Northern Delaware Seismic Exploration

Full Mitigation Best Practice Story

State-wide, Delaware

The State of Delaware - There have been more than 550 earthquakes documented within 150 miles of Delaware since 1677. The largest registered one occurred in the New Castle County area in 1871, the second largest in 1983 near the Delaware River in northern Delaware. In this area, there are no known fault traces on the surface of the earth. In order to identify the faults responsible for the earthquakes, their detection in the subsurface is required.

The Delaware Geologic Survey (DGS) developed a joint cooperative agreement with the U.S. Geological Survey (USGS) to artificially produce seismograms in order to get a picture of the subsurface. Using a geophysical data processing technique developed by the USGS Geological Division in Menlo Park, California, and with staff from that center, the faults were explored.

Seismic waves were produced by firing 8-gauge shotgun shells into the ground at a depth of approximately 12 to18 inches below the surface. Simultaneously 1-pound explosive charges, at a depth of approximately 10 to 15 feet below the surface, were detonated. The results from both sets of explosions were recorded on an array of five seismographs with 300 active channels.

This project provided the first opportunity to study and map the possible subterranean fault line in Delaware. It presented scientists with a relatively non-invasive method of imaging the subsurface. The high-resolution seismic reflection and refraction survey identified possible faults that may be associated with earthquakes in the northern Delaware area.

The information garnered from this study will be useful to planners and local governments when considering development in the local area. It will be especially useful when selecting sites for critical facilities. The dollar values saved are not measurable since the objective is to prevent development on the fault or at least make sure it meets earthquake building standards.

Activity/Project Location	
Geographical Area:	**State-wide**
FEMA Region:	**Region III**
State:	**Delaware**

Key Activity/Project Information

Sector:	**Public**
Hazard Type:	**Earthquake**
Activity/Project Type:	**Mitigation Planning/Disaster Resistant Universities**
Activity/Project Start Date:	**05/1998**
Activity/Project End Date:	**Ongoing**
Funding Source:	**National Earthquake Hazards Reduction Program (NEHRP); State sources; Other Federal Agencies (OFA)**
Funding Recipient:	**State Government**
Funding Recipient Name:	**Delaware Emergency Management Agency**

Activity/Project Economic Analysis

Cost:	**$280,000.00 (Estimated)**

Activity/Project Disaster Information

Mitigation Resulted From Federal Disaster?	**Unknown**
Value Tested By Disaster?	**No**
Repetitive Loss Property?	**Unknown**

Reference URLs

Reference URL 1:	**http://neic.usgs.gov/**
Reference URL 2:	**http://www.state.de.us/dema/default.shtml**

Main Points

- This project provided the first opportunity to study and map the possible subterranean fault line in Delaware. It presented scientists with a relatively non-invasive method of imaging the subsurface.
- The Delaware Geologic Survey (DGS) developed a joint cooperative agreement with the U.S. Geological Survey (USGS) to artificially produce seismograms in order to get a picture of the subsurface.
- The information garnered from this study will be useful to planners and local governments when considering development in the local area. It will be especially useful when selecting sites for critical facilities.