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### **The secty earthquake prevention system**

The earthquake area is located at the Oberrheingraben one of the most active seismic areas in the German-speaking space. It is shaken over and over again by microseism and large earthquakes. Rather moderate Magnitudes are expected however, nevertheless, they can locally lead to high accelerations. The so-called Basel earthquake of 1356 is at the same time the largest earthquake to the north of the Alps since human memory. The fires following the earthquake caused the biggest damage. In case of an earthquake round about 95 % of to be expected damages appear to buildings and their infrastructure. Hence, it is especially also to be reckon on damages to gas pipes.

With regard to the surface conditions in Basel is to be count rather on a firm ground with which no big settlements are to be expected between the single buildings.

Only by earthquake prevention measures can be assured that the immediate damages by earthquakes as well as the secondary damages keep within a limit.

Prof. Wyss, Director of World agency of Planetary monitoring and Earthquake Risk Reduction with headquarter in Geneva has advised us of the earthquake early warning system secty electronics GmbH first. This system has been developed specially for the earthquake early warning. secty electronics GmbH conducted the development in close cooperation with the worldwide known and approved GeoForschungsZentrum (GFZ) in Potsdam under the direction of Prof. Dr. Zschau. The GFZ has very successfully conducted basic research in this area and, among the rest, was also involved decisively in the implementation of a network of early warning systems in Istanbul in Turkey. Prof. Wyss has also tracked this project.

Heart of the system technology of secty electronics GmbH is the algorithm implemented in the software. This algorithm enables by the detection and the analysis of the P-wave of an earthquake to suggest the strength to be expected of the following destructive S-wave. Based on it an authoritative earthquake early warning can be released. In this manner one wins precious seconds before the earth starts to shake. Therefore, one can use this time to interrupt the gas supply still before the following, strongest ground movement.

Besides, the high system reliability/ security is guaranteed by a redundant earthquake supervision. Several earthquake detectors spatially separated of each other work on a network in a master submaster correlation. Only if several earthquake detectors detect that a threshold is exceeded earthquake alarm is released.

In his statement for the assesment of the system technology Dr. Koller of the Résonance Ingénieurs-Conseils SA has spoken of an algorithm of „amazing simplicity“.The practise suitability was checked with the help of real seismograms from the strong quake data bank successfully, so that, against the initial skepticism, one has come to the end that the system

shows a mature technical solution for an early warning system according to the demands of the IWB.

### Definition of the Project:

In case of an earthquake it is the task of the advanced earthquake early warning system to interrupt the natural gas supply of 5 natural gas supply lines in the IWB supply area. This interruption occurs from the pressure reduction stations of the GVM by shutting off the safety blocking valves automatically.

All 5 pressure reduction stations of the GVM in each case are equipped with 3 earthquake detectors (1 x master and 2 x submaster) and are connected to the control center. The 3 earthquake detectors are installed in every station to minimize possible transference problems basically. Every station works self-sufficiently.

In case of an earthquake 2 of 3 earthquake detectors must release an alarm, with it the corresponding safety blocking valve of the pressure reduction station is shut off. At the same time a signal is sent to the control center. To interrupt the natural gas supply in the complete IWB supply area, at least 2 of 5 pressure reduction stations must send a signal decentralized to all remaining stations, so that all the safety blocking valves are shut off.

For safety reasons all systems were connected to independent 24 V of emergency power supply.

An additional installed phone module is used to inform by means of an SMS signal all persons responsible about the fact that the safety blocking valves of the 5 pressure reduction stations have been shut off.

### Installation and Training:

secty electronics GmbH has put into operation the system in the time from Aug. 28 to Aug. 30, 2012 and has trained the employees in the functionality of the system.

### Conclusion:

The electronic advanced earthquake early warning system is scientifically tested and functioning. The advanced earthquake early warning system can contribute to the fact -by already a few seconds of advance warning time- that one is met not unprepared by the earthquake. The skilled instruction in the system technology and the instruction also in behavioral measures with earthquakes are very helpful.

Our biggest worry with regard to possible false alarm has turned out groundless. Since the installation in August, 2012 we had no false alarm and the system works problem-free.

We can only recommend to all people living and working in earthquake-threatened regions to stick up for the use of this advanced earthquake early warning system. The participation in earthquake training is very helpful.

With best regards



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