

- ▶ DR. RICHARD SMITH  
DETAILS THE WHOLE  
COMMUNITY RESPONSE  
EFFORT UNDERWAY IN  
CHRISTCHURCH, NZ..... 4
- ▶ DR. SHI PEIJUN SHARES  
LESSONS LEARNED FROM  
CHINA'S MOST SERIOUS  
EARTHQUAKE SINCE 1949..... 8

# Partners in Preparedness

ADDRESSING REGIONAL  
PRIORITIES BY WORKING  
TOGETHER TO PREPARE  
FOR THE FUTURE

## Social Media and Disaster Communication

HAVE YOU EVER NOTICED A CO-WORKER TWEETING AND RETWEETING ON TWITTER WHILE SITTING AT THEIR COMPUTER OR PLAYING WITH THEIR SMARTPHONE AND WONDERED, “What the heck does that have to do with emergency management?” (*#WasteOfTime*). Well, if things continue the way have been, probably quite a bit.

As Dr. Leysia Palen of the University of Colorado, put it during the recent Region VIII RISC meeting, “Social Media *IS* Reality”. Dr. Palen and several other hard-working faculty and students involved with Project EPIC (Empowering the Public with Information in Crisis) in Boulder and at the University of California (Irvine) hope to figure out how to create situational awareness from the Twitter platform during emergencies, crises, and disasters.

Within Project EPIC, a study called *Tweak the Tweet* (TtT) is looking at several recent events including the earthquake that destroyed Port au Prince, Haiti, the earthquake and associated tsunami off the coast of Sendai, Japan, grass fires in Oklahoma, and the shootings on the Virginia Tech campus in Blacksburg, Virginia. The study is hashtag-based (*#*), and is looking at extracting more efficient and useful data from tweets during disasters – especially if the tweeters follow the TtT format and they can be geo-located.

In addition to the team working on Project EPIC, Dr. Paul Earle, Director of Operations for the National Earthquake Information Center, a branch of the US Geological Survey headquartered in Golden, Colorado, thinks that Twitter can be used to help detect and pinpoint earthquakes around the world. He’s “not ready to ditch” the seismometers that the USGS relies upon, but he does feel that Twitter can be used to aid rapid earthquake characterization and response around the world. In fact, it has already been used in Java where *#gempa* (Javanese for earthquake) tweets were used to pinpoint the location and size of an earthquake within minutes of it occurring.

It isn’t just the tweets and retweets that researchers are using for event characterization and obtaining additional qualitative information, but the metadata hidden in each tweet that contains more characters and information than the actual tweets. This metadata includes the author’s name, their location, the time and date the tweet was written, the time zone it was written in, and all kinds of other “stuff”, according to the researchers, that looks like noise, but could prove valuable.

So, the next time you’re in the office, waiting for a plane or sitting in a RISC meeting (*#November8&9*) and you see someone with their head down, eyes focused and thumbs flailing, they could be building situational awareness for an emerging disaster or helping the USGS pinpoint an earthquake. On the other hand, they could just be goofing off (*#TexasHold’Em*).



# Partners in Preparation



THIS REGIONAL INTERAGENCY STEERING COMMITTEE TOPIC “LESSONS LEARNED FROM INTERNATIONAL EXPERTS IN THE FIELD OF EARTHQUAKES” did indeed prove to be an international affair as several experts from around the globe shared their knowledge and expertise in mapping, communicating and recovering from earthquake disasters. Experts attending the 36<sup>th</sup> Annual Natural Hazards Research and Application Workshop in Boulder, Colo. dropped by to discuss lessons learned from the devastating earthquakes in 2010 and 2011 including the catastrophic Haiti event, the massive earthquake in China, two major earthquakes in New Zealand, and a magnitude 9.0 in Japan, which spawned a deadly tsunami and the Fukushima Daiichi nuclear disaster.

FEMA Region VIII Administrator Robin Finegan welcomed participants to the July 2011 meeting at Johnson & Wales University in Denver. “This meeting is an important example of the principle of a whole community team effort” Finegan said. “If we think we are doing all this by ourselves, we are destined for failure,” pointing out that five of the six states in FEMA Region VIII are responding to declared disasters with everyone functioning under significant financial constraints. Finegan thanked all those in the public and private sector that helped create this exciting forum in the “crush of all the other FEMA activities.”

## Region VIII Snapshot

### Colorado

- ▶ Dave Hard announced as new Director of the Colorado Department of Emergency Management
- ▶ 75% of counties will complete Mitigation Plans by end of year
- ▶ Colorado is implementing an EOC Critical Performance Task Book program. It will operate similarly to the Type III IMT Task Book system

### South Dakota

- ▶ Historic flooding and response efforts this year
- ▶ Interaction with private sector continuing. Thirty NGOs added to state emergency plan

### Denver UASI

- ▶ Operation Mountain Guardian full-scale exercise September 2011 (estimated 3,000 participants)
- ▶ Partnered with Colorado Governor’s Office for a unified Citizen Preparedness effort to integrate into *Ready Colorado*

### Montana

- ▶ Currently 51 counties, 7 reservations, and 35 cities/towns with locally declared flood disasters
- ▶ Seven fatalities statewide reported due to flooding
- ▶ \$971,901 in total federal housing assistance approved

### Utah

- ▶ EMAP reaccreditation this November
- ▶ Beginning construction of new state EOC
- ▶ State is transitioning from flood to fire season, with small wildfires already noted

### Salt Lake UASI

- ▶ Continuing Utah *ShakeOut* partnership
- ▶ Developing multi-media package to promote Community Emergency Response Teams and Community Animal Response Teams

### North Dakota

- ▶ Experienced largest and most severe flooding on modern record
- ▶ Homeland Security grant dollars used for planning, training, and exercises cited as a reason for success in protracted flood response
- ▶ Continued wet cycle will severely impact the state economy due to agriculture losses

### Wyoming

- ▶ Experienced 200-300% of normal snowpack this season leading to extensive flooding in over half the counties in the state
- ▶ Extensive agricultural damage due to flooding and hail

# A Federal Perspective on Recent Earthquakes

## FEMA shares lessons learned from New Zealand and Japan

IN AN EFFORT TO CONVEY LESSONS LEARNED FROM RECENT EARTHQUAKES, Doug Bausch, Senior Physical Scientist with FEMA Region VIII Mitigation Division, delved into similarities and contrasts between two major earthquakes in Christchurch, New Zealand (September 4, 2010 and February 22, 2011), and those in Tohoku, Japan. He held participants in awe as he shared scenes from the first ever live video of ground oscillation and the resulting liquefaction. “What you’re looking at,” said Bausch, “are long-period surface waves propagating through a liquefiable soil that has softened as the pore water pressure was elevated due to the onset of liquefaction during the strong shaking.” The relevance to the Wasatch Fault in Utah is uncanny and provides a solid case for lessons learned in Region VIII.

The “Darfield Earthquake”, 30km west of Christchurch had a magnitude of 8+. It occurred at night with duration of seven seconds and no fatalities. The majority of the damage was to unreinforced masonry structures (URM) due to liquefaction and lateral spreading. As a result, there are 3,000 homes that need to be rebuilt or re-weatherized.

By comparison, one of the more significant aftershocks struck on February 22, 2011 about 10km southeast of Christchurch. Although it occurred during lunchtime, it had a lower magnitude (6.3) but much longer duration, shallower in depth and resulted in higher ground motion. That aftershock resulted in 182 fatalities and \$12 billion in damages, compared to the September 2010, higher magnitude quake. It closed down the central business district, impacted 6,000 businesses and 50,000 people. This quake also left 250,000 residents without water or sewer services for 30+ days. Bausch noted that the majority of fatalities occurred in a non-ductile, mid-rise concrete office building built prior to 1986

and that unreinforced masonry buildings suffered significant failures while retrofitted URM’s “did well” in comparison.

Bausch shared that the Japanese Tohoku quake was also preceded by a foreshock. While it had a larger magnitude (7.2) than both the New Zealand quakes, it was the later magnitude 9.0 quake which followed, that made it the fifth largest earthquake ever recorded. The Tohoku quake had an epicenter 180 miles from Tokyo and long period duration waves that triggered liquefaction. He added that the Tohoku quake had a “slip rate” that was twice the rate of the San Andreas fault in California, which caused the mainland of Japan to move 14.5 feet to the East, and sink 2.5 feet vertically.

Bausch summarized the primary lessons learned from these international quakes using the Utah *ShakeOut* as a frame of reference. “Japan’s advanced building design criteria resulted in limited structural damage, but there was still a lot of collateral damage and non-structural damage including systems, building veneers, and equipment” Bausch noted. “There is a huge inventory of unreinforced masonry structures in the Salt Lake area, and we need a better strategy for dealing with non-ductile concrete structures.”

“Continued work is also needed,” he added, “to understand liquefaction and how to incorporate it in flood scenario planning.”

Bausch noted that documented Christchurch cases exist that prove that ‘drop, cover, and hold on’ training saved lives in New Zealand.

**Japan, April 2011 - A neighborhood destroyed by flooding caused by the tsunami. In many areas flood waters could not retreat due to breakwalls.**  
- GettyImages



**Christchurch, NZ, September, 2010 – Citizens and responders survey the aftermath of the magnitude 7.1 earthquake that struck 30km west of Christchurch, NZ. Most structural damage was due to unreinforced masonry (URM) as shown.**  
- GettyImages





# Whole Community Response in Christchurch, New

**Christchurch, NZ,  
February 22, 2011 –  
First responders focus  
on caring for the  
injured following the  
magnitude 6+ earthquake.  
This quake was just one of  
several aftershocks  
experienced in New Zealand  
since September 2010.  
- Gettyimages**

## A community-centric case study from across the globe

THE CHRISTCHURCH EARTHQUAKES WERE STERLING EXAMPLES OF “WHOLE COMMUNITY RESPONSES” according to Dr. Richard Smith, Program Manager, Hazard Risk Management and Research, New Zealand Ministry of Civil Defence and Emergency Management. It was a collaborative government response at the national and local levels, combined with a continued voluntary response from the citizens of New Zealand that helped push the response and recovery effort. International search and rescue groups also aided the 22,000 residents affected by the magnitude 8+ event on September 4, 2010, and the 320,000 who experienced the magnitude 6+ aftershock on February 22, 2011.

The second quake occurred on a new, previously undetected fault with shallower depths. This created a larger disaster and put virtually all of Christchurch in the “hot spot”, including a ten-by-ten block central business district where the majority of fatalities occurred. Extensive liquefaction was also experienced for the first time in a New Zealand earthquake event.

Smith described New Zealanders response to the disasters. It occurred at three levels; the national response in the Wellington capital, regional, and local. He pointed out that New Zealand has no standing emergency management staff and the single integrated Emergency Operations Center at the national level was staffed by resources from other government ministries.

During the initial response, medical resources were adequate but additional search and rescue resources were needed from the U.S., Australia, and other countries while local and international engineers were mobilized to evaluate the large number of damaged buildings. Smith described how an “air bridge” (airlift) was also established to evacuate the vulnerable residents and non-residents.

Because of the wide area loss of critical water and sewer service in Christchurch’s residential areas, local water, shower facilities, and portable toilet resources (porta loos) were immediately deployed.



1



2

**Christchurch, NZ, February/March, 2011 –  
From left to right: (1) A creative Kiwi displays her renovations to the “porta loo” in front of her home. Many such “improvements” were noted in the aftermath of the quakes and show the resilient spirit of those affected. (2) Responders search damage following the February aftershock and bring victims to safety. (3) Crews in Christchurch survey damage to an unreinforced masonry structure following the September quake. (4) International search and rescue support teams, like this one from China, came to the aid of New Zealand and successfully integrated into the response structure.  
- Gettyimages**



# Zealand

Although many were inconvenienced by the loss of facilities, hearty Kiwi humor was not lost when an impromptu competition to decorate the street ‘loos’ became a badge of honor (see photo 1 below).

Smith noted that public information was critical to reassure the public, and that social media was huge both for mobilizing community groups into action and providing welfare information. It was also used to deal with risk communications for those fearful of re-entering older or high-rise buildings after the quake. “That fear still exists,” Smith told the group, “and formal commissions have been formed to analyze the scientific nature of the problem, as well as the practical nature of the perceptions.”

One of the major surprises of the response and recovery effort, Smith said, was the unexpected financial impact on the CBD (Christchurch Business District) and its long-term recovery. During the response and recovery phases of the disaster the

cordoned off areas of the CBD proved to be a major issue for local businesses...virtually none of which had any business continuity plans or resources, nor backup records. This resulted in a slow, but continuous process of reducing the cordon area despite the demolition and reconstruction issues that still remain. The estimated economic impact to New Zealand was between \$15 and \$20 billion, approximately nine percent of their GDP.

In the Q&A session that followed Dr. Smith’s presentation, another New Zealand success story was highlighted. According to Smith, New Zealand’s “What’s the Plan Stan” school preparedness program was well under way in half of its K-12 schools, and those resources and activities were put to good use prior to the Christchurch quakes. The program, designed to teach children basic preparedness skills, was cited as a contributing factor to the readiness of many families in the Christchurch area. The United States plans on modeling such an approach in schools over the coming years.



*Christchurch, New Zealand, February 25, 2011 – Tim Manning, Deputy Administrator for Protection and National Preparedness at the Federal Emergency Management Agency, inspecting earthquake damage in Christchurch. Manning was in Christchurch attending a U.S.-N.Z. Partnership Forum when the earthquake struck. Manning, a first responder, immediately went to work with a local relief agency going door-to-door checking for structural integrity.*  
- Janine Burns/ FEMA/U.S. Embassy-New Zealand

# Integrating Hazard and Risk Lessons

## Using technology to support decision making following disaster



INTEGRATING HAZARD AND RISK LESSONS LEARNED FROM RECENT EARTHQUAKES WAS THE TOPIC KEYNOTE SPEAKER DR. DAVID APPLGATE, ASSOCIATE DIRECTOR FOR NATURAL HAZARDS FOR THE U.S. GEOLOGICAL SURVEY IN RESTON, VIRGINIA, PROVIDED. He showed and explained an array of hazard and mapping information to support decision making and building useful emergency management exercises.

Applegate explained that the USGS seismic network supports NOAA's tsunami warnings, flood and severe weather warnings, geomagnetic storm forecasts, and wildfire operations. He pointed out that there has been an increasing focus on solar flares, injections, etc., because of better scientific forecasts. He also highlighted the congressionally mandated, four-agency (USGS, NIST,

FEMA, NSD) Natural Earthquake Hazards Reduction Program (NEHRP). The mandate of NEHRP is to develop effective measures for earthquake loss reduction; promote adoption of these measures and improve the understanding of earthquakes and their effects on communities, structures, and life. "Although there has been an extraordinary period of high profile earthquakes," he said, "this is nothing out of the norm."

To set the stage for his discussion of the various products produced by NEHRP, Applegate noted that recently over three million people in 11 states participated in Drop-Cover-Hold On drills and other preparedness activities with a special emphasis on schoolchildren. He highlighted the San Andreas Big One *ShakeOut* exercise results, in particular, the secondary affects and damages that were identified.

Dr. Applegate shared a success story where good science and good engineering design combined to mitigate what could have been the biggest environmental disaster story of

2002 but instead became a shining example of how proper mitigation can detour potential catastrophic events during and after an earthquake. When the Trans Alaska Pipeline System was built in the 1970's, it was placed on Teflon sliding bars where it crossed the Denali fault, which geologic studies showed was capable of withstanding a magnitude 8 earthquake rupture. When a magnitude 7.9 earthquake occurred in 2002 the pipeline slid almost to the end of the bars, but did not rupture and not a drop of oil was spilled.

Applegate used a photo of the Trans-Alaska Pipeline displacement to draw an important analogy with major gas and oil pipelines (and power lines) including one that carries 80,000 gallons a day of refined gasoline to Las Vegas, Nevada. As part of the *ShakeOut* scenario that USGS and its partners conducted, pipelines were identified as a major vulnerability. This scenario has prompted a number of utilities to consider different ways to mitigate risks to their infrastructure.

Participants were walked through an example "earthquake information timeline" (0 to 1 hour), and the various actionable information products (ShakeMap, ShakeCast, PAGER, HAZUS) that could be provided to emergency managers in a variety of formats (i.e. HAZUS, GIS Shape Files, Google Earth formats, WEB EOC, etc.).

The examples used by Applegate demonstrated that magnitude did not necessarily reflect proportional fatalities and damage experienced in the two New Zealand quakes described earlier by Doug Bausch. Smaller magnitude quakes can create greater damage depending on a variety of factors including surface depth, proximity to structures and infrastructure, and the period of surface waves.

Denver, CO, July 12, 2011 -  
Dr. David Applegate,  
Associate Director for Natural  
Hazards for the U.S.  
Geological Survey in Reston,  
Virginia.  
- Cheryl Layman/FEMA



# ShakeOut Exercises

“REPETITION FROM A VARIETY OF SOURCES IS KEY TO LIFESAVING REACTIONS,” is how Mark Benthien, Director of Communications, Education, and Outreach, University of Southern California, Earthquake Center opened his remarks focused on the outreach associated with the California and upcoming Utah *ShakeOut* exercises. “People take their social cue from others, and preparing for an actual disaster can help them understand potential consequences of their decisions.” Benthien shared an unedited draft of a five minute public service announcement being created from the research associated with the 7.0 magnitude Utah *ShakeOut* exercise in April, 2012. The numbers surrounding an incident of this magnitude are staggering; 2,300 fatalities, 30,000 injured, 300,000 left homeless, 10,000 collapsed buildings, 285,000 buildings valued at \$35 billion in damages, tens of thousands without water and power for weeks or months.

*ShakeOut* exercises focus on the primary principle of Drop, Cover, Hold-On and help to “shift the culture and bring people together in a common vision” Benthien stated. The video left everyone with a better sense of what the impact of a major quake in Utah would look like and how the consequences of such an event could impact all of the states in Region VIII, not just Utah.

The Utah *ShakeOut* 2012 is scheduled for April 17-19, 2012 and will test Utah’s ability to respond to a catastrophic earthquake along the Wasatch Fault while exercising the FEMA Region VIII and Utah Catastrophic Earthquake Operations Plan. The exercise will involve all levels of government, nongovernmental organizations and the private sector. Schools, businesses, organizations and families across the state will be expected to participate in the state-wide drill on April 17, making it the largest earthquake exercise in Utah history. “Exercises inspire discussion and move others to take action as individuals, organizations, and communities, said Benthien. “Our goal is to involve millions of people in earthquake preparation.” Register to participate at [www.shakeout.org](http://www.shakeout.org).

## Utah Exercise Calendar

- ▶ SEPTEMBER 7, 2011: Utah *ShakeOut* Initial Planning Conference
- ▶ SEPTEMBER 23, 2011: Utah *ShakeOut* Mid Planning Conference
- ▶ SEPTEMBER 28, 2011: Catastrophic Mutual Aid Plan Validation TTX
- ▶ DECEMBER 7, 2011: Catastrophic Earthquake Plan Validation TTX
- ▶ JANUARY 25, 2012: Senior Officials TTX
- ▶ MARCH 8, 2012: Utah *ShakeOut* Final Planning Conference
- ▶ APRIL 17-19, 2012: Utah *ShakeOut* 2012 Exercise
- ▶ JUNE 5, 2012: Utah *ShakeOut* Recovery TTX

## Looking for More Info?

Additional copies of this newsletter are available at:

[www.fema.gov/about/regions/regionviii/](http://www.fema.gov/about/regions/regionviii/)

For copies of meeting presentations, or to obtain information in an alternate format, please contact Daniel Nyquist at 303.235.4861 or [daniel.nyquist@dhs.gov](mailto:daniel.nyquist@dhs.gov).



# Wenchuan Earthquake, China

## Examining the most serious earthquake in China since 1949

The presentation on the Wenchuan Earthquake disaster in Sichuan Province, China literally changed the scale of the RISC meeting, as did the details of the magnitude 8.0 earthquake on May 22, 2008 shared by Dr. Shi Peijun, Executive Vice-President, Beijing Normal University, National Disaster Reduction Committee, Ministry of Civil Affairs, China. Dr. Shi described the quake as the most serious earthquake in China since 1949 not only because of the high intensity, large disaster area (500,000 sq km) but for the enormous difficulties it created for disaster relief efforts.



**Sichuan Province, China 2008 - Cities close to the Wenchuan epicenter are flattened and whole mountainsides are collapsed.**

- Beijing Normal University

According to Dr. Shi, the Wenchuan quake was followed by frequent aftershocks and heavy rains, generating large area “disaster chains” related to the earthquake. These chains induced scores of additional geological events including 3,575 rock falls, 5,117 landslides, 358 debris flows, 34 barrier lakes, and it damaged 1800 reservoirs in Sichuan province, as well as more than 1054 km of dams in five provinces, and even collapsed a mountain due to shear stresses.

Extensive damage from the quake was not limited to geological damage. Dr. Shi reported that “millions of people lost loved ones, their homes, and their belongings.” The human impact included 69,197 deaths, 18,341 people missing, 374,176 injured, 97,445 hospitalized, and 151 million people relocated. The direct economic disaster loss from the Wenchuan earthquake approached 1.7 trillion RMB (\$263 billion in US dollars).

The magnitude that the recovery effort required crystallized when Dr. Shi talked about the hundreds of thousands of relief workers involved in the recovery. Shi noted that in less than two years after the quake, more than 1.5 million homes have been rebuilt, 3.55 million homes have been reinforced, and 95% of the reservoirs in the region have also been reinforced.

In his closing remarks, Dr. Shi reminded participants that the sheer size of China, combined with its geographical location, the huge population and the environmental risks that China faces requires detailed analysis and modeling to help ensure effective risk management. He stressed “that it is not the quake itself that is so devastating, but the resulting response and recovery effort that takes a larger toll.”



**Sichuan Province, China 2008 - Landslide and rockfall caused by the Wenchuan Earthquake.**

- Beijing Normal University



Regional Interagency Steering Committee

FEMA Region VIII  
National Preparedness Division  
Denver Federal Center  
Bldg. 710  
Denver, CO 80225

### Editor

Lynn Pisano-Pedigo  
Preparedness Analysis Officer &  
RISC Coordinator  
FEMA Region VIII

### Layout & Design

Daniel J. Nyquist  
Preparedness Analysis Specialist  
FEMA Region VIII

### Special Contributors

William A. Tolbert  
RSVP Disaster Preparedness  
Lead Volunteer  
Volunteers of America

Phil Serrin  
FEMA Region VIII

Bonnie Sheffield  
FEMA Region VIII

Chara Hutchinson  
FEMA Region VIII

### Photography

Cheryl Layman  
FEMA Region VIII

## Next Meeting

November 8-9, 2011

USDA Forest  
Service

Auditorium

740 Simms Street  
Lakewood, CO 80401