of reporter Alex Cohen: "This box is called a NetQuakes seismograph and it looks low-tech (…) but it's actually swiss-made and equipped with powerful sensors." Douglas Given explains how the system works: "Each NetQuakes instrument sends its seismological readings back to the USGS over the internet. As earthquakes occur, each one is a moment in time where we can learn a lot about how the earth works and how we can protect people from earthquakes, so we don't want to miss those opportunities as they occur."

The full report can be found here:

http://www.npr.org/player/v2/mediaPlayer.html?action=1&t=1&islist=fals

The Mexican Newspaper El Heraldo published an article on 5th May called "Swiss scientists visit the accelerometer network of Mexicali", relating to the recent visit of GeoSIG personnel to the Strong Motion network in Mexicali, operated by CICESE (Scientific and Educational Superior Investigation Centre of Ensenada in the state of Baja California, Mexico). The network has been established since 2009 and its functionality has been tested and confirmed by GeoSIG specialists.

The network of GeoSIG instruments in Baja California consists of 30 stations: 12 in the Mexicali valley, 11 in the Mexicali urban area, several others perform strong-motion monitoring of the dams of El Carrizo, Tijuana and in La Rumorosa.

The GeoSIG engineers visited the CICESE systems to verify the correct installation and functioning of the stations, and to support and train the respective personnel. The GMS instruments of the Mexicali networks send their recorded data (trigger-based), similarly to the USGS' NetQuakes network, through the internet to the servers at CICESE in Ensenada.

Furthermore, the article refers to the "mother"-network of USGS in the state of California, where approximately 500 instruments are installed, forming a dense monitoring system for the urban areas. Future plans involve the integration of the two networks in order to allow for the exchange of data and information from both sides of the border, as well as the continuous expansion of the Mexican network to further cover five major cities in the state of Baja California.

The related article can be found here:

http://www.oem.com.mx/elheraldodetabasco/notas/n2066516.htm

Figure 1.US-Mexico Border region

Construction/Blast Monitoring of Tunnel Boring Project with GeoSIG Equipment

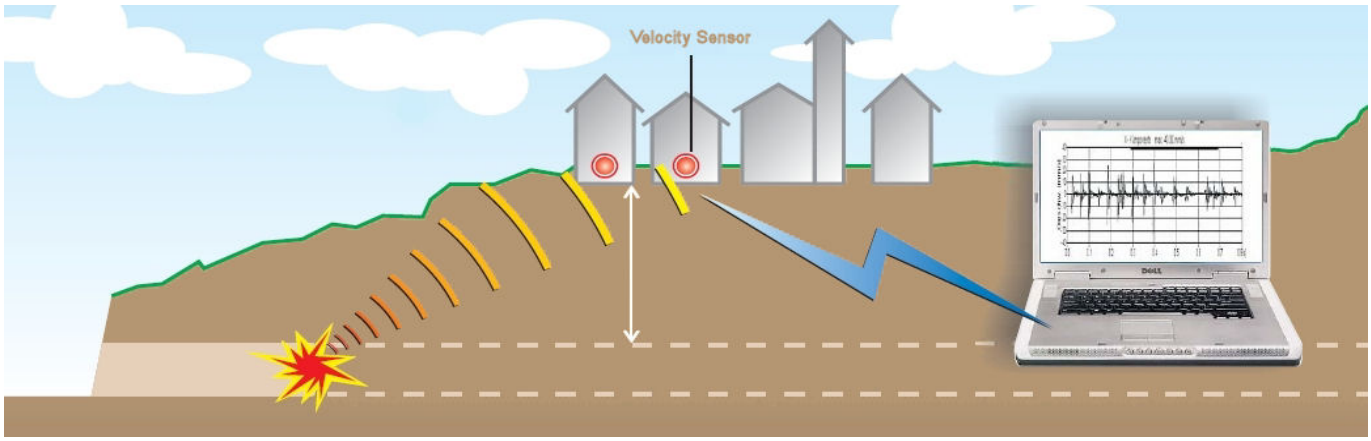

Figure 2. Tunnel Boring Operation under Inhabited Area

Scope:
The construction of a bypass road for a town in Switzerland in mountainous terrain requires the construction of a tunnel of a length of 2.5 km, between 5 and 170 meters under inhabited surface. As part of the tunnel's route leads through solid rock, the construction technique applied for these sections is drilling and blasting. The ground motion at the surface, induced by the underground use of explosives, can pose a danger to existing buildings. The respective building authority has therefore defined guidelines for the construction operation in order not to exceed certain levels of ground motion to assure the safety of the residents and the integrity of the buildings under which the tunnel is being drilled.

System:
After previous meticulous analysis of the residential buildings (Detection, location, registration and analysis of existing cracks and damages), GMS recorders with VE-33 velocity sensors are installed in numerous locations in order to monitor the ground motion/vibration induced by the tunnel drilling operations underneath.
The GMS Measuring Systems installed in 14 selected houses perform continuous recording. Data (15 minutes ring buffer files) is uploaded to the GeoDAS server which is located at GeoSIG Head Offices, where it is evaluated. The trigger level has been defined by the building authority for each station at 4 or 6 mm/s. Event files as well as daily reports are sent by Email to previously defined recipients.

Figure 3. Technician prepares explosives

Figure 4.GeoSIG GMS and sensor installed in a basement

GeoSIG offers a comprehensive range of solutions for all types of Structural health Monitoring, including bridge monitoring, gas/oil pipeline monitoring, tunnel monitoring, high speed railway monitoring and many more. Contact us for advice and consultation on your monitoring requirements.

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