



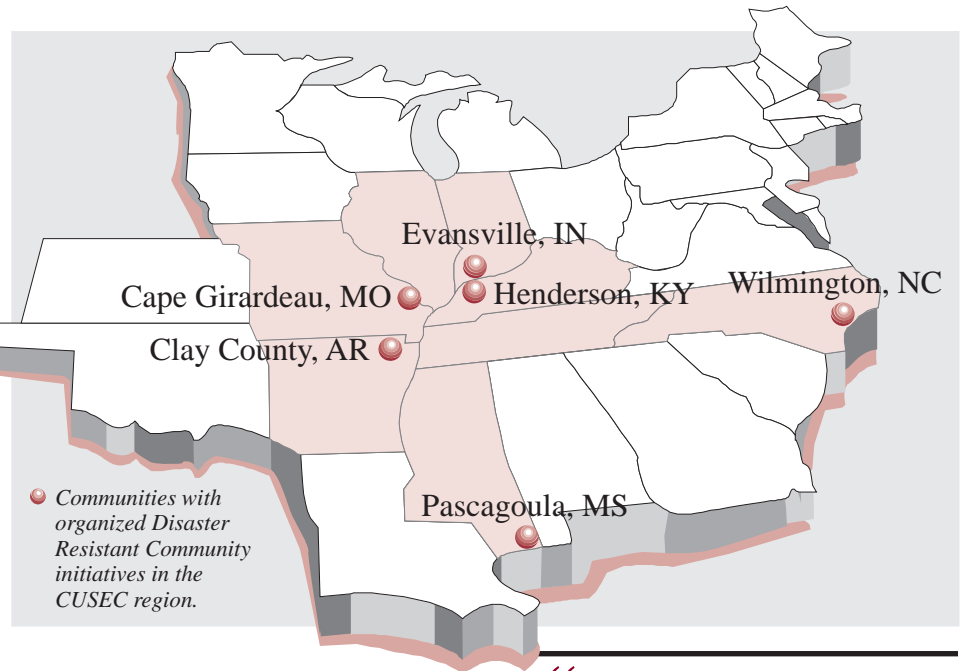
ACHIEVING EARTHQUAKE RISK REDUCTION THROUGH COMMUNITY-BASED PARTNERSHIPS

Against a backdrop of recurring losses from natural disasters, communities throughout the Central U.S. and across the nation are beginning to embrace a new approach to hazard mitigation and business loss reduction. The premise behind the Disaster Resistant Community (DRC) initiative is straightforward: disaster losses in this country continue to escalate, creating misery and economic hardship for communities. Yet, we clearly have the knowledge, experience, tools and ability to *reduce future losses* from earthquakes, floods, tornadoes, and other natural disasters.

What is needed is a community-based approach to reducing risk that involves all elements of the community—business, government, community organizations, local universities, and others—in a broad-based Disaster Resistant Community initiative to identify the risks, and to develop a long-term, sustainable strategy in partnership with FEMA, State government, non-profit organizations (e.g. CUSEC, Institute for Business and Home Safety) to reduce the risks from natural disasters.

CUSEC Annual Conference - June 14-16, Louisville, KY - to focus on Disaster Resistant Community initiatives (see article on page)

This Special Issue of the *CUSEC Journal* is devoted to Disaster Resistant Communities, with emphasis on how this initiative can be used to promote the *implementation* of earthquake risk



reduction policies and programs at the community level. With the creation of the Mid-America Earthquake Center (see article) in 1997, there is an unprecedented opportunity in the Central U.S. to develop a unified strategy to reduce the earthquake risk in this region that capitalizes on the momentum generated by the Disaster Resistant Community initiative.

“With the creation of the Mid-America Earthquake Center in 1997, there is an unprecedented opportunity in the Central U.S. to develop a unified strategy to reduce the earthquake risk in this region”

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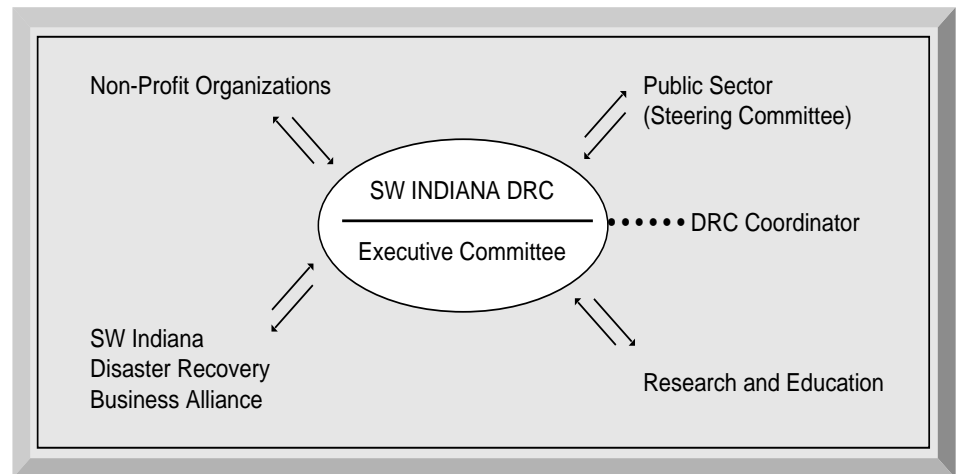
Finally, as more communities actively pursue this community-based approach to reducing future losses from disasters, lessons are beginning to emerge from these experiences. Some of these lessons are captured in this issue of the Journal and are intended to help community leaders, business leaders and others who are giving thought to initiating a DRC program in their community.

GETTING ORGANIZED

One unique aspect of the DRC initiative is the unprecedented effort to engage and actively involve key decision-makers in government, business, research and academia, non-government and voluntary organizations, community activists, and others. Each group has a role and contribution to make in a long-term effort to make a community—including the business sector—“resistant” or at least more “resilient” to natural disasters.

In getting organized, there are a number of issues to address and decisions to make, including:

- The goals, objectives and expectations of the organization(s), what groups it will be accountable to (e.g., report to).
- How to recruit and actively involve the business leadership of the community in the DRC initiative.
- The geographic area of the DRC initiative (e.g, city, city-county, multi-county).
- Committees that need to be formed (e.g, Education and Outreach) to advance the goals and objectives of the organization and how the progress of these committees will be measured.
- Resources (financial and in-kind) that will be needed to sustain the organization.



Southwestern Indiana Disaster Resistant Community model.

- Role and contributions of external partners (e.g., State, FEMA/federal, CUSEC, Institute for Business and Home Safety, etc.) in establishing and accomplishing goals and priorities.
- Recruitment of a program coordinator who can serve as the point of contact for the DRC program.

Evansville-Vanderburgh County, Indiana has elected to pursue a regional approach to developing a Disaster Resistant Community initiative. The decision to take a regional approach was influenced by at least three factors: 1) the flood and earthquake hazards are regional, which calls for a regional loss reduction strategy; 2) business and industry—including several multi-national companies in surrounding counties—will be a driving force in the SW Indiana DRC initiative, warranting a regional loss reduction strategy; and 3) a regional approach can take advantage of an economy of expertise and effort. It is envisioned that many of the products and services (e.g, training, demonstration projects, etc.) that are developed by the Evansville-based DRC initiative can be shared with surrounding counties.

As reflected in the organizational diagram, the SW Indiana DRC will coordinate policy, planning, program development, priority setting, funding, and draw upon resources, input and expertise from at least four sources: 1) Public—including local, State, and federal government; 2) Research and academia - including the University of Evansville, State geologists, and the Mid-America Earthquake Center; 3) Private—including the Disaster Recovery Business Alliance and Metropolitan Evansville Chamber of Commerce; and 4) Non-profit/voluntary sector—including CUSEC, American Red Cross, and others.

Clay County, Arkansas, a rural community in the northeastern part of the state, has launched its own Disaster Resistant Community initiative. This effort is led by the Clay County Disaster Preparedness Council, a community-based group of elected and appointed officials, civic and volunteer groups (notably the American Red Cross), and

FEMA'S PROJECT IMPACT GAINS MOMENTUM

Under the leadership of Director James Lee Witt, FEMA has launched *Project Impact*, a national initiative to support the creation of Disaster Resistant Communities across the nation. This year, seven pilot communities have been selected to demonstrate the benefits of disaster mitigation, including the importance of developing public-private partnerships. These communities are: Pascagoula, MS, Deerfield Beach, FL, Wilmington/Hanover County, NC, Oakland, CA, Seattle, WA, Allegany County, MD, Randolph County, Tucker County, WV.

There are at least four fundamental principles associated with the Disaster Resistant Community concept:

- 1) Communities must build a partnership of all elements of the community that can work together towards the common goal of saving lives and protecting property;
- 2) Communities must undertake a program of risk identification so that they clearly know the magnitude and types of threats that are faced every day;
- 3) Communities must identify what they are going to do to mitigate against and prepare for these threats and lay out a program to address these issues; and
- 4) Communities must get support to initiate these programs from all segments of their population.

Project Impact: Building Disaster Resistant Communities (1997, 48pp. , free from FEMA Publications Center, (800) 480-2520) outlines a step by step process for organizing a Disaster Resistant Planning Committee, recruiting and motivating members, creating alliances, identifying and prioritizing risk reduction actions, and establishing a long-term, community-based program that can be tailored to the unique characteristics of communities across the Central U.S. and the nation.

businesses. The Arkansas Office of Emergency Services has taken the lead role in providing technical and organization support, as well as seed funding for start-up projects.

Clay County, with a population of 8,000, mirrors many rural communities in the Central U.S. The Clay County DRC initiative can serve as a rural community model for this part of the country, demonstrating the tangible benefits of cooperation between business and the community leaders in a long-term effort to reduce community vulnerability to natural disasters.

Meanwhile, a third Disaster Resistant Community initiative is underway in **Cape Girardeau, Missouri**—a flood prone community of 30,000 in the Bootheel section of the state—which is also in the heart of the most seismically

active part of the New Madrid Seismic Zone. Cape Girardeau recently formed a DRC Steering Committee, drawn from community and business leadership, to direct and coordinate that community's DRC initiative, with support from the State Emergency Management Agency, FEMA, and other organizations, including CUSEC. In a significant move, Cape officials appointed a DRC coordinator, Walter Denton, who is the Administrative Assistant to the City Manager.



SHOWCASE COMMUNITIES

Another major community-based initiative is the *Showcase Communities Program*, sponsored by the Institute for Business and Home Safety, which is designed to demonstrate the benefits of taking specific, creative steps within an entire community to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters.

The Showcase Communities program has three key objectives:

- 1) Help a community help itself by reducing its vulnerability to hurricanes, earthquakes, tornadoes, wildfires, floods, or whatever natural disaster threatens it.
- 2) Generate a “me too” attitude among other communities by showcasing the successful efforts of particular jurisdictions.
- 3) Learn what works and what does not work to reduce the emotional and financial devastation caused by natural disasters.

IBHS has established 14 areas for participation in the program:

- Formally commit to participation by adopting a formal resolution to that effect.
- Complete a risk assessment of its natural hazards or agree to do so.
- Adopt or agree to adopt the latest version of one of the model building codes as the minimum code and enforce it.
- Complete a land use plan that delineates the relevant hazards and incorporates them as factors in all land use decisions.
- Participate in the National Flood Insurance Program (NFIP) if in a floodplain and apply for/participate in the NFIP’s Community Rating System.
- Receive a suitable Fire Suppression Rating System grade from the Insurance Services Office (if a community is vulnerable to wildfire, be a participant in an Incident Command System and mutual aid agreements).
- Maintain emergency response and post-disaster recovery plans in place.
- Develop programs to increase the public’s awareness of natural hazards and ways to reduce or prevent damage.
- Incorporate natural hazard awareness and reduction programs into its school curriculum.
- Support IBHS and its partners in the non-structural retrofit of non-profit child care centers.
- Offer mitigation training to building design and construction professionals.
- Develop public sector incentives for mitigation to complement private sector financial incentives developed by IBHS and its partners.
- Develop inspection and certification procedures for incorporating mitigation into new construction and retrofit of existing buildings.
- Develop a Disaster Recovery Business Alliance.

Among the first tasks of a DRC Steering Committee is to clarify its mission, goals and objectives, to recruit members, and to establish a subcommittee structure to carry out the work of the DRC. The following section examines five potential elements of a Disaster Resistant Community strategy with emphasis on setting goals, establishing priorities, recruiting members, and identifying resources to carry out the initiatives.

HAZARD AND RISK ASSESSMENT

In communities throughout the Central U.S., decisions are made on a daily basis on the siting, design and construction of new development, and these decisions are often made without the benefit of accurate information on the nature of hazards and their consequences.

“Among the first tasks of a DRC Steering Committee is to clarify its mission, goals and objectives, to recruit members, and to establish a subcommittee structure to carry out the work of the DRC.”

The starting point for a Disaster Resistant Community initiative is a comprehensive assessment of community and business risk to earthquakes, floods, and other natural as well as technological hazards. The Hazard and Risk Assessment can provide a baseline of information on community and business vulnerability and can be used by leaders to set reasonable performance objectives and priorities for hazard mitigation, response, and recovery.

Hazard and Risk Assessment, then, is central to planning for earthquake mitigation, response, and recovery. Officials in the public and private sectors are more inclined to invest in mitigation if they have reliable information on *potential losses* (economic and social)

from earthquakes and other hazards, and the *potential benefits*—short term and long term—from adopting and implementing mitigation measures.

Sample Goal: To develop a comprehensive, all-hazards risk assessment that can be used by the Disaster Resistant Community Steering Committee and others to establish priorities, develop risk reduction programs and measure progress.

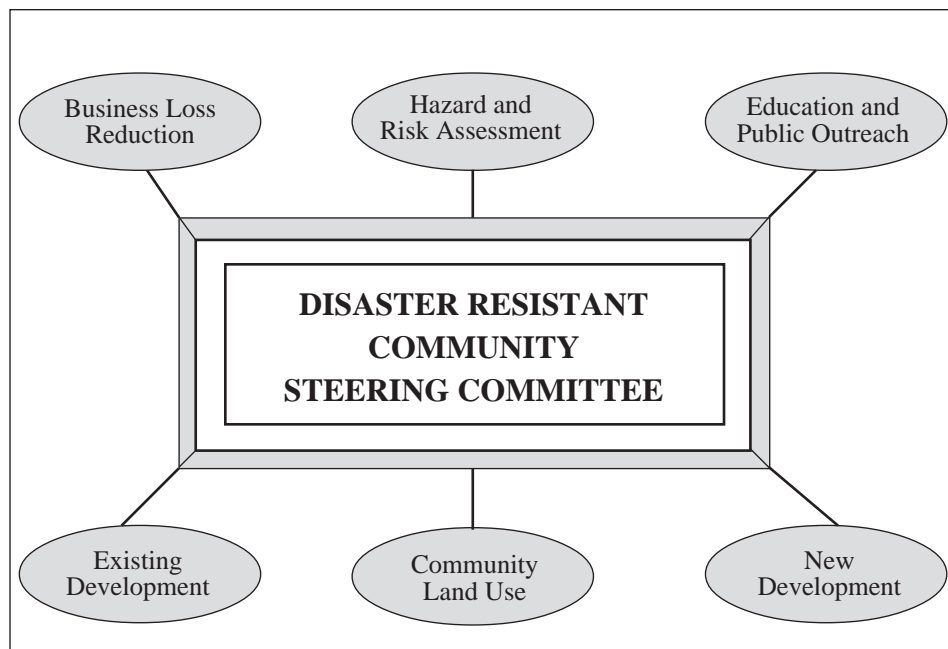
Strategy Considerations:

1. Getting organized and assessing needs.

Among the tasks that need to be considered include: forming a Hazard and Risk Assessment Committee; identifying, gathering and consolidating hazards information (maps, building inventory data, etc.); identifying gaps in hazard and risk assessment data; determining how the information is going to be used, including how the information can be used to establish a “vulnerability baseline” against which to measure progress in reducing vulnerability.

2. Recruiting committee members.

There are a variety of knowledgeable individuals who can assist in conducting a Hazard and Risk Assessment. At the State and local level, expertise includes: CUSEC State geologists, State and local emergency managers (including Earthquake Program manager), State Floodplain manager, business continuity planners from the private sector, local government “area planners,” natural resource professionals, and researchers from local university or hazards center. Among federal agencies, FEMA’s regional offices can be consulted in developing a hazard and risk assessment.



CUSEC’s DRC Model is designed to bring community officials together to develop a mitigation strategy that is organized around at least six goal areas.

3. Identifying resources to support this goal. The tools that are available to support earthquake hazard and risk assessment fall into at least three categories: seismic hazard maps; building vulnerability surveys; and loss estimation methodologies (including FEMA’s HAZUS).

Seismic hazards maps show where earthquakes are likely to cause damage. They provide scientific information regarding expected future locations and probabilities of ground shaking and ground failure from earthquakes. This information is important for making decisions regarding the safety of new or existing buildings. Examples of seismic hazards maps:

- *Earthquake Hazards Map of the St. Louis, Missouri, Metro Area* (1: 100,000 scale, prepared by the Missouri Department of Natural Resources, 1995) shows potential for severe and moderate liquefaction, soil amplification, landslide potential, and collapse potential.

Building vulnerability surveys can be used to identify structures that are vulnerable to earthquakes, floods, and high winds. As an example:

- *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook* (FEMA-154, 1988). This handbook presents a method for quickly identifying buildings posing risk or death, injury, or severe curtailment in use following an earthquake. The “ATC-21” methodology can be used by trained personnel to identify potentially hazardous buildings on the basis of a 15 to 30 minute exterior survey.
- *Inventories of Essential Facilities in Mid-America* (Mid-America Earthquake Center). This project will assemble GIS inventories of essential facilities in the seven CUSEC states.

HAZUS - FEMA's Earthquake Loss Estimation Methodology. Developed by FEMA, HAZUS is intended to provide local, state, and regional officials with a user-friendly risk assessment tool to forecast future losses from scenario earthquakes. For a given magnitude earthquake, the "loss estimation methodology" will describe the scale and extent of damage and disruption that will result, including:

- *Quantitative estimates of losses*, including direct costs for repair and replacement of damaged buildings and

lifeline system components; direct costs associated with loss of function (e.g., loss of business revenue); casualties; people displaced from residences; quantity of debris; and regional economic impacts.

- *Functionality losses*, including loss-of-function and restoration times for buildings, critical facilities such as hospitals, and components of transportation and utility lifeline systems and rudimentary analysis of loss-of-system function for electric distribution and potable water systems.

- *Extent of induced hazards*, including fire, flooding, and hazardous materials releases.

HAZUS can be a valuable tool in forecasting potential losses to transportation, utilities, and other regional infrastructure that is so important to business continuity.

EDUCATION AND PUBLIC OUTREACH

The key to reducing loss of life, personal injuries, and damage from earthquakes and other natural disasters is widespread public awareness and education. People must be made aware of what natural hazards they are likely to face in their own communities. They should know in advance what specific preparations to make before an event, what to do during an earthquake, flood, tornado, or other likely event, and what actions to take in its aftermath.

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Education and public outreach is the foundation for a Disaster Resistant Community initiative. Put another way, a community whose citizens are informed, educated and prepared will fare much better in a disaster. Fewer resources will have to be devoted to response. Recovery will be expedited, including business resumption.

An Education and Public Outreach program should be tailored to the information needs of a broad range of target groups, including: public officials, school children, families, professional groups, the workplace, and critical facility managers (hospitals, police and fire, shelters).

HAZUS TRAINING AND DEMONSTRATION PROJECT IN EVANSVILLE

In support of the Southwestern Indiana Disaster Resistant Community initiative, the Central U.S. Earthquake Consortium and partner organizations—including FEMA and the Indiana Emergency Management Agency—have selected Evansville-Southwestern Indiana as a pilot for a HAZUS demonstration project.

The goal of the project is to develop a successful model of the *application* of HAZUS to support a community DRC initiative. The project has four components: 1) Training of an interdisciplinary team of geologists, local government officials, university engineering students, and business risk managers; 2) Development of a strategy to gather and input the inventory data; 3) Application of HAZUS to support the planning efforts of the Southwestern Indiana Disaster Resistant Community initiative, and Disaster Recovery Business Alliance; and 4) Preparation of a report that documents the step-by-step process followed in the Evansville Demonstration Project, to be available to other communities that are considering using HAZUS.

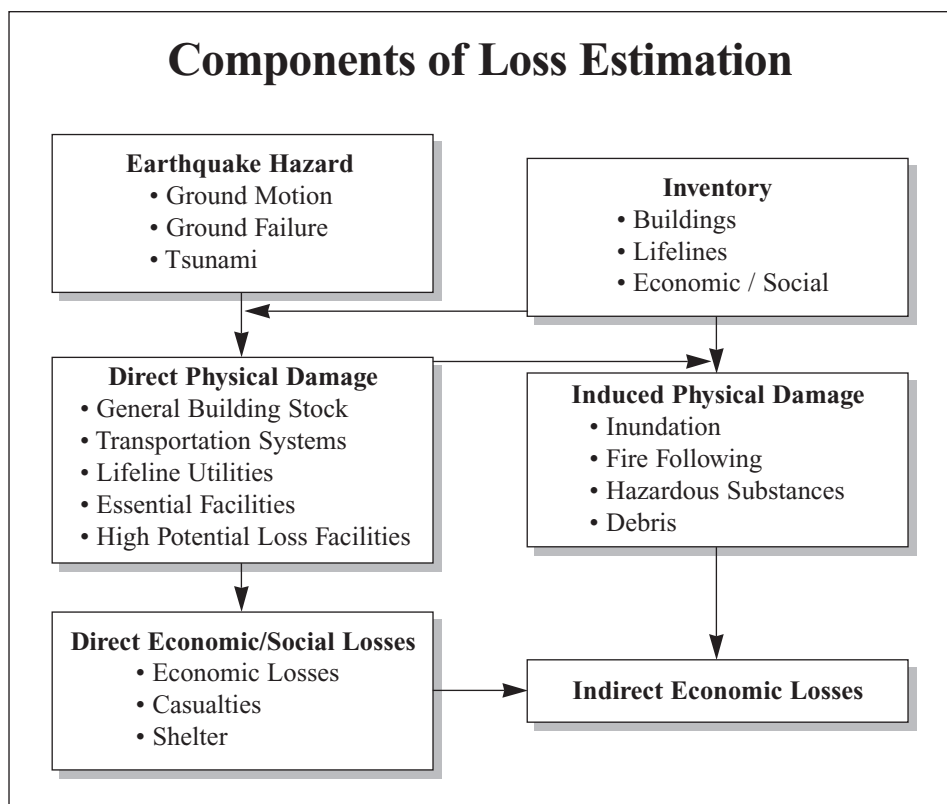
After the two and one-half day training and strategy session, the group agreed that: 1) the Area Plan Commission would take the lead in gathering the inventory data with priority given to: Essential Facilities, Geological data, Transportation Lifelines, Utility Lifelines, and Hazardous Materials (General Building Stock would be entered in a second phase effort); 2) the University of Evansville would establish a “HAZUS station” in the Engineering Department and take the lead in inputting the data; and 3) the SW Indiana DRC Steering Committee would oversee the development, at least initially, of potential strategies for the application of HAZUS to support decision making, mitigation planning and priority setting, scenario development for response and recovery planning, and other HAZUS applications. Finally, it is hoped that HAZUS can become a “hook” to get the business community in Southwestern Indiana further involved in the DRC initiative.

Special efforts should be made to reach and plan for the care of particularly vulnerable segments of the population— latch-key children, the elderly, individuals in health care and correctional facilities, people with disabilities, and those who do not speak English—with information about possible disasters and what to do in an emergency.

Sample Goal: To develop and implement a program and strategy to raise the public awareness of natural hazards, and measures that can be taken to improve disaster preparedness and promote mitigation.

Strategy Considerations:

1. Getting organized and assessing needs. Among the tasks that need to be considered include: identifying target groups for an all-hazards public outreach and education campaign; identifying community partners (e.g., American Red Cross, local chamber of commerce, volunteer and community-based organizations)—as well as “external” partners (e.g., State Emergency Management Agency) to collaborate with in developing a community-based program; inventorying education and public outreach programs and materials that are available, and appropriate for target groups; identifying “measurements of progress” to gauge the success of the program; and forming an Education and Public Outreach Committee to coordinate this aspect of the program.
2. Recruiting committee members. Education and public outreach programs can be an excellent way to galvanize support for a local DRC initiative, and to establish momentum. Committee members can be drawn from the local emergency management agency, volunteer and community-based organizations, American Red Cross, local chamber of commerce, and community schools, including local colleges or universities.



3. Identifying resources to support this goal. A number of sources can be consulted for information on earthquake preparedness and mitigation, including the American Red Cross, FEMA, USGS, and State

emergency management agencies (see Sources of Information and Technical Assistance for website information). The new Mid-America Earthquake Center also has an Education program.

CLAY COUNTY IS “COOKING.”

To build support for the Clay County Disaster Resistant Community initiative, the Clay County Disaster Preparedness Council sponsored a fish fry which drew an estimated 120 people. The three hour program featured a range of speakers, including Richard Simmons, Arkansas State Representative and champion of earthquake risk reduction, Bud Harper, State Director of the Office of Emergency Services, and a number of State and community officials with a role in disaster preparedness.

The Clay County initiative has already produced results. Dan Cicirello, Earthquake Program Manager, announced that gas valve shut-off devices will be installed in each of the county’s four schools, as part of the Disaster Preparedness Council’s effort to focus on schools and school safety. Another program, funded in part by FEMA, is targeting a county school for a non-structural retrofit, which will demonstrate cost-effective techniques that can be readily applied to promote school safety and minimize injuries in the next earthquake.

Clay County, with a population of 8,000, mirrors many rural communities in the Central U.S. The Clay County DRC initiative can serve as a rural community model for this part of the country, demonstrating the tangible benefits of cooperation between business and the community leaders in a long-term effort to reduce community vulnerability to natural disasters.

SHOWCASE COMMUNITY INITIATIVES

The Institute for Business and Home Safety and its partners are working closely with the Southwestern Indiana DRC Steering Committee in a broad based program to improve community awareness of hazards and their consequences and to educate design professionals, contractors, home inspectors, and other key officials who are well positioned to influence design and construction practices in Evansville and its environs. An Education and Public Outreach Committee has been established under the leadership of Kathy Schoettlin of the American Red Cross. The committee—whose members are drawn from varied professions, disciplines and backgrounds—have developed a program that is guided by the following goals or criteria of a Showcase Community Program:

- Develop programs to increase the public's awareness of natural hazards and ways to reduce or prevent damage (Showcase Community criteria).
- Incorporate natural hazard awareness and reduction programs into its school curriculum.
- Support IBHS and its partners in the non-structural retrofit of non-profit child care centers.
- Offer mitigation training to building design and construction professionals.

Progress Report

- Establishment of a student intern program at the American Red Cross, a group of twenty students who will be carrying the preparedness and prevention message to their peers.
- First phase implementation of the IBHS-sponsored non-structural retrofit of child care centers program.
- Meetings with parochial and public school principals in Evansville and a presentation on preparedness and prevention to all southern Indiana school superintendants.
- Collaboration with Evansville-Vanderburgh County Building Commission and the Professional Training Institute (PTI) to develop and implement, over the next two years, continuing education courses on 1) floodproofing and proper floodplain construction; 2) earthquake mitigation for contractors, subcontractors and architects; and 3) financial incentives for homeowners who carry out designated mitigation measures. Many of these programs will be featured at the Annual Contractor Continuing Education Trade Show, October 22-24, 1998, in Evansville.

4. Measuring progress. A DRC Education and Public Outreach Committee should, at a minimum, keep records of target groups that are reached with educational and public outreach materials. Follow-up surveys can determine if these groups are taking action to improve preparedness at home and/or the workplace. Other measurements can be identified by the Committee in consultation with

expertise in the education field (e.g., researchers with the Mid-America Earthquake Center).

EXISTING DEVELOPMENT

Communities in the Central U.S. have high concentrations of unreinforced masonry buildings (URMs) and other *hazardous* structures that pose a risk to our citizens—at home and in the work-

place—in the event of an earthquake. Other existing structures are located in areas that are chronically subject to flooding. Thus, a major challenge for local officials is *how to address the vulnerability of existing hazardous buildings and utilities* in a manner that is sensitive to the political, social, and economic realities of the community.

“...a major challenge for local officials is how to address the vulnerability of existing hazardous buildings and utilities in a manner that is sensitive to the political, social, and economic realities of the community.”

The basic argument for the seismic strengthening or *rehabilitation* of buildings is that strengthened buildings are less likely to fail during an earthquake, thereby resulting in fewer casualties, a lower demand on urban search and rescue teams, emergency medical services, emergency shelter, and other services.

From a commercial perspective, less damage to structures means that more businesses will survive an earthquake. Buildings and inventories will be better protected, business interruptions will be reduced, and business resumption times shortened. Recent disasters have shown that the pace of community recovery is closely tied to business and economic recovery.

From a governmental sector perspective, less damage to structures means that key government agencies that manage and coordinate State and local housing, human services, finance and administration, planning and community development, natural resources and other services - can resume normal operations in a more efficient manner, thereby expediting response and recovery.

Finally, it is important to assess opportunities for *cross-hazard* mitigation programs (e.g. measures that improve resistance to floods, wind, and/or ground shaking). Or conversely, to ensure that mitigation measures for one hazard (building elevation for flooding) do not inadvertently increase exposure to another hazard (e.g., increased exposure of an elevated building to ground shaking).

Sample Goal: To develop and implement a program to reduce the vulnerability of existing development (buildings and lifelines) to the effects of earthquakes and other natural hazards.

Strategy Considerations:

1. Getting organized and assessing needs.

One of the first questions the committee will have to address is, “What categories of existing development (buildings and lifelines) should receive priority in adopting and implementing structural or non-structural mitigation measures?” For example, in developing a strategy for existing development, a DRC committee may want to establish *performance* objectives for different categories of development, including:

- Public facilities (e.g., schools and government buildings) and electric utilities. For example, community leaders may decide that these facilities and systems should be able to be repaired and occupied or used shortly after a disaster.
- Facilities essential to emergency response (police, fire, emergency operations centers, emergency communications). For example, community leaders may decide that these facilities should be designed and built to function immediately after the “maximum credible event.”
- Hospitals and medical care facilities.

2. Recruiting committee members. Among the local officials who can contribute toward this goal include: building commissioner, county engineer, public works director, school superintendent, hospital administrator, electric utility engineer, planning director, and roads superintendent.

3. Identifying resources to support this goal. There are at least three categories of assistance from “external partners” that can be tapped to assist in meeting the goal of reducing the vulnerability of existing development: research and publications; training and technical assistance; and demonstration projects.

Resources in the category of Research and Publications include:

- FEMA’s program on Seismic Safety of Existing Buildings, which contains a wealth of information, including *The Guidelines for the Seismic Rehabilitation of Buildings* and related *Commentary* (FEMA 273 and FEMA 274, respectively), a “first-of-its-kind” performance-based, nationally applicable design and engineering documents containing new approaches, new analytical techniques, choices as to seismic safety levels, and acceptability criteria for all types of buildings and construction materials.
- *Manual for the Seismic Evaluation of Buildings-A Prestandard* (FEMA 310). This document expands a previous FEMA publication (FEMA 178) and presents a nationally applicable method for engineers to identify buildings or building components that present unacceptable risks in case of an earthquake.
- *Benefit-Cost of Retrofit for Communities* (Mid-America Earthquake Center), a project that

will investigate the relative benefits of seismic retrofit measures for essential facilities. Using HAZUS, costs and benefits of seismic retrofit will be examined in two case study areas.

Resources in the category of Training and Technical Assistance include:

- The Mid-America Earthquake Center (see article) and its Essential Facilities Program, which is intended to identify needs and priorities for seismic retrofit of essential facilities, economical retrofit methods that can be adapted in communities in the Central U.S., and strategies for implementation, including through the DRC initiatives. The Essential Facilities Program, which is in its start-up phase, will emphasize the *application* of research products and guidelines, to the benefit of Central U.S. communities.

Resources in the category of Demonstration Projects include:

- Non-structural retrofit of hospitals and medical care facilities (CUSEC).
 - Non-structural retrofit of non-profit child-care facilities (Institute for Business and Home Safety).
4. Measuring progress. With an inventory of existing development—including essential facilities, lifelines, building stock—a community can set goals for non-structural and structural mitigation, and establish a tracking mechanism to monitor progress. Also, HAZUS can be used to measure the costs-benefits of retrofit measures, and factored into a program to measure community progress in addressing the vulnerability of existing development.

CUSEC UNDERTAKES HOSPITAL MITIGATION PROJECTS

Hospitals play a critical role in a community's response to a major disaster, yet these facilities, and the equipment and infrastructure that support them, are often highly vulnerable to earthquakes. Experience has shown that even a modest investment can pay dividend in terms of improved *functionality* following a disaster. For these reasons, hospital mitigation can be an excellent project for a Disaster Resistant Community initiative.

During the past year, the Centers for Disease Control and Prevention (CDC) liaison to CUSEC, in cooperation with member states and FEMA, has carried out a series of hospital mitigation projects. With funding from the Mississippi State Hazard Mitigation Program, CUSEC and the University of Mississippi carried out a Non-Structural Demonstration Project at **Baptist Memorial Hospital** in DeSoto County, Mississippi. This project featured: a seismic vulnerability analysis of the hospital, based on a magnitude 6.5 earthquake; the development of a training video; a non-structural retrofit of the hospital's critical care unit; and the development of two hospital mitigation training programs for hospital and health care facility officials.

The Baptist Memorial Hospital project can be replicated in other communities. The cost is minimal. For example, CUSEC provided \$1,600 to purchase earthquake safety non-structural mitigation straps, bolts, velcro blocks, quick release straps, etc. Hospital maintenance staff installed the materials purchased. Cost/benefit analysis performed after the installation revealed that for every dollar spent on non-structural mitigation of this unit, approximately \$15,500 to \$18,250 of savings is realized in not having to replace or repair damaged medical equipment should a damaging earthquake occur. Furthermore, hospital staff have reacted very positively to the mitigation measures.

Meanwhile, other hospital mitigation projects are underway. With funding support from FEMA, CUSEC is conducting a non-structural mitigation project at **Memorial Hospital of Carbondale**. This initiative is guided by two objectives: to provide training to hospital and other health care officials on the role of mitigation in reducing potential losses in hospital settings; and secondly, to carry out a mitigation demonstration project to strengthen and reinforce (nonstructurally) a critical care service area in the hospital. Again, CUSEC used a FEMA grant to purchase the materials, and collaborated with hospital engineering staff to install the equipment. In phase two, CUSEC will use the remaining funds (\$8,900) to upgrade the ceiling system in the hospital. Finally, the same mitigation "formula" demonstrating cost-effective mitigation techniques in collaboration with hospital staff is also being utilized in two Evansville, Indiana hospitals: **Deaconess and Welborn Baptist Memorial Hospital**. Both projects include visual engineering analyses, cost estimates of non-structural mitigation measures for critical service units, and project implementation with the assistance of hospital personnel. One-day workshops are used in all demonstration projects to discuss the mitigation techniques, the potential costs savings and value added, and how these projects can be replicated in other hospitals in the community.

COMMUNITY LAND USE

Recent advances in hazard mapping and risk assessment have made it more practical than ever to incorporate hazards information into the land use planning process.

Flood hazard mapping and floodplain management practices have become well established in many communities in the Central U.S. Several factors have contributed to progress in floodplain management: repetitive flooding, which enables communities to delineate flood hazard areas; and the availability of floodplain management tools and technical assistance (e.g., Community Rating System, Flood Insurance Maps, etc.).

Seismic hazards mapping in the Central U.S. is still relatively new. Seismic hazards maps show where earthquakes are likely to cause damage. They provide scientific information regarding expected locations and probabilities of ground shaking and ground failure from earthquakes.

Increasingly, state statutes are including provisions that require natural hazards elements in local comprehensive plans. The purpose of natural hazards elements are to document the nature, scope frequency and severity of natural hazards that potentially affect the community; to determine the adequacy of existing transportation facilities and public buildings to accommodate disaster response and recovery needs; to develop cost-effective measures for mitigation of identified hazards; and to identify resources needed for effective on-going hazard mitigation programs.

Sample Goal: To officially adopt a local comprehensive plan that includes provisions that address natural hazards, including the identification of hazard-prone and/or environmentally sensitive areas, and policies and procedures to limit development in these areas.

SHOWCASE COMMUNITIES INITIATIVES

The Area Plan Commission, Evansville-Vanderburgh County, is taking an active role in incorporating hazard identification and risk assessment criteria into land use planning and zoning decisions. As a Showcase Community, Evansville is committed to the following goals:

- Add local Emergency Management Agency as a reviewer of proposed rezoning and subdivision proposals that would likely require fill and construction in the floodplain.
- Prepare and submit application for Evansville-Vanderburgh County to participate in the Community Rating System (CRS) of the National Flood Insurance Program.
- Revise the mapping in the Physical Features section of the Evansville-Vanderburgh County Comprehensive Plan to reflect earthquake and other natural hazards, and to develop appropriate policies as a result of the mapping.

Progress Report

- CRS application for Evansville-Vanderburgh County is complete; county will qualify for initial 5 percent rate.
- Southern Indiana Gas and Electric Company will do a mass mailing to 16 counties on flood risk and mitigation, which will qualify Evansville for additional CRS credits.
- Evansville-Vanderburgh County now require disclosure of 100-year flood boundary on proposed subdivision plats, along with minimum finished floor elevation required (2 feet freeboard). This “disclosure” creates eligibility for a CRS credit.
- Vanderburgh County has applied for FEMA Hazard Mitigation Grant Program funding to buy out homes in the floodway.
- Area Plan Commission participants in the HAZUS training in March will use the data sets entered into HAZUS, maps generated, and projected loss estimations in the comprehensive planning update.
- Evansville’s repetitive flooding is caused by drainage problems. \$30 million in bonds have been sold to provide funding for drainage improvements, which have been included in the budget and will be constructed over the next 3 to 5 years. This action should allow numerous properties to be removed from the city’s repetitive loss list.

Strategy Considerations:

1. Getting organized and assessing needs. The Community Land Use element of a Disaster Resistant Community initiative is an excellent mechanism to integrate flood hazard, seismic hazard, and natural resources expertise in a multi-disciplinary and cross-hazards approach to land use planning and hazard mitigation.

2. Recruiting committee members. Many of the disciplines and organizations involved in the Hazard and Risk Assessment will have an important role in Community Land Use; the efforts of these committees should be closely coordinated.

3. Identifying resources. Several useful Internet sites contain information, including: <http://www.colorado.edu/>

hazards (Natural Hazards Center); <http://www.iris.edu> (Incorporated Research Institutions for Seismology); <http://www.scecdc.scec.org/> (Southern California Earthquake Center); and <http://geohazards.cr.usgs> (U.S. Geological Survey).

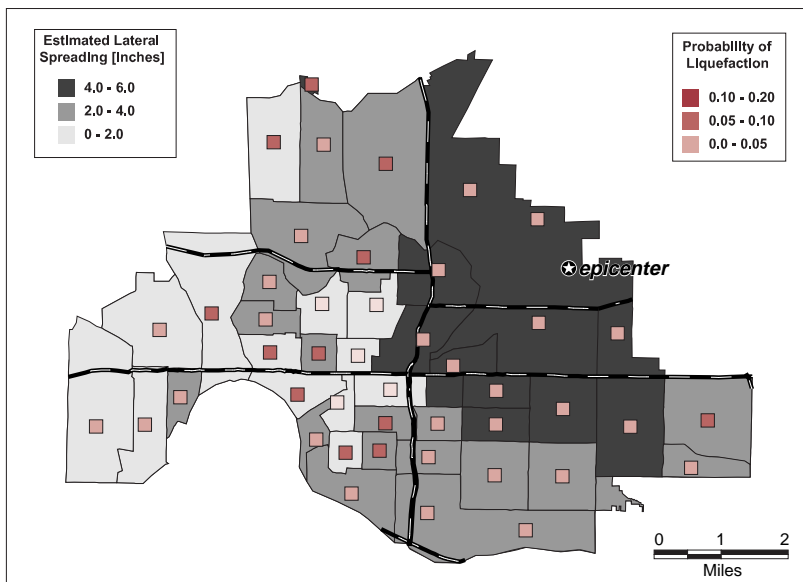
4. Measuring progress. By mapping natural hazards and determining percentages of the built environment in hazard-prone areas of the community or region, the Community Land Use Committee can assess progress in limiting development in these areas.

BUSINESS LOSS REDUCTION

Recent disasters have shown that a key to recovery is the ability of businesses, large and small, to resume operations following the disaster. Because of this, an increasing number of communities are examining the feasibility of forming “business preparedness councils” that bring together the leadership and expertise of business, emergency preparedness, the engineering and scientific community, and others to develop a partnership approach to reducing the vulnerability of businesses to flooding, tornadoes and severe weather, earthquakes, and other hazards.

Businesses play a key role in a Disaster Resistant Community program and approach to vulnerability and risk reduction. The reason is straightforward. If businesses do not survive a disaster, people are out of work, a community’s revenue stream is severely disrupted, and a ripple effect begins to occur that prolongs the recovery phase.

While many businesses have *internal* plans and procedures for responding to and coping with disasters, fewer businesses have developed *external* plans that take into consideration the disruption of electric power and water, lack of access to and from their facilities, loss of workforce for extended periods of time,



Example of Ground Failure Map of the 5.0 Magnitude Earthquake.
Source: Risk Management Solutions

and other factors that have direct and immediate implications for business resumption and recovery.

Sample Goal: To establish and sustain a public-private partnership to guide the development of a business preparedness and resumption strategy that is the product of collaboration between the business community, local government, and volunteer and community-based organizations.

Strategy Considerations:

Arguably, the greatest challenge in developing and sustaining a DRC initiative is how to approach, engage, and *maintain* a meaningful and productive working relationship between the business community and local government in a long-term effort to reduce community and business vulnerability to natural disasters. Based on the experiences of two active business alliances—Evansville and Memphis—the following observations are offered:

1. In establishing a public-private partnership, it is important to identify and carry out projects and initiatives that clearly demonstrate the need, and value added, of business participation in these partnerships.
2. Support of chief executive officers is very important to the short-term and long-term success of a public-private partnership.
3. At the outset of the organizational phase, consideration needs to be given to hiring a full-time coordinator for the business alliance; furthermore, this position should be occupied by an individual who can work effectively with chief executive officers in the business community.
4. The local chamber of commerce (or other business group) can play a pivotal role in galvanizing support among the business community for the Disaster Resistant Community initiative. The chamber can assume a number of roles in

CUSEC SPONSORS GAS UTILITY MITIGATION WORKSHOP, MAY 20-21, 1998

Natural gas distribution companies devote significant resources to providing safe and reliable service to their customers. This effort includes both capital and maintenance improvements to address expanding customer needs, improving operational efficiency, and reducing the hazards associated with the operation of older underground piping.

The threat posed by earthquakes cannot be overlooked or ignored by gas utility companies in the face of day-to-day operational requirements. In this workshop - *Integrating Earthquake Risk in Distribution Gas Pipeline Safety and Reliability*-the participants will focus on learning about earthquake hazards and how they can be appropriately addressed in effective strategies for evaluating pipeline conditions and optimizing pipeline performance.

The workshop will cover:

- Effects of earthquakes on gas system safety and reliability, using examples from recent earthquakes in California and Japan;
- Information about earthquake hazards in the central U.S., so that each participant can understand the potential risks their gas systems faces;
- Strategies and advanced methods that can be used to integrate earthquake safety and reliability into a practical, prioritized risk management program that addresses routine, short-term, and long-term maintenance and operations needs along with seismic vulnerability reduction.

Workshop facilitators are: William “Woody” Savage, a Senior Seismologist in the Geosciences Department of Pacific Gas & Electric and the manager of PG&E’s Seismic Risk Management Program, and Mark Heckman, a Senior Engineer in the Technical Services Department of PG&E, and manager of the utility’s \$2.2 billion Gas Pipeline Replacement Program.

organizing a business alliance: leadership, clearinghouse for inquiries, recruitment of new members, fund raising support, and dedication of staff (including through member businesses) to sustain the partnership.

5. The “business community” is comprised of a wide spectrum of interests (sometimes competing interests); it is important to recognize this in developing a business constituency.

6. Business continuity planning is the predominant concern among members of business alliances. In strategic planning sessions with the Memphis Disaster Recovery Business Alliance (DRBA) and Evansville DRBA, business representatives expressed interest in programs that address response/recovery/resumption issues more so than prevention or pre-disaster loss reduction measures.

7. With respect to business sectors insurance, banking, building supply, utilities (electric, gas, water), hospitals and medical care facilities are most represented; builders, developers, real estate and major manufacturing are least represented.

8. In the final analysis, progress often comes down to interpersonal relationships—finding a private sector “champion” who is willing to commit time and resources. Cultivating these relationships is important.



Metropolitan Evansville Chamber of Commerce President Robert Quick discussing the SW Indiana Disaster Recovery Business Alliance at Chamber breakfast, with (left to right) FEMA director James Lee Witt, DRBA Chair Dale Olson, SW Indiana DRC Chair Roger Lehman, and Indiana State Emergency Management director Patrick Ralston.

MEMPHIS DISASTER RECOVERY BUSINESS ALLIANCE CONTINUES TO MAKE PROGRESS

The Memphis DRBA initiative has an active core group of nine members: ATS Telephone & Data, Bell South, First Tennessee Bank, International Paper, Methodist Health Systems, NextLink, Perkins Restaurants, Sedgwick, and Union Planters Corporation. Under the leadership of Jeff Crenshaw, DRBA Executive Director, the organization has identified two priorities:

Post-Disaster Business Communication, a project that is designed to increase business awareness of hazard vulnerabilities and steps that each business can take to reduce their vulnerabilities. In the short-term, this project will establish a communication network so that when a major disaster does occur, business will understand the role of key services providers (including public sector), and how to coordinate and communicate with public, private, non-profit and research organizations in a post-disaster environment.

Vulnerability Assessment, a two-year project that will provide businesses with an assessment of their vulnerabilities to natural, technological and man-made hazards in Shelby County, including a comprehensive hazards database, and in the process serve as an important educational tool for other Shelby County businesses that need to become involved in a community-based business vulnerability reduction program, developed under the auspices of the DRBA.



SOUTHWESTERN INDIANA DISASTER RECOVERY BUSINESS ALLIANCE: AN UPDATE

One of the recommendations of the Evansville-Henderson (KY) Disaster Resistant Community Workshop on April 15-16, 1997, was the formation of an Evansville-Vanderburgh County Disaster Recovery Business Alliance (DRBA) that would become the focal point for regional business resumption planning in partnership with local government and the university community.

The Evansville DRBA was formerly established on May 11, 1997, with Dale Olson, CEO of Citizens Insurance, nominated as the Chair. The following decisions were made: 1) The Metropolitan Evansville Chamber of Commerce would serve in a supporting role to assist in recruitment of members, fund raising, and some of the secretariat functions that are necessary to support the DRBA in the organizational phase; and 2) Priority would be given to an outreach campaign to communicate the *value added* of business participation in an Evanville-based regional DRBA. With the active support of the Chamber of Commerce, nineteen companies were recruited as members of the DRBA. Approximately \$162,000 was raised from the 19 Founders, with matching funds provided by a local donor.

On January 26, the Chamber of Commerce sponsored a strategic planning session, which resulted in the following recommendations to be made to the DRBA Founders: 1) Because several of the major companies that are actively interested in the DRBA are located in surrounding counties, and because earthquakes and other hazards have a regional impact, the DRBA should be regional in scope; and 2) A Work Plan should be drafted that reflects the following priorities:

- Development of a Business Resumption Planning seminar series, to be delivered to the Founder members, that emphasizes regional business impact assessments and public-private coordination in pre-disaster planning for response and recovery.
- Training for business in the application of HAZUS to support a regional business impact analysis.
- Application of incentives to stimulate the adoption of mitigation measures (in coordination with the Institute for Business and Home Safety and other partners).

A major milestone in DRBA's development was a Chamber sponsored breakfast meeting—attended by Director James Lee Witt of FEMA, that drew over 200 business representatives to a ninety minute interactive discussion on Project Impact, and the role of business alliances in supporting this initiative. At the breakfast meeting, Director Witt observed that Evansville can serve as a national model for what one community can accomplish with little outside funding.



SHOWCASE COMMUNITIES

An Insurance Perspective

The following article was written by Diana L. McClure, Director of Showcase Communities and Special Projects, Institute for Business and Home Safety (IBHS).

A Societal Challenge:

As we approach the 21st century, a major economic and societal issue that must be addressed is, *how will we as a nation live with Mother Nature, and pay for natural disasters—disasters which often are of our making, caused by the choices we make to live, work and play in harm's way?* The Midwest floods, Hurricane Andrew, the Northridge Earthquake, the Oakland fires and many other recent natural hazard events have challenged some basic assumptions by which our society has abided, such as “change the river, but don't change me.”

Consequently, the American taxpayer; federal, state, and local governments; private sector interests and individuals are wondering

- Should we rethink our society's view of its interrelationship and interdependence with Mother Nature; in essence move from a mentality of attempting to control the forces of nature, to an approach that emphasizes harmony, co-existence, and interdependence?
- Should we rethink the balance of rights and responsibility? Is there too much emphasis on rights, and too little on responsibility?
- Should we place greater emphasis on communicating the risk, *listening* to one another's point of view, and articulating the consequences of our actions?

IBHS Response:

Developing answers to these questions is crucial to the implementation of the mission and strategic plan of the Institute for Business and Home Safety (IBHS), an initiative of property/casualty insurers that write a majority of the property insurance business in the United States, as well as by others who have an interest in loss reduction. The overarching goal of IBHS is to protect human life and property, and

to do this it aims to make mitigation a public value, to foster incorporation of the potential impacts of natural hazard events into the daily decision-making of governments, businesses and individuals. This is important if we are to keep insurance affordable and available, so that it can be utilized when most needed. In other words, IBHS recognizes the need for people to understand their relationship with their surroundings and to take appropriate responsibility for consequences that arise from their choices.

IBHS has approached this challenge to make mitigation a public value by developing a focused strategic plan, which addresses five key areas—public outreach, community land use, new building construction, retrofit of existing structures and information management—as the strategy to achieve its mission which is to “reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters.” Insurers recognize they cannot achieve this goal alone, as do many individuals; local, state, and federal government organizations; and private sector entities. Through partnerships, working together, even when our interests may seem juxtaposed, we have a much better chance of making a difference.

Showcase Communities

In recognition of the fact that much of the impetus for loss reduction must occur at the local level, IBHS established the Showcase Community Program to operationalize the goals of its strategic plan. Since most mitigation strategies and measures are implemented locally—although they are influenced by both state and national policy and private sector actions—4 criteria were developed to serve as an organizing strategy to integrate mitigation into daily decision making and to stimulate collaboration amongst the public and private sectors. As one of the private sector stockholders in loss reduction, member insurers recognized the key role they play in helping to reduce the human suffering and losses caused by natural hazard events.

Progress and Measurements of Success

In July 1997, Evansville/Vanderburgh County, Indiana was the first pilot Showcase Community to be designated by IBHS. The designation followed a broadly attended public/private sector meeting in April, 1997, organized by CUSEC, which articulated the community's vision of a disaster resistant community into six subject areas that encompassed the 14 criteria of the IBHS Showcase Community Program. Close to a year later, there has been demonstrable progress towards implementation of the vision, due to the strong and committed public and private sector leadership in Evansville/Vanderburgh County, and to the external partners such as CUSEC, the Electric Power Research Institute (EPRI) Disaster Recovery Business Alliance (DRBA) group, the State geologist, the University of Evansville, and the State Emergency Management Agency. This issue of the *CUSEC Journal* clearly illustrates that progress.

To sustain the momentum towards disaster resistance that Evansville/Vanderburgh County has generated, short-term, measurable accomplishments must be realized and communicated. On the other hand, for the long term, any community committing itself to become a disaster resistant community must institutionalize a philosophy that will sustain making mitigation a public value, incorporating the potential impacts of natural hazard events into daily decision making. This means communities must address the appropriate balance between nature's agenda and our sometimes conflicting agenda, the appropriate balance of rights and responsibilities with regard to assumption of risk and responsibility for those choices, and the kinds of partnerships and communication strategies necessary to generate individual and societal change across a broad range of interests.

Interspersed throughout this issue of the *CUSEC Journal* are examples of short- and long-term measures and strategies taken by Evansville/Vanderburgh County, utilizing the 14 Showcase Community criteria as a tool to move itself—and SW Indiana, as the initiative expands—towards disaster resistance.

CUSEC 1998 ANNUAL CONFERENCE:

ACHIEVING EARTHQUAKE RISK REDUCTION THROUGH COMMUNITY-BASED PARTNERSHIPS

CUSEC ANNUAL CONFERENCE THE GALT HOUSE, LOUISVILLE, KY JUNE 14-16, 1998

CUSEC's 1998 Annual Conference, which starts on Monday, June 15, 1998, will bring together a diverse group of community officials, business leaders, seismologists and geologists, risk assessment professionals, engineers, emergency managers, university researchers, non-profit and volunteer organizations, and other groups that have a role in creating and sustaining a Disaster Resistant Community program in their community.

The conference will provide an opportunity for participants to:

- Learn from community leaders in Evansville, Memphis, Cape Girardeau, Deerfield Beach (FL), Clay County (AR) and other communities that have organized Disaster Resistant Community Programs underway.
- Learn about programs and projects that are available to assess and mitigate the earthquake risk in their community and region.
- Gain a better understanding of the role, resources and potential contributions of organizations that are actively supporting Disaster Resistant Community initiatives: State emergency management agency (and other State agencies), Federal Emergency Management (through *Project Impact*), the Institute for Business and Home Safety (through the *Community Showcase Program*), CUSEC, and the Disaster Recovery Business Alliance.

Plenary sessions will address:

- A Unified Strategy for Earthquake Risk Reduction in the Central United States
- Role of Business Alliances in a Disaster Resistant Community Program
- Keys to Successful Community-Based Partnerships: Some Early Lessons
- A Housing Recovery Strategy for the Central U.S.
- Earthquake Risk Reduction and Earthquake Insurance: Developing an Action Agenda

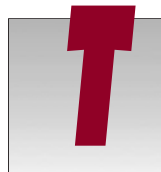
Breakout sessions will address:

- Hazard and Risk Assessment: Role of HAZUS Loss Estimation Methodology in a Disaster Resistant Community Initiative
- Education Programs and Projects
- U.S. - Latin American Partnership Programs
- Mitigation Programs for Hospitals and Other Essential Facilities
- Establishing and Sustaining Business Alliances
- Transportation Networks: Research and Implementation

For more information on the conference, call: 901-544-3570, or visit the Web Site at www.cusec.org



MID-AMERICA EARTHQUAKE CENTER IS LAUNCHED



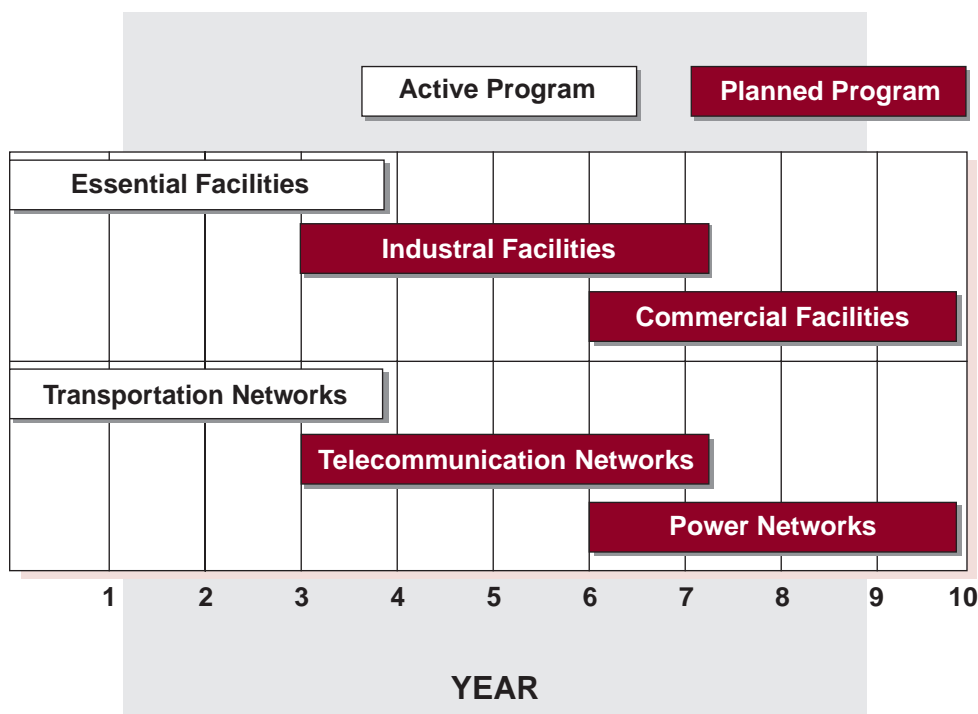
he Central United States has a major new player in the earthquake research and risk reduction field—the Mid-America

Earthquake Center, a newly funded earthquake engineering research center, based at the University of Illinois at Urbana-Champaign.

The “MAE Center,” as it is known, was “born” on October 1, 1997 when the University of Illinois at Urbana-Champaign was awarded one of the three National Science Foundation earthquake engineering research centers. The MAE Center brings together researchers from seven core institutions—University of Illinois, Urbana-Champaign, University of Memphis, Massachusetts Institute of Technology, Georgia Tech, Saint Louis University, Texas A&M, and Washington University (St. Louis)—with mutually compatible talents in seismology, geophysics, geotechnical and structural engineering, social science, economics, risk assessment, and urban planning.

In December, 1997, a Strategic Plan was prepared that identifies four general goals of the MAE Center:

1. Improve engineering of the built environment.
2. Improve data for construction of standards and codes.
3. Continue the development of seismic hazards and risk assessment tools.
4. Develop an understanding of societal impacts and responses related to earthquake hazard mitigation.



Mid-America Earthquake Center Coordinated Research Programs

As Dan Abrams, Director of the MAE Center, points out, “The Mid-America Earthquake Center is a new concept in earthquake engineering research.”

Emphasis will be placed on an interdisciplinary approach to research that carefully integrates education, implementation, outreach, and collaboration into all of the MAE Center’s activities.

The Central U.S. Earthquake Consortium, which is represented on the MAE Center Board of Directors, will play an active leadership role to ensure that the products and services of the MAE Center are carefully integrated into the earthquake risk reduction strategies of the member states, including the Disaster Resistant Community initiatives. CUSEC-MAE Center collaboration will

be one of the themes of the CUSEC Annual Conference, on June 14-16, 1998 in Louisville.

Center Priorities: Essential Facilities and Transportation Networks

Early in the planning process, the decision was made to give priority to *Essential Facilities* (shelters, police and fire stations, hospitals) because these buildings play a direct and pivotal role in supporting disaster response and recovery; and *Transportation Networks* (highways, waterways, railways, airways), because of the fact that

extensive damage to any of these systems has national economic and security ramifications, and would seriously impact emergency response and recovery operations.

The objectives of the Essential Facilities Program are: (1) to identify needs and priorities for seismic retrofit based on functional criticality, predicted ground motions, and expected structural performance; (2) to develop, validate, and standardize economical retrofit methods; and (3) to implement those retrofit methods by encouraging planners and public officials to adopt them. It is anticipated that Essential Facilities retrofit demonstration projects can be developed and implemented as part of a Disaster Resistant Communities initiative.

The primary objectives of the Transportation Networks Program are to: (1) assess vulnerabilities and estimate potential economic losses in the national transportation network, and (2) identify

effective retrofit methods for reducing these potential losses.

Role of MAE Center in DRC Initiative

The Mid-America Earthquake Center, with encouragement from the National Science Foundation, has made research application a priority. So far, for example, the MAE Center has sponsored two End User Focus Group meetings for Transportation and Essential Facilities. Many of the products of the MAE Center can be readily adapted to a community-based DRC program, including:

- Manuals for seismic retrofit of procedures.
- Guidance on earthquake risk reduction to schools, hospitals, medical care facilities and fire/police departments.
- Teaching modules on earthquake science and mitigation technology for K-12 grades.

- Hazard maps to support community and regional planning efforts.
- Inventories and database of information on buildings and transportation structures at risk.
- Knowledge on the effectiveness of incentives and regulations in furthering mitigation and preparedness actions.
- Technologies for assessing the condition of existing buildings, cost-effective strengthening techniques and rational guidelines for assessing conditions of existing buildings.

In essence, the MAE Center can be an important source of expertise and practical, user-friendly research products, which can be incorporated into the risk assessment and mitigation strategies of the “embryonic” Disaster Resistant Community initiatives in the Central U.S.

Earthquake Risk Reduction Through Community - Based Partnerships

Mid-America
Earthquake
Center

States

CUSEC

• State Geologist



Private Sector

FEMA/Federal

Non-Profit/Volunteer
• IBHS

A HOUSING RECOVERY STRATEGY FOR A NEW MADRID EARTHQUAKE: A FEMA/FEDERAL - CUSEC INITIATIVE

Recent earthquakes in Northridge, California (1994) and Kobe, Japan (1995) have focused attention on the significant and complex problems associated with providing shelter to tens of thousands of displaced disaster victims in these urban areas. The problems of post-disaster housing recovery in the Central U.S. will be compounded by several factors: 1) the concentration of unreinforced buildings in urban area neighborhoods of St. Louis, Memphis, and other Central U.S. communities, which suggests that it may be necessary to shelter 20 to 30 percent of a community's population following a major earthquake; 2) the relatively high percentage of urban dwellers living at or below the poverty line, typically in hazardous structures (e.g., approximately 30,000 Memphis residents live in public housing); 3) the multi-state impact of a New Madrid earthquake resulting in considerable competition for limited resources; 4) the tremendous difficulties in gaining access to damaged areas and displaced populations; and 5) the lack of experience in the Central U.S. in dealing with the consequences of a major earthquake.

It is clear that an effective approach to addressing the basic housing needs of potentially thousands of displaced disaster victims will require a comprehensive, long-term strategy that involves the input and active support from a range of agencies and organizations—Federal, State, local, non-profit community-based, and others.

A Housing Recovery Strategy

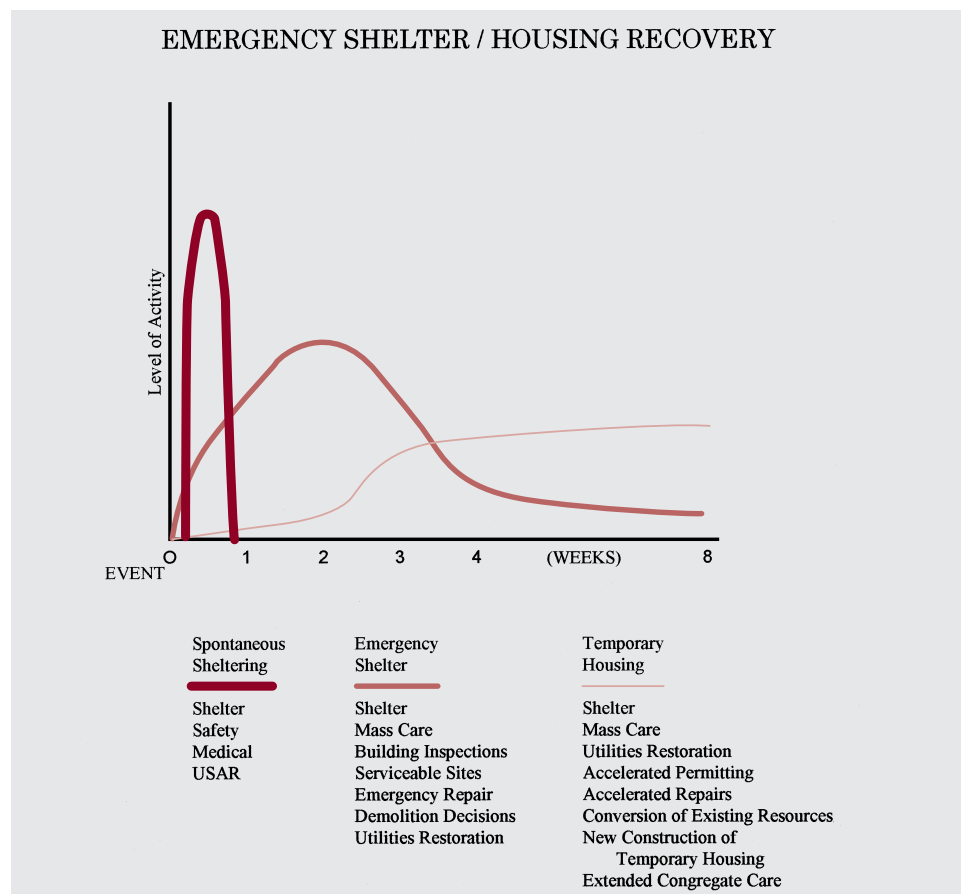
Acknowledging the nature, scope and magnitude of the post-disaster shelter and housing problem in the Central U.S. following a catastrophic earthquake, the

Central U.S. Earthquake Consortium, member States, FEMA, the American Red Cross and other organizations are collaborating to develop and implement a *Housing Recovery Strategy for a New Madrid Earthquake*. A Housing Recovery Working Group has been established to coordinate this multi-year initiative.

The Strategy will complement and support the Federal Response Plan, and set forth a range of pre-disaster, scenario driven *policy options* to guide decision-making in three, overlapping phases:

1. Spontaneous Shelter (first 72 hours)—objective is to provide an interim, safe haven while the situation stabilizes.
2. Emergency Shelter (first 60 days)—objective is to provide emergency shelter and feeding to displaced population requiring shelter.
3. Interim Housing (first year, or beyond)—objective is to provide temporary housing—safe and secure shelter, water, power, and heating—to displaced disaster victims while efforts are underway to make permanent repairs to dwellings, or to find other suitable permanent housing.

The following section highlights some of the key findings and recommendations from the *Housing Recovery Strategy*, organized under each of the three phases of housing recovery.



This figure depicts the phases of housing recovery, and several of the functions that must be planned for in each of the overlapping phases.

SPONTANEOUS SHELTER

Earthquakes occur without any warning, and for the first 24 hours, response will be dominated by spontaneous actions (e.g., search and rescue, medical aid, fire suppression). Furthermore, given the potential for damages over a seven to ten state region, and the inability to access the disaster sites, some communities may not receive any substantial outside help for 72 hours, including the provision of managed shelters. Under these conditions, people will generally seek whatever shelter they can, whether that shelter is “safe” or not.

EMERGENCY SHELTER

In a 1994 study, the American Red Cross estimated that a magnitude 7.6 earthquake in the New Madrid Seismic Zone could lead to an unprecedented demand for emergency shelter—approximately 576,000 in the seven states that would be most impacted. The shelter shortfall is estimated to be 445,000.

“Based on previous major disasters, it is assumed that approximately 25 percent of the displaced population will seek emergency shelter”

In going beyond the numbers, it is important to consider the basic needs, and coping capabilities, of the victims of a New Madrid earthquake. An emergency shelter strategy—designed to provide sustained emergency care for displaced victims (food, water, medical attention, emergency information, security)—must take into account the needs of urban populations, as well as rural populations.

Based on previous major disasters, it is assumed that approximately 25 percent of the displaced population will seek emergency shelter. Among the issues that need to be addressed in developing an emergency shelter strategy: minimum criteria for shelter selection (e.g., size and configuration of interior space, long-term “usability”, etc.); communicating emergency shelter information to potentially thousands of displaced victims; how to cope with aftershocks; when to encourage relocation of disaster victims outside the disaster area; dealing with the potential for social conflict if extended stays in shelters are required; and establishing policies on allocating shelter to disaster victims, as well as the thousands of disaster workers who will also need housing.

The **Emergency Shelter Strategy** that was developed by the Housing Recovery Working Group has four elements:

1. *Pre-designation of congregate shelters.* This traditional approach to emergency sheltering involves pre-designation of schools, churches, community centers, armories and other facilities that can serve as temporary shelters for disaster victims. The limitation with this approach is that many of these facilities are among the most vulnerable to earthquakes. For example, a 1996 survey conducted by the U.S. Army Corps of Engineers, Memphis District, determined that only 5 percent of designated shelters in Memphis would be available following a magnitude 7.5 earthquake in the New Madrid Seismic Zone.
2. *Conversion of structurally sound commercial and publicly owned facilities.* This strategy focuses on the conversion of existing, structurally sound, accessible buildings for use as *emergency* shelter to meet basic human needs in the first 60 to 90 days. Structures in

this category include: commercially owned warehouses, manufacturing plants, unused military bases, hotels, and transient lodging.

3. *Utilization of tents/other portable structures.* This strategy calls for the deployment and installation of tents and other portable structures to serve as *emergency, short-term shelters*. The advantages of this strategy are the availability and transportability of these materials. Disadvantages include the lack of protection against cold weather, and societal considerations (e.g., lack of privacy, confined spaces, hygienic issues, etc.).
4. *Increase the supply of safe housing through targeted/coordinated building inspection program that can be carried out in 60 days post event.* This strategy focuses on the supply side of the equation, and involves close coordination among State, Federal, and local agencies with post-disaster building inspection responsibilities.

Emergency Shelter Strategy: Pre-Disaster Actions

In practice, a strategy to provide Emergency Shelter following an earthquake or other major disaster will involve a combination of the four strategies outlined above, and others. In order to develop an *emergency sheltering capability* in the Central U.S., the Housing Recovery Working Group identified a number of *pre-disaster actions* that need to be undertaken, as outlined below.

- Develop a consensus on a clear definition of the minimum criteria for shelter selection.
- Complete structural surveys (ATC-21) of designated shelters to determine the likely availability of these shelters following an earthquake.

- Identify privately owned structures that could serve as emergency shelters; develop memorandums of understanding with private owners of these facilities; encourage/reward employers to provide emergency shelter for employees.
- Prioritize building inspections, assign responsibilities to ensure designated shelters are inspected in a timely manner.
- Establish linkages with community services agencies, housing authorities, and other local agencies that are the day-to-day “lifeline” of urban populations.
- Develop/refine emergency public information program to target potentially tens of thousands of disaster victims.
- Consider the unique requirements of the elderly, handicapped, homeless, and other special needs populations.
- Develop policies and criteria for addressing the housing needs of disaster workers, so that competition with victims for scarce housing space can be adjudicated in a systematic way.

INTERIM HOUSING

This is a critical phase that may last for years. The goal is to provide safe, interim housing—including utilities—to disaster victims until they can make permanent repairs to damaged homes, or find permanent housing.

There are a number of factors that will directly influence a strategy to provide Interim Housing following a major disaster: 1) Construction resources in the impacted areas will be overwhelmed, and the construction industry, including materials, labor and equipment will also be victims of the disaster. An acceptable rate of reconstruction will require augmentation from construction support from outside the Midwest. 2) Weather conditions will have a significant impact on the type of housing that will be

necessary. 3) Displaced residents will resist leaving the general vicinity of the damaged dwellings. 4) While the predominant form of assistance provided by most housing recovery programs is financial (money provided to rent or repair homes), this strategy will not be appropriate or effective following a catastrophic earthquake. 5) Repair of damaged housing will be a primary means of meeting housing needs.

The **Interim Housing Strategy** that was developed by the Housing Recovery Working Group has five elements:

“Interim housing is a critical phase that may last for years...the goal is to provide safe, interim housing—including utilities—to disaster victims until they can make permanent repairs to damaged houses.”

1. *Accelerated repair of damaged dwellings.* Returning displaced people to their own repairable dwellings in a short period of time is much cheaper and more efficient than obtaining or building temporary or interim housing, needs no additional land, and is least disruptive to the life of neighborhoods.

This strategy seeks to increase the supply of habitable dwellings through an accelerated program that targets minimally damaged buildings for emergency repairs. The success of a *rapid repair* strategy will depend on a number of factors, including: rapid building inspections; repair standards in place that are agreed upon by pertinent building officials; availability of technical support for getting design and engineering work completed and permitted in a short

period of time; availability of public and private financing for repairs; and availability of “residential construction workers” who can make use of volunteer labor and accessible materials.

2. *Conversion of existing resources.* This strategy calls for remodeling or adaptation of available, structurally sound buildings, or other resources, as temporary housing on an intermediate term. This includes privately owned buildings that can be appropriated by local authorities for conversion to housing. Examples of structures/resources that can be converted to temporary housing include: vacant public housing stock; travel trailers, campers, recreational vehicles; rail cars; campgrounds; military bases; warehouses and storage facilities.
3. *Construction of new temporary housing.* There is a wide range of modular building systems available in the United States which can be used to house large numbers of disaster victims. This option would require potentially large, serviceable tracts of land. In a catastrophic disaster, “temporary” housing can become permanent.
4. *Extended congregate care.* In a catastrophic earthquake, it is likely that a significant portion of the emergency shelter population will be in congregate shelters beyond the four week target maximum. This is due to a number of factors, from lack of water, power, and other services, to the sheer complexity of matching victim’s housing desires with viable options. Reliance on extended congregate shelter is not desirable, but should be anticipated and planned for.
5. *Establishing temporary housing in street rights-of-way.* In urban areas, in particular, street rights-of-way can be used as temporary sites for

housing following an earthquake. The advantages are: displaced victims can be in or near their neighborhoods, which will allow victims to remain in familiar social and neighborhood surroundings, and facilitate rebuilding; and services can be brought to the temporary housing sites (e.g., “service pods” consisting of rest room facilities, utilities, common cooking areas, child care, communications can be incorporated into design layouts).

Interim Housing Strategy: Pre-Disaster Actions

With five policy options for Interim Housing identified by the Housing Recovery Working Group, the next step is to establish and prioritize a range of “pre-disaster actions” that can be undertaken by Federal, State, local government and community based organizations in a long-term initiative to *develop a capability to deliver a range of interim housing solutions* following a major or catastrophic earthquake. Outlined below are a sample of the pre-disaster actions that local governments have a role in implementing.

- Develop and/or refine space and location criteria for selection of sites that can support new temporary housing.
- Develop criteria and standards for repair of damaged buildings.
- Prepare instructional materials that can be disseminated to residents to encourage “do-it-yourself” quick fixes to make structures habitable until permanent repairs can be made.
- Work with financial institutions to accelerate the processing of loan approval for housing repairs and rebuilding.
- Identify a range of serviceable tracts of land in an around high risk communities that can serve as temporary housing sites.
- Develop procedures to facilitate and support the construction of on-site interim housing (e.g., basic, hand-

made shelter) on or near premises while repairs are being undertaken.

- Seek waivers on local codes, permitting requirements, and fees to accelerate construction of temporary housing.
- Conduct a structural survey of designated shelters and other publicly owned facilities that can serve as temporary housing following a major earthquake.
- Anticipate and document requirements associated with overseeing the procurement, siting, and placement of mobile homes and other forms of temporary housing. Develop memorandums of understanding.
- Determine feasibility of using street right-of-ways and other vacant spaces (e.g., backyards, parking lots, neighborhood parks, etc.) in high risk communities for temporary housing; assess post-disaster accessibility; determine space and location requirements for “service pods.”

How to Use the Strategy

The primary objective of the Housing Recovery Working Group is to develop a *coordinated strategy* to meet the short-term shelter and long-term housing requirements of displaced disaster victims, and ultimately to develop a *capability* at the local level to take care of displaced disaster victims following an earthquake or other major disaster.

More specifically, the Strategy, when finalized, can be used by Federal, State, local, non-profit and non-government organizations, and business community to assess the nature and scope of the problem; to identify assumptions, impediments, and critical issues to be addressed; to identify a range of policy and program options that when implemented will lead to a coordinated strategy for housing recovery; and finally, the Strategy can be used to prioritize actions, and to monitor progress in implementing program elements.

Housing Recovery Strategy and Disaster Resistant Communities

Finally, the Housing Recovery Strategy can become an integral feature of Project Impact—the FEMA-led initiative to develop Disaster Resistant Communities. Disaster “resistance” is an objective. Expressed in terms of performance objectives and performance standards, a community can be said to be disaster resistant when after a major earthquake, flood, hurricane, or other major disaster the following conditions are present:

- Instead of heavy casualties, there is a *minimal loss of life and limited interruption of public services*—including emergency shelter, emergency medical and health services, electric and water utilities, transportation, and communications.
- The private sector is able to *resume business operations* in a timely manner, contributing to the recovery of the community.
- The community is able to *manage the response operations*—including the provision of emergency shelter and medical care following a major disaster—supplemented by pre-planned resources and State and Federal government resources.
- The community is able to *recover* to at least pre-disaster conditions in an accelerated, ordered, pre-planned manner. This includes the capability to implement a housing recovery strategy that is the product of collaboration between local government leaders, the business community, State and Federal government, and non-profit and non-government organizations.

In essence, *housing recovery* should be an integral feature of a long-term strategy to reduce the vulnerability of a community to natural hazards, so that when a major or catastrophic disaster *does occur*, there is a strategy in place that lays out policy and program options to expedite housing recovery, and in the process guide decision-making in the critical days and weeks following the disaster.

ASSESSING THE EARTHQUAKE RISK IN THE CENTRAL U.S.:

A FORUM FOR INSURANCE AND EARTHQUAKE HAZARDS PROFESSIONALS

There continues to be considerable interest and concern among insurance professionals and others over the vulnerability of the Central U.S. to a damaging earthquake in the New Madrid Seismic Zone. This concern is understandable. In the last decade, the insurance industry has paid out record sums of insured losses caused by earthquakes, floods, hurricanes, and other natural disasters.

Against this backdrop, a Forum was held—organized by CUSEC in cooperation with the Center for Earthquake Research and Information, University of Memphis, the Memphis Business Emergency Preparedness Council, the Institute for Business and Home Safety, the Federal Emergency Management Agency, and the U.S. Geological Survey—that brought together approximately 200 insurance officials, risk assessment professionals, earth scientists, and emergency managers to address several fundamental issues at the center of insurance industry dialogue:

- What is the probability of a damaging earthquake in the New Madrid Seismic Zone?
- What structures are likely to be damaged, and how do soil conditions and construction practices in the Central U.S. contribute to the seismic risk?

- What specific tools—including maps, studies, risk assessment models—are available to assist insurance professionals in making decisions on insuring the seismic risk in the Central U.S.?
- What steps can be taken to develop a “working partnership” among insurance, risk assessment, and earthquake hazards professionals?

The following excerpts capture some of the dialogue and discussion at the Insurance Forum.

Probabilities of a Damaging Earthquake

“Within any 50-year window, there is virtually a 100 percent chance that we’re going to have a magnitude six earthquake somewhere in the New Madrid Seismic Zone. It just becomes a question of where it’s going to occur.”
Kaye Shedlock, Research Geophysicist, U.S. Geological Survey.

Nature of the Seismic Risk

Jill Stevens Johnston, Center for Earthquake Research and Information:

“...in many ways, the New Madrid Seismic Zone has given us a gift. And that is the gift of time. By choosing to release a large load of energy in 1811-12 when the population of the Central U.S. was relatively small, when people were self-sufficient and didn’t rely on lifelines, on transportation systems, on electric power facilities.....the impact then was relatively small. We can learn through this gift of time how to lessen the impact of another repeat of a catastrophic earthquake.”

“Soil failure is a problem, which has important implications for land use policy and planning. For example, we have a lot of service infrastructures that have no seismic design components yet, we can look to a current movement towards a commitment of funds to retrofit key structures, such as the Hernando DeSoto Bridge.”

Because of the concentrations of unreinforced masonry buildings in our urban and rural areas, there is a significant risk to businesses, and other occupants of hazardous buildings. In particular, schools in older areas, urban and rural, are highly vulnerable to the effects of earthquakes. The fact that many of these schools are designated shelters will be problematic in a response operation following an earthquake.

Hemant Shah, Risk Management Solutions:

The potential for a truly catastrophic Midwest earthquake is driven by at least five parameters, including:

1. Tremendous level of energy release in major New Madrid earthquakes.
2. Attenuation of ground motion—New Madrid earthquakes will cause intensities of ground motion over great distances.
3. Soil related hazards—large areas of liquefaction are likely to occur in a major earthquake.
4. Vulnerability of built environment—the building inventory of the Central U.S. is highly vulnerable to earthquake damage.

5. Level of insurance exposure - since 1990, the amount of earthquake insured exposure in the region has increased dramatically, driven by an increased awareness within the region of the risk potential and by low insurance prices for earthquake coverage.

Modeling the Earthquake Risk in the Central U.S.

Hemant Shah:

"I've been involved in the development of approximately 20 earthquake models for countries around the world, and surprisingly or not, the New Madrid earthquake is perhaps the most challenging area that we have encountered....challenging not only in terms of technical issues, but also in terms of the level of interest that the model has generated. In very few places in the world do we have a situation where we have a truly singular catastrophic event at the edge of our perception, the edge of our historical consciousness, overlaid with tremendous amounts of economic value."

Bob Healy, EQE International:

Earthquake catastrophe models are used by insurers and reinsurers to:

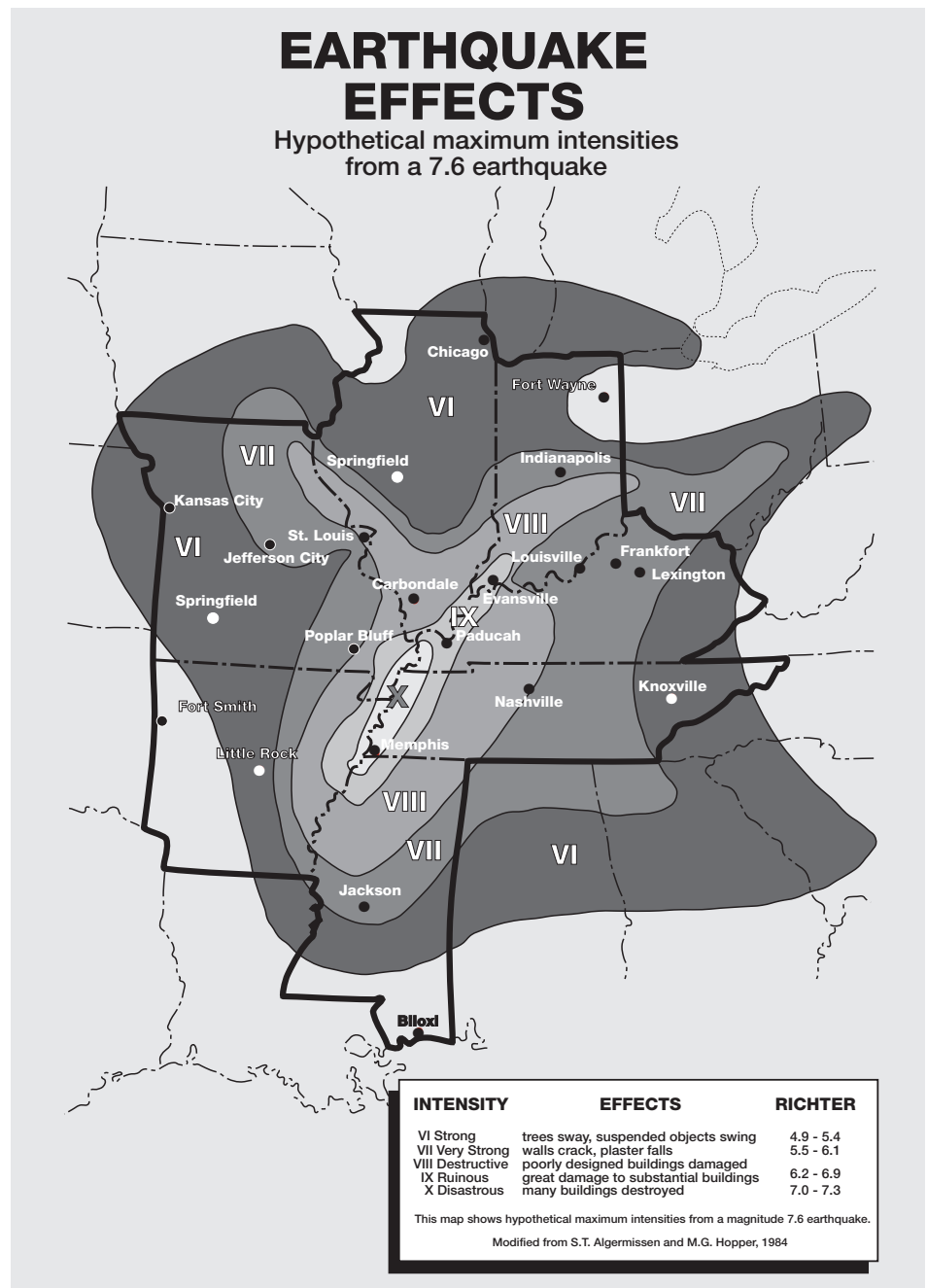
1. Manage aggregate exposure (probable maximum loss).
2. Manage geographic exposure concentration.
3. Quantify "cat" loss cost for pricing.
4. Develop risk transfer strategies.
5. Support individual risk screening, mostly in commercial settings.
6. Model impact of acquisitions and divestitures.

Underwriting and Managing Risk

Hemant Shah:

Given the uncertainties that exist on the baseline level of risk in the Central U.S., a key question is, "what is an *appropriate strategy* for underwriting and managing risk in the high-loss potential/low probability regions of the Central U.S.? Using IRAS as the foundation for quantified guidance, Risk Management Solutions has recommended the following basic strategy for underwriting and risk management by insurers and reinsurers:

1. All exposures should be quantified and accounted for. Because damaging events are so infrequent in the region, there may be the tendency to overlook the need for management of all exposures and limits written in the region.
2. Special attention should be given to managing/controlling earthquake liabilities for insurance and reinsurance contracts within the region. Given the potential for losses across large geographic areas,



earthquake liabilities can be controlled through application of occurrence sub-limits for both multi-location accounts and proportional accounts.

- Underwriting opportunities exist due to variation in both hazard and vulnerability in the Central U.S. Certain classes of construction outperform others during ground motion; certain areas, whether due to distance from epicenter or local soil type and liquefaction are inherently higher or lower risk.

Michael J. Hudson, J&H Marsh & McLennan, Inc.:

“Earthquake losses are not like other losses...its going to effect you, your suppliers, your customers, your employees, and the infrastructure, with no warning. And don’t underestimate the effect on your employees, particularly when aftershocks are involved.”

In discussing insurance policies, it is very difficult to answer the question, “how much coverage is needed?” The reason is the unpredictability of damages; and the lack of information in studies on Probable Maximum Losses (PML) that shed light on damages to infrastructure, availability of resources (e.g., contractors), and competitor benchmarking.

It is very important to pay close attention to how earthquake policies are written, particularly for commercial properties, including: 1) probable damage versus ensuing loss; 2) ingress/egress (e.g., access to building); 3) contingent time element (e.g., what period of time does the policy cover, including waiting periods for suppliers); and 4) coverage for debris removal requirements.

Reducing the Risk: Role of Insurance

Dennis Fasking, Allstate Insurance:

On the definition of *mitigation*...”it is to promote the building of safer and damage resistant structures. What that means is that we need to build awareness and understanding of the risk and risk assessment, and we need to teach people where to build and how to build, and that with their freedom of choice comes responsibility and accountability for their decisions.”

John Robinson, State Farm Insurance:

The question posed is, how to *create demand for mitigation* for an earthquake hazard that can be characterized as “low probability - high risk?” There are fundamental issues to address. The first is apathy. The second is “how much are people willing to pay for mitigation?” And closely related, “how do we communicate the benefits of mitigation?” And the third challenge, which relates to the insurance industry, is if we do create a demand for mitigation and people take action, *is the insurance industry going to be willing to respond with insurance coverage on this property?*

Against this backdrop of challenges, State Farm is taking action in the following areas. First, is education and public awareness. For its part, State Farm has distributed 38,000 “Movers and Shakers” kits to K through grade 12 in the Central U.S., which serves as a model for insurance industry activism. The second area of activity is to complement and support the organizations that take a direct role in promoting earthquake mitigation including the model codes groups, CUSEC, IBHS, and FEMA . A third area of activity is *economic incentives*. The Building Code Effectiveness Grading Schedule—a joint initiative of the Insurance Services Organization and

IBHS—provides a standard against which to measure the commitment of building code departments to adopting and enforcing codes, and also provides a credit for policy holders in communities that score well on the “BCEGS.”

Dean Flesner, formerly with State Farm Insurance:

“My view of the starting point for strengthening codes is to push for mandatory state-wide building codes, which do not permit local amendments or exceptions to the code, or at least permit amendments which are more stringent than the code.”

Kaye Shedlock:

“The risk is very real here. The uncertainties are such that you’re going to need to really focus in on how to set rates, how to examine the seismic research and data to come up with fair and equitable mitigation strategies, but our colleagues and universities, CUSEC and the USGS are excited about working with you to do that.”



SOURCES OF INFORMATION AND TECHNICAL ASSISTANCE

The following is a partial listing of sources of information and technical assistance for earthquake risk assessment and mitigation.

Member States

Arkansas Office of Emergency Services

P.O. Box 758, Conway, AR 72033.
Dan Cicirello, (501) 730-9801;
 Fax: (501) 730-9754.
 Email: djc@oes.state.ar.us

Arkansas Geological Commission

Vardelle Parham Geology Center,
 3815 West Roosevelt Road, Little Rock,
 AR. 72204. *Bill Bush*, (501) 296-1877;
 Fax: (501) 663-7360.

Illinois Emergency Management Agency

2309 West Main Street, Suite 110,
 Marion, IL 62959. *Chuck Cutrell*,
 (618) 997-5847; Fax: (618) 997-2642.
 Email: cutrell01@mychoice.net

Illinois State Geological Survey

615 East Peabody Drive, Room 121
 Champaign, IL 61820. *Bob Bauer*,
 (217) 244-2394; Fax: (217) 244-0029.
 Email: bauer@geoserv.usgs:uiuc.edu

Indiana State Emergency Management Agency

302 West Washington Street, E-208,
 Indianapolis, IN 46204. *John Steel*,
 (317) 233-6519; Fax: (317) 232-4987.
 Email: jsteel@sems.state.in.us

Indiana Geological Survey

611 North Walnut Grove
 Bloomington, IN 47405. *Norman Hester*,
 (812) 855-9350; Fax: (812) 855-2862.
 Email: hester@indiana.edu

Kentucky Disaster and Emergency Services

Boone Center, EOC Bldg., Room 106,
 Frankfort, KY 40501-6168. *Gelonda Casey*,
 (502) 564-8628
 Fax: (502) 564-8618.
 Email: gcasey@kydes.dma.state.us

Kentucky Geological Survey

228 Mining and Mineral Resources Bldg.,
 Lexington, KY 40506-0107. *John D. Kiefer*,
 (606) 257-5500; Fax: (606) 257-1147.
 Email: kiefer@fidu.mm.uky.edu

Mississippi Emergency Management Agency

P. O. Box 4501, 1410 Riverside Dr.,
 Jackson, MS. 39296-4501. *Grady Kersh*,
 (601) 960-9978; Fax: (601) 960-9983.
 Email: mema@mema.state.ms.us

Mississippi Department of Environmental Quality Office of Geology

P.O. Box 20307, Jackson, MS 39289-1307.
Craig Knox, (601) 961-5503;
 Fax: (601) 961-5521.
 Email: craign-knox@deg.state.ms.us

Missouri Emergency Management Agency

P. O. Box 116, Jefferson City, MO 65101.
Ed Gray, (573) 526-9131; Fax: 634-7966.
 Email: egray01@mail.state.mo.us

Missouri Geological Survey

P. O. Box 250, Rolla, MO 65401. *Ira Satterfield*,
 (573) 368-2101
 Fax: (573) 368-2111.
 Email: isatterfield@fidnet.com

Tennessee Emergency Management Agency

P. O. Box 41502, 3041 Sidco Drive,
 Nashville, TN 41502. *Cecil Whaley*,
 (615) 741-0640; Fax: (615) 242-9635.
 Email: cecilw@bellsouth.net

Tennessee Division of Geology

Department of Environment and
 Conservation, 401 Church Street, Life and
 Casualty Tower, Nashville, TN 37243-0445.
Ronald P. Zurawski, (615) 532-1500;
 Fax: (615) 532-0231.
 Email: rzurawski@mail.state.tn.us

Associate Members

Alabama Emergency Management Agency

224 Marietta Avenue, Muscle Shoals, AL
 35661. *Paulette Williams*,
 Pager: (800) 991-6710, Pin # 991-5726.

Georgia Emergency Management Agency

P. O. Box 18055, Atlanta, GA 30316-0055.
Terry Lunn, (404) 635-7016;
 Fax: (404) 635-7005.
 Email: tlunn@gema.state.ga.us

Georgia Geological Survey

Environmental Protection Division, 19 MLK
 Jr. Drive, S.W., Room 400, Atlanta,
 GA 30334. *William H. McLemore*,
 (404) 657-5947; Fax: (404) 657-8379.

Iowa Division of Emergency Management

Hoover State Office Bldg., Room 29, Des
 Moines, IA 50319-0113. *Brian Wood*,
 (515) 281-0657; Fax: (515) 281-7539.
 Email: bwood@max.state.ia.us

Louisiana Office of Emergency

Preparedness

P. O. Box 44217, Baton Rouge, LA 70804.
Brett Kriger, (504) 342-1570;
 Fax: (504) 342-5471.
 Email: Bkriger@hotmail.com

Louisiana Geological Survey

P. O. Box G, University Station, Baton
 Rouge, LA 70893. *Bill Marsallis*,
 (504) 388-5320; Fax: (504) 388-5328.
 Email: BILLMS@DNR.STSTE.LA.US

Nebraska Civil Defense Agency

1300 Military Road, Lincoln, NE 68508.
Dennis Kumm, (402) 471-7213;
 Fax: (402) 471-7433.

Nebraska Geological Survey

Conservation of Nebraska, University of
 Nebraska, 113 Nebraska Hall, Lincoln, NE
 68588-0517. *Perry B. Wigley*,
 (402) 472-3471; Fax: (402) 472-2410.
 Email: pwigley@unlinfo.unl.edu

North Carolina Division of Emergency Management

116 West Jones Street, Raleigh,
NC 27603-1335. *Will Brothers*,
(919) 733-3627; Fax: (919) 733-0795.
Email: wbrothers@dem.dcc.state.nc.us

North Carolina Division of Land Resources, Department of Environmental Health and Natural Resources

P. O. Box 27687, Raleigh, NC 27687.
Charles Gardner, (919) 733-3833;
Fax: (919) 733-4407.
Email: cgardner@mail.ehn.state.nc.us

Ohio Emergency Management Agency

2855 W. Granville Road, West Jones Street,
Columbus, OH 43235-2206.
Candice Sherry, (614) 889-7172;
Fax: (614) 791-0018
Email: csherry@dpspo.dps.state.oh.us

Ohio Department of Natural Resources Division of Geological Survey

5383 Fountain Square Drive, Columbus, OH
43224-1362. *Thomas Berg*, (614) 265-6576;
Fax: (614) 268-3669.
Email: thomas.berg@dnr.state.oh.us

Oklahoma Civil Emergency Management Agency

P. O. Box 53365, Oklahoma City,
OK 73152. *Fred Liebe*, (405) 521-2481;
Fax: (405) 521-4053.
Email: FRED.LIEBE@oklaosf.state.ok.us

Oklahoma Geological Survey

100 East Boyd Room N-131, Norman,
OK 73019-0628. *Dr. Charles J. Mankin*,
(405) 325-3031; Fax: (405) 325-3180.
Email: cjmankin@ou.edu

South Carolina Emergency Preparedness Division

1429 Senate Street, Columbia, SC 29201.
Tammie Dreher, (803) 734-8020;
Fax: (803) 734-8062.
Email: tldreher@strider.epd.state.sc.us

South Carolina Geological Survey

5 Geology Road, Columbia, SC 29210-0098.
C.W. (Bill) Clendenin, (803) 896-7702;
Fax: (803) 896-7695.
Email: clendrin@pop.scdnr.state.sc.us

Virginia Department of Emergency Services

310 Turner Road, Richmond,
VA 23225-6491. *Addison Slayton, Jr.*,
(804) 674-2499; Fax: (804) 674-2490.

Federal Emergency Management Agency Regions

Region IV

3003 Chamblee-Tucker Road,
Atlanta, GA 30341. *Jim Smith*,
(770) 220-5426; Fax: (770) 220-5440.
Email: jim.smith@fema.gov

Region V

175 West Jackson Street, 4th Floor,
Chicago, IL 60604. *William King*,
(312) 408-5575; Fax: (312) 408-5551.
Email: william.king@fema.gov

Region VI

800 North Loop 288, Denton, TX 76201.
Dennis Lee, (940) 898-5260, *Anna Hart*,
(940) 898-5107; Fax: (940) 898-5195.
Email: dennis.lee@fema.gov;
anna.hart@fema.gov

Region VII

2323 Grand Blvd., Suite 900, Kansas City,
MO 64108-2670. *Joe Rachel*,
(816) 283-7015; Fax (816) 283-7018.
Email: joseph.rachel@fema.gov

Non-Government Organizations

American Red Cross

Disaster Services National Headquarters,
615 N. Asaph Street, Alexandria, VA 22314.
Ken Deutsch, Associate for Mitigation,
(703) 206-8631.

Building Seismic Safety Council (BSSC)

1201 L Street N.W., Washington D.C.
20005. *Jim Smith*, Executive Director,
(202) 289-7800.

Center For Earthquake Research and Information (CERI)

University of Memphis, 3890 Central
Avenue, Memphis, TN 38152. *Jim Dorman*,
Director, (901) 678-2007;
Fax: (901) 678-4734.

Disaster Research Center (DRC) University of Delaware

Newark, DE 19716. *Joanne Nigg*, Director,
(302) 831-6618; Fax: (302) 831-2091.

Earthquake Engineering Research Institute (EERI)

499 14th Street, Suite 320, Oakland,
CA 94612-1902. *Susan Tubbesing*,
Executive Director, (510) 451-0905;
Fax: (510) 451-5411. *Sharam Pazesh*,
President, New Madrid Chapter,
(601) 678-4727.

Institute for Business and Home Safety

73 Tremont Street, Suite 510, Boston,
MA 02108-3910. *Harvey Ryland*,
President and CEO, (617) 722-0200;
Fax: (617) 722-0202.

Mid-America Earthquake Center (MAE Center)

1241 Newmark Laboratory, 205 North
Matthews Avenue, Urbana, IL 61801.
Dan P. Abrams, Director, (217) 333-0565;
Fax: (217) 333-3821.
Email: d-abrams@uiuc.edu

National Center for Earthquake Engineering Research (NCEER)

State University of New York at Buffalo,
Red Jacket Quadrangle, P.O. Box 610025,
Buffalo, N.Y. 14261-0025. *George Lee*,
Director; *Patricia Ann Coty*, Manager,
Information Services, (716) 645-3391;
Fax: (716) 645-3399.

Northeastern States Emergency Consortium (NESEC)

607 North Avenue, Suite 16, Wakefield,
MA 01880. *Ed Fratto*, Executive Director,
(617) 224-9876; Fax: (617) 224-4350.

Southern Building Code Congress International (SBCC)

900 Montclair Road, Birmingham,
AL 35213-1206. *Rick Vognild*, Director/
Technical Services, (205) 591-1853;
Fax: (205) 592-7001.

Western States Seismic Policy Council (WSSPC)

121 2nd Street, 4th Floor, San Francisco,
CA 94105. *Steve Ganz*, Executive Director,
(415) 974-6422; Fax: (415) 974-1747.
Email: wssp@slp.net

The CUSEC Board and staff bid a fond farewell to John Mitchell, board member from Illinois, and wish him all the best in his new job with the Illinois Department of Transportation in Chicago. CUSEC welcomes Rex Coble into his new position as acting director, Illinois Emergency Management Agency. Closer to home, CUSEC wishes all the best to Linda Mauldin, Administrative Assistant, who left CUSEC on April 20, 1998, and is living in Brownsville, Tennessee. Please visit CUSEC at its new website—www.cusec.org.

Hospital Mitigation Demonstration Project, Deaconess Hospital, Welborn Baptist Memorial Hospital, Evansville.

April 22, 1998 in Evansville, Indiana

Integrating Earthquake Risk in Distribution Gas Pipeline Safety and Reliability

May 20-21, 1998 at Sheraton Four Points, Memphis.

Sponsored by CUSEC in cooperation with the U.S. Department of Energy.

CUSEC's 1998 Annual Conference: Achieving Earthquake Risk Reduction Through Community-Based Partnerships
June 14-16, 1998 at The Galt House, Louisville, Kentucky

The **Central United States Earthquake Consortium** is a not-for-profit corporation established as a partnership with the Federal government and the seven member states: Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri and Tennessee; and ten associate member states: Alabama, Georgia, Iowa, Louisiana, South Carolina, North Carolina, Ohio, Oklahoma, Nebraska and Virginia. The Federal Emergency Management Agency provides the basic funding for the organization.

CUSEC's purpose is to help reduce deaths, injuries, damage to property and economic losses resulting from earthquakes occurring in the central United States. Basic program goals include: improving public awareness and education, mitigating the effects of earthquakes, coordinating multi-state planning for preparedness, response and recovery; and encouraging research in all aspects of earthquake hazard reduction. CUSEC supports the International Decade for Natural Disaster Reduction.

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Institute for Business and Home Safety
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Northeastern States Emergency Consortium
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U.S. Environmental Protection Agency
U.S. Geological Survey
U.S. Public Health Services - Centers for Disease Control
Western States Seismic Policy Council

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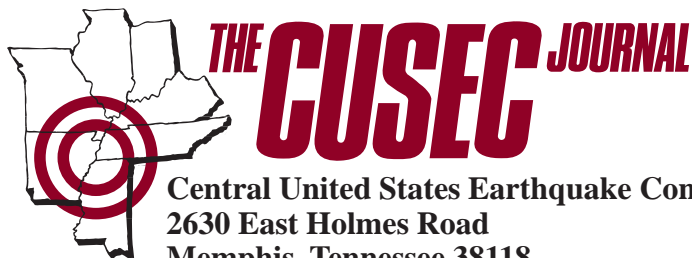
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