AbstractID: 8815 Title: When things go kaboom! Handling the safety of an MRI facility during a nearby building implosion.

Purpose:
To develop methods of assessing the risk associated with implosive demolition of a large building, located in the immediate vicinity of a large MR imaging facility. To devise appropriate protocols for monitoring the impact of building collapse on the status of MR Imaging equipment.

Method and Materials:
Blasting and demolition industry follows regulations, designed to prevent damage by shock waves to building structures located near the blasting sites. On the other hand, manufacturers of MRI equipment specify limits of mechanical vibration levels allowed at magnet locations. The major problem is, these two approaches focus on very different goals (preserving a building structure vs. ensuring proper quality of MR images). Thus, each party uses different definitions, nomenclature, testing methodology, and compliance guidelines. As a result, statements made by one party (the demolition monitoring experts) are incompatible with concerns raised by the other party (the MRI equipment manufacturers).

Information about the blast monitoring technology was reviewed and adopted to the task of assessing the risk of damage to the MRI equipment caused by shockwaves resulting from building collapse. Blast vibration monitoring seismographs have been evaluated to assess sensitivity and precision limits of acquired data. Methods of translating engineering system of units, used by blasting industry, into units used by MRI equipment vendors, have been developed.

Results:
Two major possible types of damage to MRI equipment have been identified: magnet quenches and structural damage to the RF shielding. Since no prior data regarding recommended limits of blast vibration levels at MRI magnet location were found, a conservative limit of 500 μg was adopted in risk analysis.

Conclusion:
As a result of careful planning, the building demolition was successful with no demonstrable effect on MRI equipment. The largest recorded vibration level at the MRI site was about 30 μg at 30 Hz.