



JON M. HUNTSMAN, JR.  
Governor

GARY R. HERBERT  
Lieutenant Governor

# State of Utah

## UTAH SEISMIC SAFETY COMMISSION

PETER W. MCDONOUGH  
Chair

January 19, 2007

Kenneth H. Bullock, Executive Director  
& Lincoln Shurtz, Director of Legislative Affairs  
Utah League of Cities and Towns  
50 South 600 East, Suite 150  
Salt Lake City, Utah 84102

Re: Seismic Instrumentation to Meet State Needs

Gentlemen:

On behalf of the Utah Seismic Safety Commission, I wish to extend our sincere thanks to both of you and to the Utah League of Cities and Towns for ongoing efforts to facilitate the advocacy of seismic-instrumentation needs to the Utah State Legislature. Effective seismic monitoring of all earthquake-prone parts of Utah is fundamentally important to meet multiple state needs for emergency response, engineering of buildings and lifelines, and risk management.

The Commission unanimously endorses and advocates the detailed proposal drafted by the University of Utah Seismograph Stations for ***“Expanding Seismic Instrumentation and Rapid Earthquake-Information Products in the St. George–Cedar City Area and Rural Utah.”*** The Commission also endorses and urges the Legislature to consider the broader list of ***“Strategic Building Blocks for Effective Statewide Seismic Monitoring in Utah.”***

On a separate but also important matter, the Commission unanimously endorses—and urges the leadership of the State Legislature to fund—**seismic structural-response monitoring of the State Capitol**. In January 2003 the Commission wrote to state legislators supporting planned improvements to seismically strengthen the historic State Capitol building. Emplacing instrumentation within the Capitol for structural-response monitoring is a patently worthwhile investment. Information on this earthquake-engineering matter was brought to the attention of the House Speaker during a meeting last June, which one of you (Ken Bullock) attended together with Barry Welliver (then chair of the Commission) and Dr. Walter Arabasz.

The Commission strongly urges the Utah State Legislature to favorably consider the funding requests for earthquake-related instrumentation described above. (For the record, these are summarized in three enclosures, copies of which you already have in hand). We believe these are cost-effective investments to help reduce the vulnerability of Utah’s people, built environment, and economy to earthquake impacts.

For the Utah Seismic Safety Commission

Peter W. McDonough, chair

Enclosures

cc: Senator Peter C. Knudson  
Representative Michael T. Morley

Support staff:

Department of Natural Resources, Utah Geological Survey, PO Box 146100, Salt Lake City, UT 84114-6100  
telephone (801) 537-3300 • facsimile (801) 537-3400 • [geology.utah.gov](http://geology.utah.gov)

Department of Public Safety, Division of Homeland Security, 1110 State Office Building, Salt Lake City, UT 84114-1201  
telephone (801) 538-3400 • facsimile (801) 538-3770 • [homelandsecurity.utah.gov](http://homelandsecurity.utah.gov)

## Expanding Seismic Instrumentation and Real-time Earthquake Information Products in the St. George-Cedar City Area and Rural Utah

### IN A NUTSHELL

- ❑ Need for improved seismic monitoring and real-time earthquake information products in the dramatically growing St. George-Cedar City area and quake-prone parts of rural Utah
- ❑ Needed for emergency response, earthquake engineering of buildings and lifelines, and risk management
- ❑ For a solid start: 10 new regional and 12 new urban strong-motion seismic stations
- ❑ Cost: \$420,000 one-time; \$125,000 ongoing

### CAPABILITIES FOR REAL-TIME EARTHQUAKE INFORMATION

#### Wasatch Front

The University of Utah Seismograph Stations (UUSS) plays a critical role in meeting the state of Utah's many needs for earthquake data and information.

UUSS operates a network of 160 urban and regional seismic stations in the Utah region, most of which are in or around the Wasatch Front urban corridor.

Since 2000, UUSS researchers have obtained more than \$3 million in federal funds to create and operate a new real-time earthquake information system (sensors, telecommunications, hardware and software) **in the Wasatch Front area** as an element of an Advanced National Seismic System (ANSS):

- Automated earthquake alerts (magnitude and location) to emergency managers and the Web within a few minutes
- "ShakeMaps"—computer maps showing severity and extent of actual ground shaking—within 5 min of a disruptive earthquake

- Digital recordings of strong ground shaking for rapid post-earthquake damage assessment and earthquake engineering design

#### Need to Extend Capabilities to Southwestern & Rural Utah

**Earthquakes in Utah are not just a Wasatch Front problem.** But seismic instrumentation in other earthquake-prone parts of the state is sparse, mostly outdated, and generally inadequate to meet growing needs for hazard assessment, emergency mgt., and earthquake engineering. Reasons for improved seismic monitoring:

- Dramatic population growth in southwestern Utah
- Seismic vulnerability and engineering of lifelines (power, water, transportation, communications, fuel pipelines) throughout ~100-mile-wide seismic belt transecting Utah from St. George to the Idaho border
- Energy development (coal, oil, and gas production) in central and NE Utah linked to known and potential induced seismicity

#### What's Needed?

For a solid start, significant gains can be made with a strategic combination of 10 new regional stations and 12 new urban strong-motion stations:

- 13 stations in and surrounding the St. George-Cedar City area
- 7 stations in other seismically active parts of southwestern Utah (e.g., near Richfield, Beaver, Panguitch, and Kanab)
- 2 stations in Uinta Basin near Vernal and Duchesne

#### Estimated Cost

For installation, maintenance, and operation of 22 new stations: \$420,000 one-time, \$125,000 ongoing. State line-item to UUSS is now \$424,300 /yr (37% of UUSS budget for monitoring and research in the Utah region).

#### Benefits

- Real-time earthquake information for emergency response and public awareness
- Automated maps (ShakeMaps) of strong ground shaking for rapid impact and loss estimation
- ShakeMaps can be input to FEMA's HAZUS loss-estimation software to fast-track federal disaster declarations
- Data for cost-effective earthquake engineering of buildings and infrastructure
- Improved understanding of earthquake hazards for science, planning, and insurance

#### SEISMIC MONITORING SERVES MULTIPLE STATE NEEDS

Seismic monitoring serves diverse government agencies in Utah responsible for emergency services, natural hazards, transportation, dam safety, mine safety, insurance, risk management, trust lands administration, and facilities construction and management, among others.

UUSS and the **Utah Seismic Safety Commission** are jointly committed to improving seismic monitoring in Utah to help safeguard Utah's people, built environment, and economy.

## Strategic Building Blocks for Effective Statewide Seismic Monitoring in Utah

	<b>Building Blocks—Ranked in Priority University of Utah Seismograph Stations (UUSS)</b>	<b>One-time Costs (thousands of dollars)</b>	<b>Ongoing Annual Costs (thousands of dollars)</b>
<b>1.</b>	<b>Base Proposal for a Solid Start</b> (10 new regional, 12 new urban seismic stations in St. George-Cedar City area and parts of rural Utah)	420 <sup>1</sup>	125 <sup>1</sup>
<b>2.</b>	<b>0.75 FTE Seismologist</b> (important for effective completion and leveraging of all other building blocks—and to better meet varied state needs for earthquake data and information)		82 <sup>2</sup>
<b>3.</b>	<b>Continuity of Earthquake Monitoring &amp; Reporting in Event of Large Wasatch Front Earthquake</b> (includes (a) backup systems outside the Wasatch Front area for receiving and processing network data and (b) robust telemetry routing to ensure emergency recording of Utah seismic data by the National Earthquake Information Center in Golden, Colorado)	300	120 <sup>3</sup>
<b>4.</b>	<b>Effective Delivery &amp; Use of Near-Real-Time Earthquake Alerts</b> (upgraded notification software, video-conferencing connectivity to state Emergency Operations Centers, training workshops for emergency responders throughout quake-prone parts of Utah)	25	---- <sup>4</sup>
<b>5.</b>	<b>20 Additional Urban Strong-Motion Stations</b> in cities and towns outside the Wasatch Front area (Richfield: 6 stations; Uinta Basin : 4 stations; St. George-Cedar City area: 5 stations; other cities/towns to be determined by engineering advisory board: 5 stations) @ \$12.5 K per station	250	74 <sup>5</sup>
<b>6.</b>	<b>7 Additional Regional Stations in Sevier Valley Area</b> (to be added in region where eight historical earthquakes of magnitude 5 and larger have occurred between Richfield and Marysvale) @ \$21K per station	147	20 <sup>6</sup>
<b>7.</b>	<b>Leveraged Addition of 10 Regional Stations to Statewide Network</b> (conversion of temporary high-quality stations of a “rolling” USArray experiment, funded by the National Science Foundation’s EarthScope project to study Earth structure, to permanent stations of Utah’s statewide network) @ \$30K per station)	300	29 <sup>7</sup>
	<b>Totals</b>	<b>1,442</b>	<b>450</b>
	<sup>1</sup> See <i>Concept Proposal</i> for detail <sup>2</sup> Salary plus benefits <sup>3</sup> 1.0 FTE computer/communications engineer (salary plus benefits) plus ~\$35K/yr telemetry charges [Note: IT engineer important not just for this continuity module but for all network operations] <sup>4</sup> Costs to be absorbed by UUSS in partnership with State Office of Emergency Services <sup>5</sup> 0.50 FTE seismograph engineer/technician (salary plus benefits) plus telemetry, supplies & travel @ \$1800/station <sup>6</sup> 0.10 FTE seismograph engineer/technician (salary plus benefits) plus telemetry, supplies & travel @ \$1800/station <sup>7</sup> 0.15 FTE seismograph engineer/technician (salary plus benefits) plus telemetry, supplies & travel @ \$1800/station		

## ***Earthquake Engineering Need Reported to House Speaker on June 21, 2006***

### **Seismic Structural-Response Monitoring of State Capitol**

#### **Explanation**

- Important to structural engineers for evaluating the performance of the seismically retrofit Capitol (enables the effectiveness of the base isolators to be evaluated, even at a low level of seismic shaking)
- If structure is hit by a damaging quake, can pinpoint where damage is—even if hidden
- Best contracted to—and done by—experts of the U.S. Geological Survey's National Strong-Motion Program
- If done, important to do before walls are closed during remodeling process (for access to structural elements in the building)
- For comparison, the cost of instrumenting the Wallace F. Bennett Federal Building in Salt Lake City was approximately \$170,000

#### **Cost Estimate**

- One-time: \$200,000
- Ongoing: Relatively minor; U.S. Geological Survey would have to provide quote (likely about \$10,000 per year)