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SHAKEALERT™

Technical Bulletin 1

A Case for Automatic Actions



A CASE FOR AUTOMATIC ACTIONS

The Really Big One! – (any day)

If you are responsible for infrastructure management and live in the Pacific Northwest, you most likely already know about the Cascadia Subduction Zone (CSZ) and the inevitability of a severe earthquake (EQ) occurring at any time. Nobody can say with any certainty when the next CSZ EQ will occur, but we can say with certainty that lives will be lost and much of our infrastructure (roads, utilities, buildings, etc.) will be severely damaged. To say that this is a looming challenge for infrastructure managers is an obvious understatement.

Earthquake Early Warning – SHAKEALERT™

Along the West Coast of the United States a new technology can be used to protect lives and facilities. That technology is known as **SHAKEALERT™**. **SHAKEALERT™** is a system of hundreds of sensors, monitors and computers that detects when an EQ has occurred and provides information about the location and magnitude of the EQ, as well as the anticipated severity of shaking that will occur at locations throughout the Northwest. This information is determined based on the size of the harmless preliminary wave (P wave) that travels faster than the damaging shaking wave (S wave) generated by the EQ. Depending on your location relative to the epicenter of the EQ, the warning you receive will range from a few seconds to a couple of minutes. While **SHAKEALERT™** has the potential for saving lives and reducing injuries it has even more potential for reducing damage to our infrastructure, which will substantially help recovery efforts and reduce the time and cost of rebuilding.

Public Alerts – Opportunities and Challenges

Most emergency managers are excited about the potential for **SHAKEALERT™** to provide public warnings via some sort of public alert system. Most envision this eventually occurring through a cell phone signal set up to provide a mass alert. But there are numerous technological challenges associated with this plan and such a mass alert to the general public may not be possible for several years.

One of the primary challenges with public warnings is that people may tend to ignore alerts or forget to take the appropriate actions. If you eventually receive a warning at work that severe shaking will start in a few minutes, will you remember what to do? Will you remember how to minimize deaths? Do you know where that emergency manual is? Will there be enough time to do everything you should do and take actions to protect yourself and your loved ones?

The Benefits of Automatic Actions

The decisions and results for infrastructure managers can be vastly improved in such a situation by utilizing the full capability of **SHAKEALERT™** to perform preset, well-planned and conceived automatic actions. Damage to facilities and injuries to your employees and the public can be reduced by allowing **SHAKEALERT™** compatible equipment to inform your existing control equipment to automatically do things like: alert your employees via radio signal or loudspeaker, turn off power to reduce

damage and prevent electrical fires at critical facilities, close gas and/or water valves to prevent fires and/or conserve water for use after the EQ, stop elevators and open doors at the next floor so people are not trapped in an elevator shaft. These are examples of a long list of possible automatic actions that do not depend on people to take the proper actions in a highly stressful situation. These types of actions can be determined in a thoughtful manner far in advance of shaking from a major EQ event. Since those actions are programmed into your control system, they don't depend on remembering what actions to take in each situation. In fact, these actions will take place even if the EQ happens on a weekend or at night while you are at home. These systems don't need practice drills and they will know what to do whether an EQ strikes next year or fifty years from now.

The best way to prepare for a major EQ is generally to take measures to harden facilities to withstand strong shaking. Infrastructure managers need to evaluate their facilities and take steps to harden them as upgrades are needed and funding becomes available. However, that process typically takes many decades. SA provides an affordable option for reducing damage to existing infrastructure at a relatively low cost. It, as well as upgraded, hardened facilities, should be part of any EQ resilience strategy. The primary benefits are that the cost is usually so low, compared to the full cost of hardening, and the benefits are so great that installation and programming can almost always be justified to occur in the first year of implementation of an emergency response plan related to EQ resilience.

A Healthy Dose of Skepticism

You may have questions about automatic actions. It would be reasonable for you to be concerned about:

- Just what information is provided by **SHAKEALERT™** and is it going to be pertinent to my location even though an EQ occurs hundreds of miles away?
- How reliable is a **SHAKEALERT™** signal? Will my system be responding, even occasionally, to false alerts?
- Cyber security. Is my system going to be less secure from cyber-attack by allowing a connection between **SHAKEALERT™** and my control system?

Varius Has the Answers

As an early adopter and leader in **SHAKEALERT™** implementation, Varius, Inc. has heard these concerns and more. The answers are provided in this series of technical reports. As new information is developed it will be made available to you. These reports may be accessed via our website at www.variusinc.com. Please let us know if you'd like a no-cost consultation to discuss whether automatic actions may be right for your organization.



425 269 8479 / dan.ervin@variusinc.com