GeoWatch

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GeoSIG extends the horizon for Structural Monitoring, using the Internet for Data Transmission and offering Enhanced Data Processing and Structural Modal Analysis with ultimate flexibility

GeoSIG has deployed three IA-1 Internet Accelerographs in the 12 story Schweizerischer Ingenieur- und Architektenverein (SIA, Swiss Engineers and Architects Association) building in Zurich.

The IA-1 instruments used were modified to accommodate for structural monitoring of the high-rise via the ambient vibrations of the structure. The modification consisted of disabling of the internal accelerometers and external sensor connector, as seen on Figure 1. The external sensor consisted of triaxially configured geophones. The modified instrument has a full scale of ±20 mm/s, with 0.0075 mm/s peak to peak noise whereas the unmodified IA-1 has a noise floor of 0.5 mg and a range of ±4 g over a frequency band of DC to 42 Hz.

Figure 1. IA-1 with the external sensor, installed at the basement of the SIA building.

Permanent locations of the installed instruments are shown on Figure 2. The lowest location is at the basement –3, at the foundation level, appearing as green axes. The other two instruments shown with blue axes are located at the 12th floor; one next to the stairwell, which is also housing the shaft of three elevators, and the other at the North corner of the building.

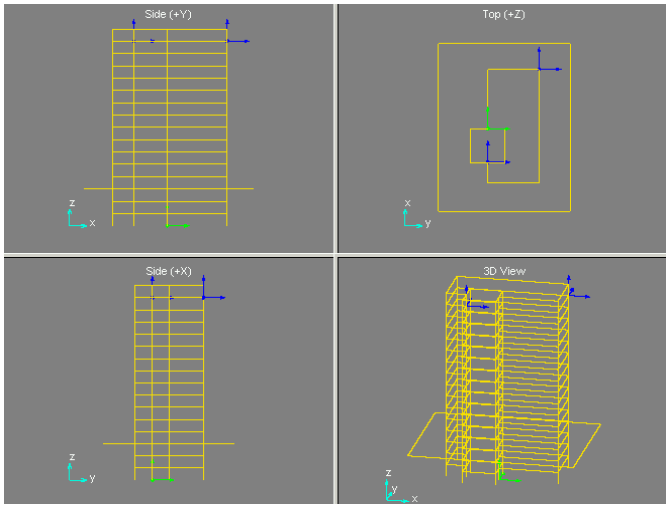

Figure 2. Permanent IA-1 locations in the SIA building.

Each instrument continuously records 5 minutes files with 100 samples per second in miniSEED format. The full set of miniSEED files for one day are than automatically retrieved by a computer in GeoSIG offices via the Secure Shell internet communication.

IA-1 instruments an output-only modal analysis is underway for the building using the ARTeMIS software. For this purpose, further measurements were taken using the basement unit as a roving instrument within the building. The sensor attached to the instrument was located at several corners at the top two floors of the building, while keeping the other two instruments in their permanent locations for reference measurements.

The said modal analysis was not yet completed at the time of preparation of this issue of GeoWatch, thus no results are presented herein. Respective analysis details and results will be presented in an upcoming issue.

As with all other data files from any GeoSIG instrument, GeoDAS is able to open, display, process and convert these MiniSEED files as required. And it is worthwhile to mention here that a new feature is implemented now in GeoDAS such that conversion of data files (including the

MiniSEED) to the format that ARTeMIS requires can be performed with a mouse click.

Therefore, a user who has a complete system from GeoSIG, consisting of GeoSIG sensors and recorder(s), GeoDAS and ARTeMIS; can easily, efficiently and quickly perform detailed structural modal analyses for almost all types of engineering structures. Such analyses yield a better understanding of the natural frequencies, mode shapes and damping properties, as well as provide a clear insight to determine any potential problems within respective structures.

GeoSIG will deliver the Seismic Instrumentation System for Leibstadt NPP, Switzerland

Approximately 40% of Switzerland's power production comes from the nuclear energy. Leibstadt nuclear power plant is the fifth plant in Switzerland, starting continuous operation on 15 December 1984. The NPP is situated on the Aare delta between Koblenz, Switzerland and Waldshut, Germany. It provides over 9 billion kilowatt-hours annually to the Swiss power network and is connected to the European compound network.

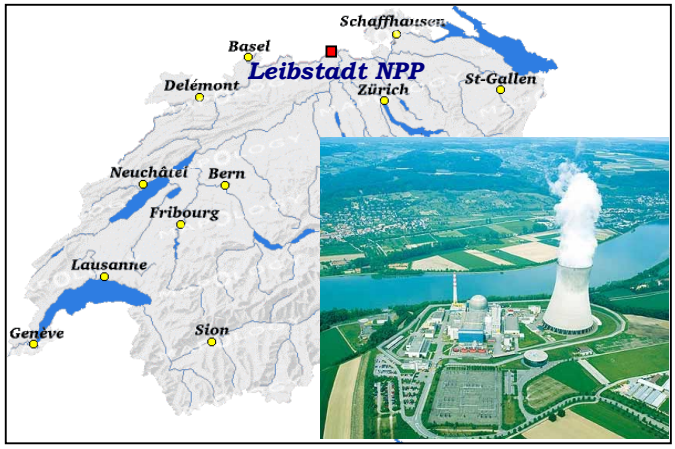

Figure 3. Location and general view of Leibstadt NPP

The Seismic Instrumentation system for Leibstadt NPP, has many similarities with the system provided to Beznau NPP earlier this year by GeoSIG. It consists of a Central Processing Unit (CPU) and five distributed Detection and Recording Units (DRUs). A typical DRU comprises of two instruments; one AC-23 Triaxial Sensor and one GSR-18 Strong Motion Recorder.

In order to achieve a certain level of redundancy, the motion signals detected by the sensors are stored first in the local recorders.

The seismic instrumentation is continuously running during normal operation and during event downloading. The key components of the seismic instrumentation are equipped with emergency power supply (sensors with recorder) or 24 VDC supplies.

The five triaxial measuring sensors and recorders have self-monitoring and testing facilities for periodic testing of the entire measurement chain. For each measuring channel the recording threshold and the alarm limit values can be set individually.

The GSR-18 has sufficient storage capacity for the complete recording of an event, i.e., main- and after-shock. In order to analyze weak-motion signals as well, the data are acquired with a resolution of 1:131'000.

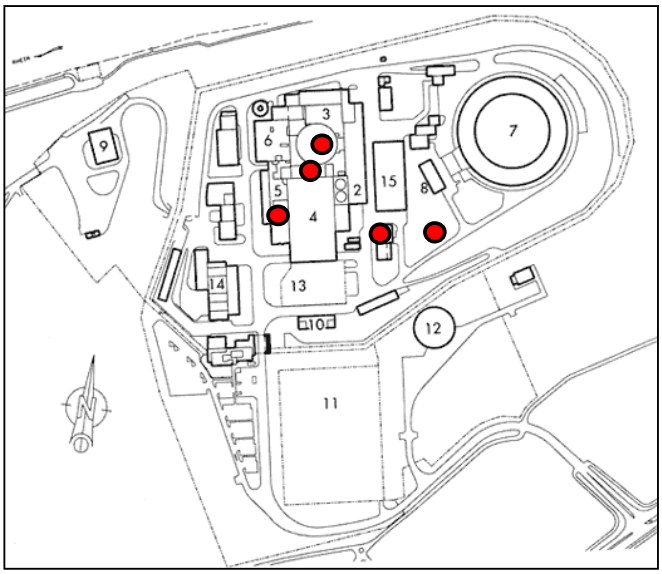

Figure 4. Approximate DRU locations in Leibstadt NPP

The alarm transmission and communication between the GSR-18 and the CPU take place via RS-485/Alarm cable. After an event, the CPU acquires the locally recorded data automatically. In addition, it is also possible to retrieve the data with a laptop computer directly from the GSR-18.

As soon as recording starts, the system automatically initiates a pre-defined evaluation. The results of this automatic evaluation are stored in the computer of the CPU in pre-defined files and can be printed out. The CPU is housed in the existing earthquake-safe cabinet, including specified accessories.

GeoSIG supplies a comprehensive documentation and guarantees the training of the personnel of the Leibstadt NPP.

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We would like to take this opportunity to announce that our annual winter holiday will be from the 20th of December 2003 to the 4th of January 2004,
And Wish You a Happy and Prosperous New Year