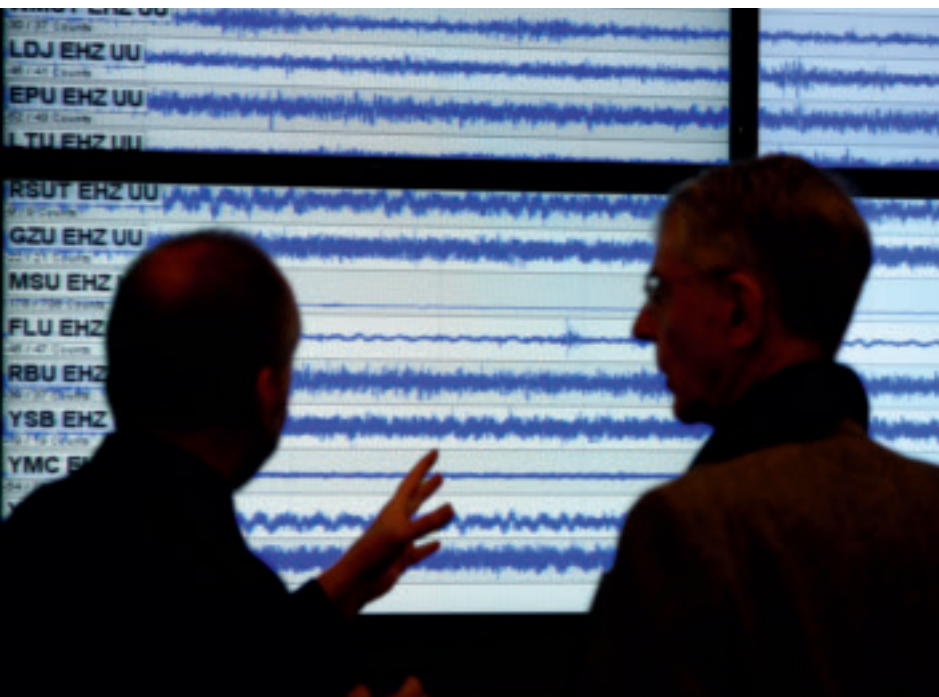


# Made to measure



Ralph Mills discovers how a new information centre monitors Utah's earthquake threat.

Photographs by Jeffrey D Allred, *Deseret News*, Utah.

We humans tend to regard what's under our feet as pretty immobile. We talk about "being grounded", being "as solid as rock", of "standing our ground", or of things being "rock hard". But in the newly opened Rio Tinto Earthquake Information Center at the University of Utah, Salt Lake City, there's a wall of flat screen displays that shows us just how wrong is that perception of solidity.

In the foyer of the Center, screens of moving zigzag lines show in real time how the Earth's crust beneath this mountain state is very much in a state of perpetual motion. The distance between California's Sierra Nevada mountain ranges to the west and Utah's Wasatch Range to the east is stretching by about a centimetre a year. Visit the Center's website and you'll be greeted by a

map of the region criss crossed by scratchy red lines that indicate its many fault lines and dotted with coloured squares that indicate recent seismic activity.

At first this might sound a little alarming, but when you click on one of those squares you find that it almost always denotes a "micro earthquake", a tremor of magnitude of less than three, hardly noticeable except by the Center's sensitive arrays of detectors that are positioned across the region.

Having said that, Utah is a highly seismically active region, and some three quarters of its 2.7 million population live in an urban corridor that lies astride the Wasatch Fault. A map of tremors recorded and plotted since 1880 resembles a Jackson Pollock painting, and ironically, almost exactly mirrors a map showing population distribution. And there have been a number of earthquakes in the last 150 years that have caused significant damage.

So knowing as much as possible about earthquakes is important to Utah. Professor Walter Arabasz, director of the University of Utah Seismograph Stations, explains

that it's the job of his group to combine research, education and public service, to monitor seismic activity in great detail, and to use the gathered data and knowledge not just to advise the state's governments, engineers and developers in constructing earthquake resistant communities and buildings, but also to provide information and guidance that will help Utah's population to live with this ever present threat.

The Rio Tinto Earthquake Information Center is located in a dignified, stone grey building, set amongst scattered boulders and trees, newly built to

house the university's Department of Geology and Geophysics. Modernised seismic monitoring facilities in the building cost US\$3 million, towards which Rio Tinto company Kennecott Utah Copper donated US\$600,000 to create a state of the art earthquake information outlet. Two thirds of the donation went towards space costs and the rest for equipment and technologies.

The building was constructed using concrete shear wall techniques which not only make it earthquake resistant but also provide a low ambient noise environment for the arrays of sensitive equipment housed within it.

The data published on the web and those fuzzy lines on the foyer screens are collected by more than 200 seismic stations, spread over 800km from Yellowstone National Park in the

north to Arizona in the south. Most stations are located on bedrock a long way from interference of cultural noise, but recent advances in technology have enabled some to be located in urban areas. Some minor earthquakes are caused by human activity, especially coal mining and oil and gas production. The Center also regularly picks up blasting activity at Kennecott's Bingham Canyon mine, and is able to distinguish this from natural earthquakes.

Kennecott president and CEO Kelly Sanders enthusiastically remembers how taken he was when he attended the opening of the Center in early 2009: "The Earthquake Information Center is impressive. The foyer and information wall really stand out. Rio Tinto and Kennecott's involvement is very evident."

Supporting the Center came naturally to Kennecott, which has had a relationship with the university, especially with the College of Mines and Earth Sciences, dating back to the 1900s. Over the decades the company has supported many students as part of a policy to identify, encourage and employ the brightest. The Kennecott Research Center has been active in university/industry collaborative research since the 1950s.

Says Sanders: "This donation demonstrates Kennecott Utah Copper's dedication to education – specifically in the Earth sciences. The Earthquake Information Center has a well deserved regional reputation for its expertise in seismic study and earthquake tracking, and Kennecott feels it is important to provide support to further the tradition of excellence in this important area of scientific endeavour."

The plaque in the Center underlines the company's thinking: "Rio Tinto is proud to affix its name to the Earthquake Information Center at the University of Utah which provides a state of the art earthquake information outlet for the Intermountain Region. Rio Tinto believes that the funding of the Earthquake Information Center demonstrates our commitment to the present and future needs of the community."

The Center reports on local earthquake activity to emergency managers, the news media and the general public and also serves as a modern facility for education and research. During an earthquake emergency, the Center would also act as a control centre for providing up to date information.

"Based on research carried out at the Center as well as the expertise it shares with us, we take seismic activity into account when designing future buildings and structures, as well as engineering rock and soil type slopes to minimise impact in the event of a significant earthquake," explains Sanders.

"Improving understanding of the seismic activity of our region improves the accuracy of the calculations of probability that are used to determine the likely frequency and magnitude of future seismic events. We incorporate these in the design and specification of our buildings, rock slopes, and tailings impoundment facilities so they meet seismic design codes and internationally recognised earthquake design criteria.

"That knowledge also helps us to seismically upgrade existing facilities. Accurate and timely seismic data information gathering and transfer are fundamental towards reducing the earthquake hazard."

The philosophy is perhaps best summed up by that plaque in the foyer of the Center: "Rio Tinto thinks big, making big commitments, generating big innovations, developing big ideas and making big contributions to positively impact the community. Our goal is to meet the needs of today's generation without compromising the needs of tomorrow."

Find out more at [www.seis.utah.edu](http://www.seis.utah.edu)

Ralph Mills is a writer and archaeologist based in Nottingham, England.