SCHOOL PREPAREDNESS: LESSONS FROM THE GREAT SOUTHERN CALIFORNIA SHAKEOUT

Dr. Rebekah Green

Partners in Emergency Preparedness
April 6-7, 2010, Tacoma, WA
Overview

I. Background
   • Disaster Impacts to Schools
   • Disaster Prevention and Preparedness Policy

II. Context
   • The Great California ShakeOut
   • Observation and Assessment Team

III. Surveys & Observations
   • Preparedness Survey
   • Post-drill Survey
   • Post-drill Observations

IV. Considerations & Conclusions
School Disaster Impacts in California

- San Francisco, 1906
- Long Beach, 1933
- Kern County, 1952
- San Fernando, 1971
- Coalinga, 1983
- Loma Prieta, 1989
- Northridge, 1994
Long Beach, 1933: Children Died

- 2 children killed.
- Many more would have died if schools had been in session.

Collapse of John Muire School on Pacific Avenue.

Courtesy: W.L. Huber
Long Beach, 1933: Schools Destroyed

- 70 schools destroyed.
- 120 suffered major damage.

Photo courtesy: EERC, University of California, Berkeley

Roosevelt School, Long Beach, California
Long Beach, 1933: Education Disrupted

- School held in tents for 2 years

Compton Union High School, Los Angeles

Courtesy: of California, EERC, University Berkeley
Long Beach, 1933: Catalyst for Change

Jefferson Junior High School.

Courtesy: W.L. Huber
Long Beach, 1933: Action Taken

Passage of the 1933 Field Act, California’s first school safety construction legislation

Courtesy: EERC, University of California, Berkeley
1933 Field Act: Making New Schools Safer

- New building code for school construction to a higher standard.
- Safety of public schools became an important policy goal.
- Engineers, public officials, and general public united.
- Mandated building code and regulatory procedure for new school construction.
- Required review of school buildings upon request (by school board or 10% of local parents).

No damage reported to this one-story, wood-frame Field Act school in the 1966 Parkfield, CA earthquake.

Courtesy: EERC, University of California, Berkeley
1939 Garrison Act: Making Existing Schools Safer

- Required immediate examinations of pre-Field Act schools.
- Mandated modernization of non-Field Act compliant structures.
- Key problems: Non-enforcement, no time limits or deadlines.

Courtesy: Man and Element
Kern County, 1952: Testing the Field Act

- 20 schools damaged or destroyed
- Most damaged and destroyed schools were built before 1933
- >50% of pre-1933 schools were damaged

Courtesy: EERC, University of California, Berkeley

Collapse of Cummings Valley School
Kern County, 1952: Non-Structural Damage

Unsecured light fixtures like these in the Dawson Elementary School library would have caused many injuries if school had been in session.

Courtesy: Earthquake Engineering Research Institute
1968 Greene Act
& Geologic Hazards Legislation/

- Set deadlines for compliance with Garrison Act
- Set schedule for seismic retrofitting of pre-1933 schools – by 6/30/75
- Provided funding for school districts with insufficient funds for repair
- Mandated geological hazards studies for all new school sites
- Amended by 1972 Alquist-Prioto act prohibiting schools sited on fault zones. (eg. Berkeley closed 2 schools as a result).

Courtesy: Man and Element

School Preparedness Lessons from ShakeOut, Rebekah Green, WWU Resilience Institute
Coalinga, 1983: Non-Structural Hazards

- Minimal structural damage to schools
- Significant non-structural damage was catalyst for 1984 Katz Act

Photo Credit: NOAA
1984 Katz Act: Mandating Planning and Preparedness

Schools must plan and prepare for earthquakes (public and private elementary and high schools with >50 students)

Required:

- Periodic drills
- Training for students and staff in EQ safety and response
- Non-structural hazard mitigation
- Personal liability of superintendents and board members for non-compliance

Courtesy: EERC, University of California, Berkeley

Library, Lakeside Union Elementary School.
(Kern County, California)
Loma Prieta, 1989: Not All Field Act Schools Are Safe

- 5 schools seriously damaged (3 pre-Field Act, 1 Field Act, 1 damaged by collapsed freeway)
- 1 classroom collapsed in a post-Field Act school building (the first and only to date)
- Weakness of many reinforced-concrete structures demonstrated

Courtesy: EERC, University of California, Berkeley

Front view of older school showing column failures. (Watsonville, California)
Northridge, 1994: Non-Structural Hazards

- 24 of 127 affected schools suffered significant structural damage.

- If the earthquake had struck during school hours, nonstructural hazards would have made safe exit impossible for hundreds of children and teachers.

Courtesy: Earthquake Engineering Research Institute
1999 Assembly Bill 300: Seismic Safety Inventory

- 9,959 pre-1978 schools assessed on paper for structural safety by Office of State Architects
- Over 7,500 public schools buildings at potential risk
- Information initially available by school board request only
- In 4 years only 70 of 1,400 (3%) districts requested the information from State Architect’s office.
- Information not released to public until 2005
- No follow-up mandated or funded.
Signs of Success

- Since passage of Field Act, no school collapse or loss of life due to earthquake.
- Few Field Act schools have required demolition due to earthquake damage.
- Significant evidence shows Field Act standards are more effective than UBC standards.
- Public awareness of school seismic safety issues has increased.
- Clear understanding that public employees are disaster service workers.
- 1984 Katz Act clearly outlines emergency roles, procedures, ongoing training, and drills.
Remaining Challenges

- Private schools and portable classrooms not covered in Field Act
- Schools built before 1978 do not meet current standards and may be dangerous
- Some building categories have been exempted (leased, portable classrooms)
- School disaster plans remain untested in many cases
- Lack of basic drilling in some schools
- Non-structural hazards persist in schools
- Public may be unaware of specific risk

Photo Courtesy of Alma Calderon, 3rd Grade Students. www.shakout.org
Remaining Challenges

- **Complacency**
  - Fear of “Pandora’s Box”
  - Battling false sense of confidence that all schools are safe
  - Insufficient public pressure and demand

- **Need for aggressive inspection and plan review**
  - Opponents think it's too costly or time consuming
  - Quantity of work often exceeds staff capacity

- **Funding Gap**
  - Regulation without resources
  - Burden on school district creates competition between seismic safety and education

- **Dependence on local action rather than state-wide solution**
  - School construction funding insufficient and local tax-base dependent""
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The Great California
Shake Out

GET READY TO SHAKEOUT!

Register now for the 2010 ShakeOut on October 21 at 10:21 a.m.

More than 6.9 million Californians participated in 2009 to practice how to protect themselves during earthquakes, and to get prepared.

We now invite you to "Secure Your Space" to reduce damage and injuries.

Learn how to participate below.

Time to 2010 ShakeOut:
197 days 17:04:18

INTERACTIVE MAP

3 million
Participants and Counting!

Click the map for details about each area.

2009 Participants
Overall total: 6.9 Million

Click Map for Area Total

Are You Ready?
PREPARE — PROTECT — RECOVER

QUAKE QUIZ

PLAY BEAT THE QUAKE

DROP! COVER! HOLD ON!

ANNOUNCEMENTS

April 1 Baja California Magnitude 7.2 earthquake

Did You Feel It?

ShakeOut Email Updates

Why Drop, Cover, and Hold On?
ShakeOut Observation and Evaluation

- The Resilience Institute at Western Washington University

- Risk Red

Risk RED
Risk Reduction Education for Disasters
http://www.riskred.org
ShakeOut Observation and Evaluation

- Administer and Analyze two online surveys in conjunction with the 2008 ShakeOut
  - School Disaster Preparedness Survey
  - School Post-Drill Evaluation Survey
- Assembled a voluntary international research team of 13 school safety activists
- Provide schools with preparedness and planning tools and templates
School Participation 2008

- Opportunity to test state-mandated disaster plans
- 4 million children & adults participated at school sites
  - 207 school districts
  - 95 additional individual public schools
  - 650 private schools
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School Preparedness Survey

- Completed by 197 individual schools
  - 46% public
  - 53% private
  - 1% home school
- Schools notified through ShakeOut
- Voluntary, confidential
Preparedness Survey Findings

- Administrative level action
  - 95% stated their school has a preparedness committee
    - Virtually all included administration and teachers
    - 3/4 of public and 1/2 of private schools included staff
    - 1/3 had parents
    - 1/4 of high schools included students
    - 1/10 had community members or parents
  - Overwhelming majority had no plan for alternate schedules of continuing instruction during school closure
  - 78% of public and 37% of private schools had off-site, secured, backup records
Preparedness Survey Findings

Teacher and Staff level action

- $\frac{3}{4}$ of schools reported that all or most staff and teachers having reviewed school emergency plans in the last year and revised it.
- Only 14% of schools could confirm that all or most staff and teachers had completed their own family emergency plans.
- 92% reported staff and teachers knew they were disaster service workers.
Preparedness Survey Findings

- Teacher and Staff level action

### TABLE 6: INDIVIDUAL SCHOOLS REPORTING AT LEAST ONE OR MORE STAFF WITH SPECIFIC EMERGENCY RESPONSE TRAINING

<table>
<thead>
<tr>
<th>Emergency Response Training</th>
<th>Percent of schools having someone with training</th>
<th>Average number of staff with training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic First Aid</td>
<td>97%</td>
<td>8</td>
</tr>
<tr>
<td>How to turn off elect., water, gas</td>
<td>90%</td>
<td>2</td>
</tr>
<tr>
<td>Student release procedures</td>
<td>89%</td>
<td>6</td>
</tr>
<tr>
<td>Advanced First Aid</td>
<td>62%</td>
<td>2</td>
</tr>
<tr>
<td>Safety Training</td>
<td>60%</td>
<td>5</td>
</tr>
<tr>
<td>Psychological First Aid / Crisis Counseling</td>
<td>55%</td>
<td>2</td>
</tr>
<tr>
<td>Red Cross Disaster Class</td>
<td>31%</td>
<td>1</td>
</tr>
<tr>
<td>CERT</td>
<td>25%</td>
<td>3</td>
</tr>
<tr>
<td>Military</td>
<td>25%</td>
<td>4</td>
</tr>
<tr>
<td>SEMS/NIMS/ICS Training</td>
<td><strong>21%</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>Fire Suppression</td>
<td><strong>20%</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>Outdoor Survival Class</td>
<td>16%</td>
<td>1</td>
</tr>
<tr>
<td>Law Enforcement</td>
<td>14%</td>
<td>1</td>
</tr>
<tr>
<td>Amateur Radio (HAM)</td>
<td>13%</td>
<td>2</td>
</tr>
<tr>
<td>HAM DCS Training</td>
<td>3%</td>
<td>1</td>
</tr>
</tbody>
</table>

* Twenty-three individual school respondents did not answer any part of this question (12%).
Preparedness Survey Findings:

- **Students participation**
  - 80% of all students had practiced “Drop, Cover, and Hold On” in their classrooms
  - 1/3 schools had students engage in drill-related activities

- **Response provisions**
  - 66% had classroom “Go-bags”
  - 3/4 had sanitation and food for 72 hours
  - ½ had alternate communication, shelter and lighting
  - ¼ had alternate power
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School Post-drill Survey

- Completed by 378 individual schools
  - 53% public
  - 41% private
  - 6% Other
Post-drill Survey Findings

- 17% of schools did “Drop, Cover and Hold-on” drills only
- 55% did “Drop, Cover and Hold-on” and evacuation
- Average evacuation time 8 minutes

**TABLE 10. TYPES OF DRILL PRACTICED**

<table>
<thead>
<tr>
<th></th>
<th>Drop Cover and Hold on (DCH) only</th>
<th>DCH and Building Evacuation only</th>
<th>Full ICS/SEMS (including DCH &amp; building evacuation)</th>
<th>EOC drill</th>
<th>N*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Schools</td>
<td>17%</td>
<td>55%</td>
<td>30%</td>
<td>3%</td>
<td>397</td>
</tr>
<tr>
<td>Public schools</td>
<td>10%</td>
<td>50%</td>
<td>40%</td>
<td>5%</td>
<td>195</td>
</tr>
<tr>
<td>Private schools</td>
<td>25%</td>
<td>60%</td>
<td>20%</td>
<td>2%</td>
<td>174</td>
</tr>
<tr>
<td>Districts</td>
<td>7%</td>
<td>37%</td>
<td>63%</td>
<td>37%</td>
<td>43</td>
</tr>
</tbody>
</table>

*N=Total number of responding schools and districts. Since many reported performing more than one type of drill, percentages total more than 100%.*
Post-drill Survey Findings

Problems encountered during “Drop, Cover and Hold”

<table>
<thead>
<tr>
<th>Problem(s)</th>
<th>Individual Schools</th>
<th>Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>74%</td>
<td>71%</td>
</tr>
<tr>
<td>Distractions</td>
<td>11%</td>
<td>14%</td>
</tr>
<tr>
<td>Non-Participation (Staff)</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>Non-Participation (Students)</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Cutting School</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>11%</td>
<td>10%</td>
</tr>
</tbody>
</table>

*Forty-six (12%) of individual school respondents and nine (30%) of district respondents did not answer this question.*
### Post-drill Survey Findings

- District offices expect more problems than school sites

#### Expected Problems During a Real Disaster

<table>
<thead>
<tr>
<th>Type of Problem Expected</th>
<th>Individual Schools</th>
<th>Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelter</td>
<td>40%</td>
<td>57%</td>
</tr>
<tr>
<td>Student Reunion</td>
<td>35%</td>
<td>52%</td>
</tr>
<tr>
<td>Nutrition</td>
<td>29%</td>
<td>43%</td>
</tr>
<tr>
<td>Physical Safety</td>
<td>28%</td>
<td>10%</td>
</tr>
<tr>
<td>Educational Continuity</td>
<td>23%</td>
<td>62%</td>
</tr>
<tr>
<td>Health</td>
<td>17%</td>
<td>24%</td>
</tr>
<tr>
<td>None</td>
<td>16%</td>
<td>0%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>14%</td>
<td>19%</td>
</tr>
</tbody>
</table>

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Partners in Emergency Preparedness, April 7, 2010

School Preparedness Lessons from ShakeOut, Rebekah Green, WWU Resilience Institute
Post-drill Survey Findings

- Students or Staff with Disabilities Participating in the Drill

<table>
<thead>
<tr>
<th>Response</th>
<th>Percent of School Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Individual Schools</td>
</tr>
<tr>
<td>Yes, all</td>
<td>49%</td>
</tr>
<tr>
<td>Yes, some</td>
<td>6%</td>
</tr>
<tr>
<td>No, none</td>
<td>4%</td>
</tr>
<tr>
<td>No, not present</td>
<td>32%</td>
</tr>
</tbody>
</table>

*Twenty-nine individual schools (8%) and eight districts (27%) did not respond to this question.*

- Parents participating in the drill
  - 41% of the schools did not respond
  - <30% had parent involvement
  - Average of 10 parents involved
Perceived benefits of ShakeOut for individual schools

- Significant opportunity to improve school response (88%)
- Greater public awareness (84%)
- Opportunity to collectively improve response (80%)
- Opportunity to practice unified command and know they were practicing with other schools (71%)

Desired frequency of future ShakeOut

<table>
<thead>
<tr>
<th></th>
<th>Annual</th>
<th>Every 2 years</th>
<th>Every 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schools</strong></td>
<td>79%</td>
<td>17%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Districts</strong></td>
<td>76%</td>
<td>24%</td>
<td>--</td>
</tr>
</tbody>
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Post-drill Observations

- One private primary school
- One public middle school
- One public high school
- One district EOC
• Near universal DCH in classroom
• Complete lack of application outside classroom
• Spotty staff and teacher DCH
• Orderly and quick evacuations
• Assumptions of clear halls and breezeway
• Thorough, but slow, process of release
• Range of flexibility
• Little practice or anticipation of crowd control needs
• Confusion over changed procedures, but mutual support and learning evident
  • Keys but no numbers
  • Overlapping LSAR communication
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Improvements to Drilling

- Realism with the element of surprise
  - Vary when and where
  - Add injects to change scenario
  - Involve real parents
- Coordinate with EM districts
- Require all staff, students and visitors to participate: act as role models
Improvements to Preparedness

- Provide signage to direct concerned parents and promote calmness
- Consider special needs and students and staff with disabilities
- Consider emergency response issues that are external to the school site
- Before & after school transportation issues
- Include the community
Questions & Concerns

 How would the school deal with community members wanting to use the space for shelter, or wanting to congregate? How would the school seek to encourage or discourage community members seeking to help during an emergency?

 What plans are in place for students who are on school transportation vehicles during the time of an earthquake? Where will students wait for reunification with parents?
Questions & Concerns

- How prepared are schools to provide educational continuity following a major disaster?
- How prepared are school-site before and after-care organizations and daycares?
‘Our school wants to think that the drill is over, but it’s not. We need to let them know that this is only the first step.’

Parent participant in the ShakeOut

‘They all thought the drill was over at 11:00 am on the day of the ShakeOut, but we are just beginning. We need to now work on what the drill taught us.’

County Office of Education, Safety Representative
What is going on in Washington State
Approved by the Legislature in 2007, requires:

- Districts must adopt and implement a Safe School Plan
- All building principals to be ICS certified
- Schools required to conduct six fire evacuation drills
- Drills intended to satisfy federal requirements for comprehensive school emergency drills and evacuations

- Requirement for annual inventory and replenishment of supplies eliminated
- Only encouraged to conduct tabletops, functional exercises, full-scale exercises
- Earthquake drills only encouraged
Safety Planning Manual

- Cover
- Introduction
- Table of Contents
  - Chapter 1 - Safe School Plans
  - Chapter 2 - Emergency Rule Fire Codes
  - Chapter 3 - Definitions of Critical Terms for School Safety Plans
  - Chapter 4 - Guidance for School Shelter in Place/Drills and School Mapping System Drills
  - Chapter 5 - Training Guidance
  - Chapter 6 - Proposed K-12 School Emergency Communications Guidance
  - Chapter 7 - Guidance on School Transportation Involvement in School Emergency Preparedness Plans
  - Chapter 8 - Responding to Emergencies and Disasters: Proposed Recommendations for School Public Information Officers
  - Chapter 9 - Guidance on the Use of K-12 Public Schools as Emergency Shelters
  - Chapter 10 - Recommended Emergency Supplies for Schools
  - Chapter 11 - General Suggestions for Parent-Student Reunification Plans for Schools

Appendix A - Checklists
  - Comprehensive Safe School Plan Guidance Checklist (PDF)
  - Washington State Safe School Plan Compliance Checklist (PDF)

Appendix B - Local Emergency Management Contact Information (PDF)

Appendix C - Bulletins
  - Bulletin 105-07 (PDF)
  - Bulletin 025-08 (PDF)
  - Bulletin 060-08 (PDF)

Appendix D - Templates
  - Modified Lockdown Template (PDF) (Word)
  - Full Lockdown Template (PDF) (Word)
  - Shelter-in-Place Template (PDF) (Word)
  - Initial Guidance on Drills (PDF) (Word)
  - Model Emergency Drill Reporting Form (PDF)
“I encourage all citizens to increase their knowledge and awareness of proper safety measures to follow before, during and after a disaster” during Disaster Preparedness Month.

- Gov. Chris Gregoire
April is Washington State Disaster Preparedness Month.

April 21, 2010 at 9:45 am – 10:00 am businesses, schools and organizations will participate in “Drop, Cover and Hold”
Washington State Earthquake School Recovery Draft April 2010

PURPOSE
Supporting Washington State schools' earthquake preparedness and recovery planning is of critical importance for the safety of our students and for wider community recovery. Earthquake hazard is a significant risk in Western Washington. Past disasters from the Northridge Earthquake to Hurricane Katrina have shown that schools are better able to recover from a disaster if they have proper planning and preparation. This assessment aims to look at some issues and planning activities that can improve school recovery preparedness.

To assess school preparedness and recovery planning in Washington State, Western Washington University students researched disasters and their impacts on schools. They then drafted a school survey, which can be used to establish a baseline on school readiness for a major regional disaster, such as a large earthquake. The first section of the survey gathers background information; the survey then briefly covers school preparedness, transportation, and structural and non-structural mitigation—terms for the buildings physical safety precautions and standards. School principals should be able to answer many questions themselves, with some support from maintenance staff. The survey questions are designed to not only gather baseline information, but to inspire schools with ideas for how to be more resilient in the face of earthquake and other catastrophic events.

ANONYMITY
The Washington State Earthquake School Recovery Survey is intended to help Washington State assess and better support school disaster preparedness and recovery.

The survey does not ask for identifying information about the person taking the survey or individual schools. Answers to the survey will be reported at the county or regional level. Participation is completely voluntary.

This survey can be taken online at:
http://www.surveymonkey.com/s.aspx?sm=gSemew_2bbcasQzt5GI_2bu9Ww_3d_3d

Alternatively, completed paper copies of the survey can be mailed:
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Western Washington University
teachingl@wwu.edu, Shakes3@wwu.edu
Suite 212, Western Washington University
16 High Street, MS 0085
Bellingham, WA 98225-9055

http://www.surveymonkey.com/s.aspx?sm=gSemew_2bbcasQzt5GI_2bu9Ww_3d_3d
WHAT ARE OUR NEXT STEPS?