THE FINAL REPORT OF THE EARTHQUAKE STUDY GROUP
The Final Report of the Earthquake Study Group

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A Subgroup of the Catastrophe Insurance Working Group of the Property and Casualty Insurance (C) Committee

NAIC
National Association Of Insurance Commissioners
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# The Final Report of the NAIC Earthquake Study Group

## Table of Contents

Introduction – Earthquake Defined ........................................................................................................1

Background ..................................................................................................................................3

Earthquake Study Group Activities .................................................................................................5

Areas of Study..................................................................................................................................7

Recommendations and Conclusions ..............................................................................................13

Appendixes

  Appendix A—Mitigation and Publication of Need to Mitigate ..................................................15

  Appendix B—The Value of Networking Partnerships for Mitigation and Safety .................17

  Appendix C—Solvency of Companies ..................................................................................19

  Appendix D—Market Dislocations and Market Alternatives ...............................................21

  Appendix E—Earthquake Study Group Modeler Questions ...............................................25

  Appendix F—Earthquake Study Group of the Catastrophe Insurance
  Working Group Interim Meeting (Catastrophe Modelers Interview Sessions) .......27

  Appendix G—Earthquake Insurance Computer Model Certification and
  Interrogatories ..............................................................................................................31

  Appendix H—Insurance Information Institute Presentation (October 2, 1999)
  Property/Casualty Insurers and Earthquake Mitigation .................................................41

  Appendix I—Institute for Business & Home Safety Building Code News
  (September 1999) Summary of ICC Model Code Hearings ........................................47

  Appendix J—ISO Presentation —Mid-America Earthquake Insurance Workshop
  (July 28, 1999) Building Code Effectiveness Grading Schedule (BCEGS) .............55

  Appendix K—Mitigation/Disaster Preparedness Web Sites ..............................................57

  Contacts ................................................................................................................................59

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Introduction—Earthquake Defined
(Excerpt from the NAIC Catastrophe Computer Modeling Handbook)

An earthquake is a shaking of the ground caused by the sudden breaking and shifting of large sections of the earth’s rocky outer shell. A severe earthquake may release energy 10,000 times as great as that of the first atomic bomb. Rock movements during an earthquake can make rivers change their course. Earthquakes can trigger landslides that cause great damage and loss of life. Large earthquakes beneath the ocean can create a series of huge, destructive waves called tsunamis that flood coasts for many miles. Earthquakes almost never kill people directly. Instead, many deaths and injuries result from falling objects and the collapse of buildings, bridges and other structures. Fire resulting from broken gas or power lines are another major danger during a quake. Spills of hazardous chemicals are also a concern.

Earthquakes can damage buildings, bridges, dams and other structures, as well as many natural features. Near a fault, both the shifting of large blocks of the earth’s crust, called fault slippage, and the shaking of the ground because of seismic waves cause destruction. Away from the fault, shaking produces most of the damage. Undersea earthquakes may cause huge tsunamis that swamp coastal areas. Other hazards during earthquakes include rockfalls, ground settling and falling trees or tree branches.

The rock on either side of a fault may shift only slightly during an earthquake or may move several feet. In some cases, only the rock deep in the ground shifts and no movement occurs at the earth’s surface. In an extremely large earthquake, the ground may suddenly heave 20 feet or more. Any structure that spans a fault may be wrenched apart. The shifting blocks of earth may break down dams or the banks of rivers, lakes and other bodies of water, causing flooding.

Ground shaking causes structures to sway from side to side, bounce up and down and moves in other violent ways. Buildings may slide off their foundations, collapse or be shaken apart.

In areas with soft, wet soils, a process called liquefaction may intensify earthquake damage. Liquefaction occurs when strong ground shaking causes wet solids to behave temporarily like liquids rather than solids. Anything on top of liquefied soil may sink into the soft ground. The liquefied soil may also flow toward lower ground, burying anything in its path.

Structures collapse during a quake when they are too weak or too rigid to resist strong, rocking forces. In addition, tall buildings may vibrate wildly during an earthquake and knock into each other.

A major cause of death and property damage in earthquakes is fire. Fire may start if a quake ruptures gas or power lines, and may be difficult or impossible to control if the water supply infrastructure has been damaged. The 1906 San Francisco earthquake ranks as one of the worst disasters in United States history because of a fire that raged for three days after the quake.

Other hazards during an earthquake include spills of toxic chemicals and falling objects, such as tree limbs, bricks and glass. Sewage lines may break and sewage may seep into water supplies. Drinking of such impure water may cause cholera, typhoid, dysentery and other serious diseases.

Tsunamis may build to heights of more than 100 feet (30 meters) when they reach shallow water near shore. In the open ocean, tsunamis typically move at speeds of 500 to 600 miles (800-900
kilometers) per hour. They can travel great distances while diminishing little in size and can flood coastal areas thousands of miles or kilometers from their source.

Loss of power, communication and transportation after an earthquake may hamper rescue teams and ambulances, increasing deaths and injuries. In addition, businesses and government offices may lose records and supplies, slowing recovery from the disaster.

The force of an earthquake depends on how much rock breaks and how far it shifts. Powerful earthquakes can shake firm ground violently for great distances. During minor earthquakes, the vibration may be no greater than the vibration caused by a passing truck.

**On average, a powerful earthquake occurs less than once every two years. At least 40 moderate earthquakes cause damage somewhere in the world each year. About 40,000 to 50,000 small earthquakes—large enough to be felt but not damaging—occur annually.**

Scientists can make fairly accurate long-term predictions of where earthquakes will occur. They know, for example, that about 80 percent of the world’s major earthquakes happen along a belt encircling the Pacific Ocean. This belt is sometimes called the Ring of Fire because it has many volcanoes, earthquakes and other geologic activity. Scientists are working to make accurate forecasts on when and how often earthquakes are likely to strike.

Earthquake-resistant construction and building codes help minimize property damage and injuries from quakes. Knowing what to do when an earthquake occurs is instrumental to personal safety, as are some key steps to follow both before and after a quake. Such information can be obtained from the *NAIC State Disaster Response Plan* (1996) (the Plan) developed by the Catastrophe Insurance Working Group. Many insurance company and insurance industry association Web sites also contain useful information on disaster preparedness and loss mitigation.
Background

Although California is often thought of first when earthquakes in the United States are discussed, there are several areas outside of California that have experienced severe earthquakes, and the potential for damaging earthquake activity occurring again in these areas is significant. Earthquakes that occurred in New Madrid, MO in 1811 and 1812 were among the most devastating in United States history. The New Madrid earthquakes were estimated to reach 8.4 and 8.7 Richter, respectively. According to historical records, the ground shook as far away as Chicago and New York, the course of the Mississippi River was permanently altered and church bells rang in Boston.

New Madrid is the world’s best example of liquefaction since United States geological maps show the valley is made up primarily of silt. Paleoliquefaction studies and data from seismometers that were installed in the central Mississippi Valley during the 1970s, when scientists, engineers and planners began studying proposals to build nuclear power plants in mid America, suggest a recurrence interval of 400 to 1,000 years for a magnitude 8 earthquake in the New Madrid region. Lesser quakes up to 7.5 have recurred at intervals of 200 to 400 years. While more recent studies based on Global Positioning System satellites (GPS) have called into question the maximum magnitude likely to occur in the region, the chance that a magnitude 6 or even a magnitude 5 earthquake will occur within the next 50 years remains high. Either would cause a considerable amount of property damage and a potentially high loss of human life.

In 1995, the National Underwriter ran a story in its May 8 edition on an Insurance Services Office, Inc., report that indicated property damages from an earthquake in the New Madrid Seismic Zone (NMSZ) could hit $170 billion. The article stated that insurers who had recently been hit hard by an earthquake in Northridge, CA and by Hurricane Andrew in Florida were beginning to examine their catastrophe exposure levels in the Midwest and modify their sales and underwriting practices to limit their earthquake exposure in the New Madrid region.

Insurers have attempted to manage their catastrophe exposure by limiting the number of new policies written or by reassigning policyholders to agents farther from their homes. In some areas, higher deductibles were offered or required. In others, new policies were not issued at all to risk-prone homes, such as those with masonry basements, without some type of earthquake retrofitting requirement. In some states, insurers and rating organizations filed rate increases for earthquake coverage based on the results of computer simulated earthquakes. Some policyholders ultimately switched to other companies or simply dropped the coverage upon renewal.

Insurance departments in the NMSZ, concerned by the significant underwriting and pricing changes in the earthquake insurance market, recognized a need to work together to study aspects of earthquake risk specific to the New Madrid area and to share that information with other states less experienced than California in dealing with earthquake catastrophes. On July 11, 1997, a meeting of the New Madrid Fault Catastrophe Planning Committee was held at the Missouri Department of Insurance in St. Louis, MO. Insurance regulators from Arkansas, Illinois, Kentucky, Missouri and Tennessee attended.
New Madrid Fault Catastrophe Planning Committee

The agenda for the Planning Committee began with discussion of the “reality” of the problem. An in-depth analysis of seismic activity in New Madrid revealed that the structure of the NMSZ is the result of strike-slip motion along a fault system that has a major bend. For this reason and other soil and tectonic plate factors intraplate earthquakes occur differently than those in the West coastal region. Such factors are also responsible for quakes that have occurred or could occur in Charleston, SC, in the Wasatch Fault in Montana, Wyoming, Idaho and Utah.

Among the various common interests discussed by the participating state representatives was a concern that rate advisory groups and insurers were filing earthquake rates in the Midwest based on computer simulated earthquake model results that use modified California earthquake experience, since there is little historical experience in the region to use. Insurance department rate analysts had little or no expertise in determining the reasonability of rate filings based on catastrophe model results, or in determining whether assumptions used in these models adequately reflected the exposure in the Midwest or accounted for differences in regional soil types and tectonics of quakes that occur in central United States versus those that occur on the west coast.

The participants also evaluated alternative catastrophe funding mechanisms, such as the California Earthquake Authority and the Florida Hurricane Catastrophe Fund and the feasibility of creating a multistate reinsurance pool. The committee reviewed federal and state legislation pertaining to homeowners insurance availability, affordability and catastrophe coverage as well as proposals for tax incentives in the development of catastrophe reserves and reinsurance mechanisms for state disaster insurance programs.

1998 Charge of the Property and Casualty Personal Lines (C) Committee—Formation of the Earthquake Study Group

The Planning Committee recommended to the Property and Casualty Personal Lines (C) Committee, parent to the Catastrophe Insurance Working Group, that a study group be formed to examine these New Madrid fault issues in depth and to share its findings with other state departments. Accordingly, the following 1998 charge to the Catastrophe Insurance Working Group was made:

Appoint an earthquake study group to work with seismic and actuarial experts to develop recommendations for measures designed to mitigate losses caused by earthquakes. Study the earthquake peril and identify the differences between west coastal earthquakes and earthquakes in the central United States. Assist states in dealing with market dislocations and effects of rate level caused by exposure to the earthquake peril. Identify strategies to communicate loss mitigation measures to insurers and the public. Findings made by this study group shall be reported on a quarterly basis. Present final recommendations by the 1998 Winter National Meeting.
Earthquake Study Group Activities

The Earthquake Study Group was established and first met at the NAIC 1998 Spring National Meeting in Salt Lake City, Utah. In addition to the original Planning Committee members, Indiana became the sixth New Madrid area state to participate. Alaska, Oregon and Nevada also joined the group. Each of these states was dealing with the issue of determining the reasonability of rate filings based on catastrophe modeling results using modified California earthquake experience. Both Alaska and Oregon are in a region with five interacting tectonic plate areas with faults that have produced infrequent but significantly high magnitude earthquakes. In addition, both states, being located on the coast of the Pacific Ocean, are at risk of tsunamis, which are enormous sea waves associated with offshore earthquakes.

The study group spent most of the first year identifying major areas for study and developing a strategic plan for accomplishing goals. Since five areas of interest emerged, members of the group set priorities for study and drafted the following “Statement of Intent:”

Earthquake Study Group Statement of Intent

The Earthquake Study Group has discussed the various areas related to earthquake exposure. The study group recognizes that a comprehensive study of all areas may be beyond its scope and ability to complete with available resources. In recognition of that limitation, the study group has decided to prioritize the areas it will study. This Statement of Intent discusses the areas that the study group has visited and those that it will pursue.

The study group reviewed the following topics and prepared summaries for each area:

1. “Mitigation and Publication of Need to Mitigate”—Prepared by W. Bradford Connor (MO) and Sarah McNair-Grove (AK);
2. “The Value of Networking Partnerships for Mitigation and Safety”—Prepared by Jerald Wise (IN) and Mona Carter (KY);
3. “Solvency of Companies”—Prepared by Cynthia Stephenson (IL), Judy Pool (IL) and Cliff King (NV); and

The study group recommends that the Catastrophe Reserve Subgroup or the Financial Condition (E) Committee address the study of insurer solvency issues that relate to the earthquake risk.

The study group intends to pursue the study of catastrophe models as they relate to the earthquake risk and the study of mitigation efforts and associated consumer education.

In its study of catastrophe models, mitigation and consumer information, the study group intends to pursue these activities:

1. It reviewed the Catastrophe Computer Simulation Modeling Handbook that was prepared by the Catastrophe Insurance Working Group and offered comments from the study group as it regards the consequences of regional seismic activity.
2. It will meet with catastrophe modeling vendors to review model assumptions, input and output as it relates to earthquake exposure. The study group hopes to determine if the models adequately handle regional differences in loss exposure based on differing soil conditions, building types and types of shaking that can be reasonably expected to occur.

3. It will cooperatively review insurer and advisory organization rate filings to determine if regional exposure differences are adequately reflected in the selected rate level.

4. It will partner with other organizations that are involved in loss mitigation efforts so that insurers can be encouraged to adopt rating systems that encourage policyholders to take cost-effective steps to mitigate against the risk of loss from earthquakes.

5. It will also partner with other organizations to communicate with the public about the significant risk of loss to which they are exposed from earthquakes and cost-effective ways that consumers can mitigate the risk of loss.

It will document its findings in each of the areas described so that other regulators can benefit from the discoveries of the study group.

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Note: The full text of summaries listed in the above “Statement of Intent” is found in Appendices A-D of this report.
Areas of Study

Catastrophe Computer Modeling

Handbook

The study group members reviewed the *Catastrophe Computer Simulation Modeling Handbook* developed by the NAIC Catastrophe Insurance Working Group and suggested minor amendments that have significance to states in areas where seismic activity is less frequent. The handbook will be a useful tool for states first facing the issues of loss estimates based on modeling results in lieu of loss history.

Modeler Interview Session

In February 1999, the study group, with the technical advisory assistance of several academic and government earthquake experts, conducted a confidential interviewing session in St. Louis, MO with four major modeling firms to gain a better understanding of catastrophe modeling applications used in the development of rates for earthquake coverage. A list of 25 questions, prepared by members with the assistance of state geologists, seismologists and actuaries, was given to each modeler (Appendix E). Each modeler prepared a two-hour presentation to respond to the questions and to answer any other questions raised by the members and their “experts.”

The potential catastrophic effects of earthquakes in New Madrid and seismic activity in the Pacific Northwest differ significantly from the effects of coastal earthquakes that occur routinely in California. Accordingly, a more specific goal in these interview sessions was to assess the methods modelers use to modify the input data, scientific and actuarial assumptions and algorithms used for risk evaluation in areas where seismic activity is frequent, when developing loss estimates for areas outside of California, particularly the New Madrid Seismic Zone, the Pacific Northwest Seismic Zone and Alaska.

Members of the group were provided with an extensive amount of information which explained the differences between the effects of earthquakes at various magnitudes and found that underlying scientific assumptions regarding the size and recurrence of an earthquake as potentially damaging as the 1811-1812 New Madrid earthquakes are themselves under re-evaluation as different schools of thought are developing new sources of information. It is expected that there will continue to be several revisions of risk probabilities as more research in the area is conducted. A summary report on the two-day interview sessions can be found in Appendix F.

Earthquake Insurance Computer Model Certification and Interrogatories

Although the interviews provided members with a level of comfort that catastrophe modeling is a satisfactory method of estimating loss costs for the development of earthquake rates, it was still determined that rate analysts need assurance that the assumptions, data and modifications made by modelers and by insurers who use the model results, adequately reflect the exposure in the area being rated. For this reason, the study group drafted a standard set of model and modeler “interrogatories” along with a certification form that an insurer or advisory organization may be required to submit with a rate filing that is based on catastrophe modeling results (Appendix G).
Insurer or advisory organization responses to the interrogatories will provide states with the minimum supporting information relevant and necessary to determine whether a rate filing based on modeling results properly reflects the exposure and meets the requirements of the state Insurance Code. It also enables the insurer or advisory organization to know what information to provide to regulators when submitting rate filings based on models.

Rate Analysis

During the two-year history of the study group, several member states have dealt with rate filings for earthquake coverage that calls for significant increases in rates. Most have allowed the increases, some with changes required because of inappropriate assumptions or data that did not adequately reflect the soil conditions, or some other aspect of the exposure. In cases where the rate increase was substantial, insurers sometimes were required to phase in the increases over a period of several years. One state, however, has been conducting an extensive examination of rate advisory organization filings in the New Madrid area. Though conclusions in that examination are still forthcoming, it is important to note that communication among member states has fostered, to the extent possible, uniformity in the way that filings are reviewed among states in earthquake zones outside of the California area.

Mitigation and Disaster Preparedness

Partnering

The study group has reviewed the NAIC State Disaster Response Plan developed by the Catastrophe Insurance Working Group in 1996 and endorses it as an important tool for insurance departments to use not only in responding to an emergency situation but also in preparing for an emergency before it happens. The Plan promotes partnering with other insurance departments as well as with other agencies to maximize disaster response efforts. It contains disaster response and preparedness information, model laws and regulations for drafting emergency licensing procedures for claims adjusters or other out-of-state assistance personnel, forms for use in preparing media releases, contact information lists and other sample brochures and forms. Study group members have recommended adding Web site information, e-mail addresses and other technological updates.

Members have met with insurance industry groups such as the Institute for Business and Home Safety (IBHS) and the Insurance Information Institute (III) (Appendix H) to discuss and encourage the industry’s role in natural hazard mitigation. The study group has supported industry projects and programs that encourage the development and enforcement of sound building codes for new construction facilities and has participated in workshops conducted by earthquake research groups in the New Madrid region including the Central United States Earthquake Consortium (CUSEC) at the University of Memphis and the Mid-America Earthquake Center at the University of Illinois in Urbana. Several member states have conducted their own workshops to communicate and educate department staffs, as well as the public, on disaster preparedness.

Member states have, as a group and individually, developed partnerships with other government agencies such as the Federal Emergency Management Agency (FEMA), state Emergency Management Agencies, and the Western States Seismic Policy Council to facilitate the dissemination of earthquake mitigation information to the public. The study group has also
participated in workshops with scientific and educational research organizations, such as the National Science Foundation’s Mid-America Earthquake (MAE) Center, to encourage and support funding of research to reduce the uncertainty of risk and the development of education and training programs and activities geared toward loss reduction.

Mitigation and Disaster Preparedness Measures

Retrofitting

Retrofitting can be divided into two categories: nonstructural and structural. Structural retrofits can be complex and expensive and therefore are more commonly associated with commercial properties, however residential home retrofitting is a worthwhile investment both for the protection of property and to save lives. Nonstructural retrofits are those actions that can be done easily and without great cost to the homeowner. Examples include securing shelves, bookcases, cabinets, appliances and water heaters to reduce the likelihood these items may fall over during an event.

Study group members commend IBHS projects such as “Protecting Our Kids from Disasters” that focus on nonstructural retrofits of daycare facilities. A participating daycare facility is provided with an information kit emphasizing simple modifications, such as: securing bookcases, pictures and bulletin boards to walls so they do not fall off; latching cabinet doors so they will not swing open and spray their contents; making window glass shatter-resistant by adding protective film and so on. These are all things a group of volunteer adults, with a little bit of preparation and training, can handle with ease and the IBHS kit includes a checklist that outlines everything you should do before starting to work. A typical retrofit of a 2,000-3,000 square foot facility takes 10-15 volunteers one-half day.

The Earthquake Study Group met with engineers from QuakeSafe, a private firm involved in the economical retrofitting of residences in California to make them more earthquake resistant. It was learned that in some areas, the costs of such retrofitting are not beyond reason. However, structural retrofitting of homes in many areas in the Midwest may not be as economically feasible as on the West Coast given the predominance of unreinforced masonry basements. The retrofit needs to be cost-effective, yet efficient in reducing the probability of catastrophic structural failure.

Basement retrofit may be complex and is often viewed as being too costly for a homeowner to justify. Nothing currently exists to help a homeowner determine if the basement is unreinforced. Nor, is there currently anything in terms of retrofit design to assist a homeowner in the retrofit of a basement. Research and laboratory testing of designs to effectively retrofit unreinforced masonry basements are needed. Fortunately, as part of the MAE Center research project, structural engineers will soon be able to test a full scale, two story unreinforced masonry building in a new $7 million Structural Engineering and Materials Laboratory constructed on Georgia Technical State University’s campus in Atlanta.

Building Code Enforcement (Appendix I)

Also in meeting with representatives of IBHS, the study group learned that the three existing building codes, the National Building Code (NBC) published by the Building Officials and Code Administrators (BOCA), the Standard Building Code (SBC) published by the Southern Building
Code Congress and the Uniform Building Code (UBC) published by the International Conference of Building Officials (ICBO) are coalescing as the International Building Code 2000 in January 2000, under the International Code Council or ICC. Seismic design provisions in the new code represent state-of-the-art and incorporate new calculation methods and design maps. Soil factors have a major impact and the first new seismic maps in 25 years are a critical element in the use of the code.

This process should be well underway within the year 2000. However, effective enforcement of the building code in a state or community is essential. Few states, particularly those in the New Madrid Zone have a statewide code and the adoption and enforcement of codes among contiguous jurisdictions can become a hot local political issue in some communities. Limitations in codes currently in effect in the Midwest and other areas where earthquakes are infrequent also include a lack of emphasis on protection of property from earthquake damage.

Insurer Incentives for Mitigation—Building Code Effectiveness Grading Schedule (Appendix J)

The Earthquake Study Group met with insurance rating advisory organizations and discussed industry efforts to measure risk and encourage hazard mitigation through the support of proper building codes. In the development of rates for earthquake coverage, members support an insurer’s use of the Insurance Services Office, Inc.’s (ISO) “Building Code Effectiveness Grading Schedule (BCEGS)” designed to encourage communities and residents to take the essential steps to not only implement a code which emphasizes structural protection from earthquake damage, but to make sure it is effectively enforced.

Earthquake and Disaster Safety Web Sites (Appendix K)

The study group created a booklet of state and federal agencies, insurance industry and other earthquake-related Web pages with information on disaster planning and mitigation activities. Several of the Web sites are listed in Appendix K of this report. Related Web sites will continue to be added as recommended. The booklet will be available electronically through the NAIC Research Department. Interested persons can contact Natalai Webster Hughes at the following e-mail address: nhughes@naic.org or by telephone at (816) 842-3600 to obtain a copy.

The study group is also working to establish and promote a NAIC disaster preparedness Web page with information “hyperlinks” between the NAIC and various state government Web sites and other government agencies. This project will continue beyond the existence of the study group and will be maintained by NAIC staff.

Market Dislocations and Market Alternatives

Some states, such as Arkansas, Florida, Hawaii, New York and California have passed legislation to assist the marketplace in dealing with catastrophic exposures (Appendix E). On a higher level, the federal government is also contemplating legislation such as H.R. 3303, “The Natural Disaster Insurance Solvency Act of 1999.” This bill provides for the establishment of the Natural Disaster Insurance Solvency Fund in order to ensure adequate private insurance reserves in the event of catastrophic natural disasters.

After a congressional finding that increasing costs of natural disasters is making homeowners’ insurance difficult to purchase, H.R. 21, the “Homeowners Insurance Availability Act of 1999”
was proposed. If passed, H.R. 21 would provide for a temporary federal role in providing additional reinsurance capacity for eligible state programs, as well as private insurers and reinsurers. The program is based upon sound actuarial principles and would remain in effect only long enough to allow private entities or the capital markets to provide adequate reinsurance capacity.

The Catastrophe Insurance Working Group has prepared an analysis of each of these federal legislative proposals. In consideration of their work in this area, the study group recommended that further study of market alternatives remain with its parent group.

**Solvency of Companies and Alternative Funding Mechanisms**

Much work in this area was already being done in the NAIC Financial Condition (E) Committee and the Catastrophe Reserve Subgroup, also formed under the auspices of the Catastrophe Insurance Working Group. A recommendation was made to refer the study of insurer solvency issues and catastrophe reinsurance programs that relate to earthquake risk to these groups.
Recommendations and Conclusions

The Earthquake Study Group has the following recommendations and conclusions:

**Recommendations**

1. As a first line of communication for policyholders, insurance departments should develop, seek out and actively participate in disaster planning, disaster preparedness and mitigation efforts and initiatives, both as an individual public service agency and in partnership with other local, state and federal government agencies, as well as with private businesses whenever possible.

2. Insurers, regulators and trade associations should strive to increase public awareness and concern about the reality of the potential for catastrophic loss.

3. State regulators, insurers and trade associations should actively support the establishment of strict international building codes throughout the country that can save lives, as well as property.

4. State regulators should encourage industry responses such as adoption of the proactive Building Code Effectiveness Grading Schedule that provides rate credits for homes and businesses in qualifying communities.

5. Insurers should develop rate plans that give insureds credits for taking proactive steps to mitigate loss in the event of a catastrophe.

6. The study group has reviewed the *NAIC State Disaster Response Plan* (the Plan) developed by the Catastrophe Insurance Working Group in 1996 and endorses it as an important tool for insurance departments to use not only in responding to an emergency situation but also in preparing for an emergency before it happens. However, the Plan is in need of considerable updating; therefore, the study group recommends that the Catastrophic Insurance Working Group reappoint a subgroup to update the Plan.

7. The Catastrophe Insurance Working Group should consider revising the *Catastrophe Computer Modeling Handbook*, in particular, “Section VI—Model Validation and Update.” Also, an earlier version of the Handbook contained a section that dealt with the licensing of modeling software. The study group recommends reinserting this section but expanding on the contract issues. This would be beneficial to regulators dealing with a modeler for the first time.

8. The NAIC should provide a central Web site with hyperlinks to state, federal, academic and insurance Web sites that offer helpful information on disaster related topics.
Conclusions

1. The central United States may face unprecedented catastrophe losses because of its unique hazard environment and the vulnerability of its buildings and infrastructure.

2. Current catastrophe models are largely dependent on data drawn from West Coast experience. However, mid-continent seismic activity, exposure and infrastructure are significantly different from West Coast tectonic plate movement and building environment. Despite these regional differences, the models provide our current best estimate of underlying risk assumed by insurers.

3. Few states are adequately prepared to deal with the potentially devastating effects of an earthquake. Preparation should include modifying laws to reduce the “red tape” which inhibits assistance from other states when a disaster occurs. It is essential for the insurance industry and other businesses to partner with local, state and federal agencies for the protection of the public.

4. Loss mitigation requires individuals, corporations and governments to proactively deal with a threat that may not be experienced in its full terror before the event. The insurance industry and regulators must do a much better job of educating the public on ways to prevent severe loss.

5. Regulators should consider using the certification and interrogatories in Appendix G when reviewing rate filings, which are based upon catastrophe models.

6. Regulators should remain alert to changes in the underwriting and pricing of earthquake coverage and should consider sharing the findings from their evaluations of rate filings with multistate impact.

7. The NAIC State Disaster Response Plan and the Catastrophe Computer Modeling Handbook should be updated periodically to remain current.
APPENDIX A

Mitigation and Publication of Need to Mitigate

In the central United States, no major earthquake has occurred since 1811-1812 and valid estimates of the probable severity of the next “big one” are difficult to make. In the western United States, recent earthquakes have caused large property losses. The amount of the damage encourages discussions over whether the current state of catastrophe planning in these areas can be improved to prevent or reduce future losses because of earthquakes.

Extensive public relations campaigns are needed to overcome the lack of personal experience in the central UNITED STATES, as well as to inform residents of all earthquake prone areas of the dangers and relatively simple measures that can be taken to reduce the enormity of loss. Expected costs for significant mitigation efforts could be offset by recoveries drawn from insurance credits, reduced governmental superstructures, or lessened national emergency costs born by taxpayers, etc.

A possible outline to begin discussion is as follows:

I. Mitigation defined: Mitigation is the process of taking steps to:
   A. Reduce damage caused by catastrophic events;
   B. Reduce the probability of a catastrophic event occurring; or
   C. Prevent a catastrophe from happening.

II. How is mitigation accomplished? Mitigation usually takes the form of:
   A. Land planning or restrictions on land use;
   B. Retrofitting old construction;
   C. Using appropriate new construction techniques and materials;
   D. Developing ready supply of needed material; or
   E. Other non-construction related activities.

III. Sources of mitigation information:
   A. Federal Emergency Management Agency (FEMA);
   B. EQECAT;
   C. Institute for Business and Home Safety (IBHS);
   D. Cascadia Regional Earthquake Work Group (CREW);
   E. Central UNITED STATES Earthquake Consortium (CUSEC); and

IV. Why mitigation is important to insurance regulators and consumers:
   A. Reduce cost of insurance;
   B. Reduce cost of and reliance on disaster aid from state and federal governments; and
   C. Increased availability of insurance coverage.

V. Mitigation activities of other NAIC groups:
   A. None.
APPENDIX B

The Value of Networking
Partnerships for Mitigation and Safety

State Insurance Departments throughout the country must form allegiances with other states and federal agencies to provide education to their constituents on mitigation needs. A community that has prepared for potential hazard is a community that will have less loss of lives and property. This type of preparation should cause lower insurance premiums.

As we move forward on this paper, the following groups should be considered for Partnerships:

1) State and Local Government Partnerships
2) Insurance Industry Partnerships

Below is a list of governmental agencies found in most states with which alliances could be formed:

1. State Emergency Management Agency – State Coordinating Officer
2. State Police
3. Department of Health
4. Military Department
5. Department of Transportation
6. Department of Natural Resources
7. Department of Education
8. State Auditor
9. Attorney General
10. Utility Regulatory Commission
11. Department of Commerce
12. Office of Commissioner of Agriculture
13. Commodity Warehouse Licensing Agency
14. Department of Family and Social Services
15. Department of Fire and Building Services
16. Department of Personnel
17. Department of Environmental Management
18. Department of Workforce Development
20. State Budget Agency
21. State Board of Accounts
22. State Board of Animal Health
23. Civil Rights Commission
24. Department of Insurance
25. Department of Labor
26. Department of Revenue
27. Public Safety Training Institute
28. Department of Correction
29. Department of Administration
30. Port Commission
31. Commission on Public Records
32. State Office Building Commission
33. Data Processing Oversight Commission
34. Housing Finance Authority
35. Gaming Commission
36. Board of Tax Commissioners

This list is not in any particular order, nor should it be considered complete. Some states may have agencies that are not on this list that need to be added (or deleted).

Federal and Miscellaneous Agencies:

CUSEC—Central United States Earthquake Consortium
FEMA—Federal Emergency Management Agency
IBHS—Institute for Business and Home Safety
American Red Cross
MAE—Mid-America Earthquake Center
Local Power Companies
State and Local Chamber of Commerce
APPENDIX C

Solvency of Companies

State regulators are urged to develop financial analysis methods and procedures for assessing insurers’ ability to maintain solvency in the event of catastrophic earthquake losses.

In assessing an insurer’s position, the regulator should consider the insurer’s capital/surplus as it compares to its maximum exposure to catastrophe risk. Regulators should evaluate the insurer’s risk management strategies. Consideration should be given to the effectiveness of various efforts undertaken for managing the earthquake exposure, such as:

- Geographic diversification
- Reinsurance programs
- Loss mitigation programs
- Capital market products
- Catastrophe reserves

The study group may want to propose the development of financial analysis methods for determining the solvency implications of the insurer’s catastrophe exposure. The study group might consider the methods already used by various states and those used by A.M. Best in its rating evaluation. (See Best Weekly, P/C Supplement, March 25, 1996.) Proposals for state regulator’s financial analysis methods could be as simple as evaluating the ratio of the retained risk to surplus or as involved as conducting their own catastrophe modeling—or any other methods between these two extremes.

The work of other NAIC groups should supplement this group’s study of capital market products and catastrophe reserves mentioned above.

This issue was referred to the Catastrophe Reserve Subgroup and the Financial Condition (E) Committee.
APPENDIX D

Market Dislocations and Market Alternatives

Market Dislocations:

Anecdotal evidence indicates insurance companies have been limiting their capacity in earthquake exposure for residential properties. In Missouri, for example, one insurance company has put a moratorium on earthquake coverage; it will not write any new earthquake coverage unless one of its current policyholders cancels. Another company quit writing earthquake coverage altogether in 1994 because of its Northridge experience. In addition, ISO has filed its commercial earthquake loss costs that would have the impact of increasing loss costs almost 400 percent in the bootheel areas. We also are aware of an upcoming ISO residential earthquake loss cost filing that would have the effect of increasing loss costs more than 150 percent in most rating territories of Missouri and over 260 percent in one rating territory of the bootheel. Further, A.M. Best has lowered an insurance company’s rating because of its New Madrid exposure; in the May 11, 1998, copy of Best’s Rating Monitor, Brotherhood Mutual Insurance Company of Fort Wayne, IN, had its Best’s Rating of “A+” downgraded to “A” because of the company’s “extremely high catastrophe leverage and heavy dependence on reinsurance as a result of its exposure to a New Madrid earthquake.” This, despite A.M. Best’s comment “Over the past few years, management (Brotherhood) has taken several actions to reduce this exposure by implementing earthquake deductibles, increasing rates for the New Madrid region, enhancing its catastrophe reinsurance coverage and discontinuing the acceptance of non-church-related policies in the New Madrid region,” further indicates a constricted market.

Market Alternatives:

Some states, such as Florida, Hawaii, New York and California have passed legislation to assist the marketplace in dealing with catastrophic exposures. On a higher level, the federal government is also contemplating legislation, H.R. 219, on this topic. Listed below are various approaches different entities are taking with this issue:

Enacted Legislation:

AR (Arkansas Earthquake Authority), contact Lenita Blasingame or Becky Harrington, 501-371-2800: Establishes Market Assistance Program offering monoline residential earthquake coverage through voluntary market insurers to qualifying applicants having underlying homeowner, dwelling fire or farmowner coverage. Should the NAIC fail to function because of lack of insurer participants, the Arkansas Earthquake Authority Board can, with the concurrence of the Insurance Commissioner and the Arkansas Legislature, establish the Arkansas Earthquake Authority and issue residential earthquake coverage through the Authority.

CEA (California Earthquake Authority), contact Greg Butler, CEO, 916-492-4300: Privately financed, publicly managed fund. Statutorily designed to provide residential earthquake insurance to the homeowner. Basic coverage, rates set by CEA. CEA is funded by assessments to insurance companies on their market share. Claims are handled by the agent or insurer who placed the coverage. The fund is exempt from federal taxation. Claims paying ability—$7.4 billion.
FL (Florida Hurricane Catastrophe Fund), contact Jack Nicholson, 850-413-1340 or Web site www.fsba.state.fl.us: Mandatory hurricane cat fund to provide reinsurance capacity. All residential property and commercial residential property insurers must participate. Insurers pay premiums to the fund based on its own hurricane exposure to cover losses over a certain retention, which is currently estimated to be $3.2 billion. Cash on hand is $2.5 billion, and they have the ability to bond $8.5 billion. The fund is exempt from federal taxation. Claims paying ability—$11 billion.

HW (HHRF-Hawaii Hurricane Relief Fund), contact Elliott Sumida, 808-586-3100: Similar to the CEA in that this fund is a primary insurer. Insurer assessments fund the first layer of $400 million in losses, reinsurance funds the second layer at $860 million and bank facility funds the third layer of $750 million. The fund is exempt from federal taxation. Claims paying ability—$2 billion.

NY (C–MART–Coastal Market Assistance Reference Tables): Contains up-to-date names and telephone numbers of insurance companies which had advised the Department they would insure risks within a certain proximity of the shore. This information is made available to consumers via the Department’s personal lines telephone hotline.

NY (CMAP–Coastal Market Assistance Program): Voluntary network of insurers and insurance producers that assist New York homeowners in coastal areas in obtaining insurance. This program was established for owner-occupied, one-to-four family dwellings, including condominiums and cooperative apartments in the Bronx, Brooklyn, Nassau, Queens, Staten Island, Suffolk and Westchester areas; the dwelling must meet certain “proximity to shore” requirements. Policies are placed either through the company/agent rotation process or the self-certification process.

Pending Proposals:

H.R. 219: The Treasury Department would make available voluntary, annual contracts to state-operated catastrophe funds for losses on homes, condominiums and contents of apartments that exceed the state’s own financial capacity to pay claims on events that occur on average every 100 years or more. Contracts cannot exceed $25 billion in reinsurance protection. In addition, the federal government would auction federal reinsurance to the private marketplace despite the existence of a state-operated fund.

Farmers Insurance Company, Inc.: Wants to sell stand-alone earthquake policies in only one company. The homeowners policy must be sold by a Farmers company, then the basic earthquake coverage can be offered. Rates are similar to the earthquake endorsement previously offered by Farmers. No brick, masonry veneer will be insurable, but the masonry veneer will be excluded.

USAA Insurance Co.: Believes that a mix of private and federal reinsurance is needed for catastrophic exposures; government should act as the reinsurer with private insurance as the primary insurer. Public policy considerations include adequate insurance rates, flexible policy design, mitigation measures and adequate insurer capitalization.

MO Agent’s Proposal: Requires all insurance companies who write earthquake coverage to turn over their earthquake premiums to a state catastrophe fund that would be backed by private
reinsurance. If a major catastrophe exhausted the fund as well as all reinsurance, all property and casualty companies would be assessed for the shortfall.
APPENDIX E
Earthquake Study Group
Modeler Questions

1. Is there a problem? (Is there a credible risk of major loss because of earthquakes in the mid-continent region of the United States? Based on what information?)

2. What is the history of computer modeling of earthquakes in this country, and what is the history of the development of the particular computer model in question?

3. Is the state-of-the-art in earthquake science advanced enough for mid-tectonic plate earthquakes to form the basis of a model, or is more study needed?

4. What is the structure of the model in question? (What are the model’s major components?)

5. What are the model’s basic algorithms? (How are the major components interrelated?)

6. What are the major scientific assumptions of the model? (What scientific papers, etc., have been relied upon as a foundation for the model? Also, are there other reasonable, alternative assumptions that have been rejected? Who made the selection, and why?)

7. What are the major actuarial assumptions of the model? (Also, are there other reasonable, alternative assumptions, which have been rejected? Who made the decisions, and why?)

8. What is the nature of the inputs fed into the model? (If the inputs are pieces of data, what is the source of the data and how reliable is it? Is the data appropriate for use in this context?)

9. What are the outputs of the model? (Are the outputs consistent with what one would expect given the structure and algorithms of the model? Is the model doing its mathematical manipulations accurately? Have the model and its outputs been peer-reviewed by experts on the mid-continent earthquake environment?)

10. What, if any, actuarial modifications are made to the model’s outputs? (In theory, the model is based on reasonable seismic, geologic and engineering analysis. To what extent is it appropriate to modify these results to lower, raise or redistribute rate changes?)

11. What is the model’s “track record?” Has it done reasonably well in predicting the recurrence and magnitude of earthquakes, both in the mid-continental United States and elsewhere? Has it done a good job in predicting the insured damage caused by these earthquakes?)

12. In iterations that move from deterministic to probabilistic models, do the iterations reflect the mean values or stay within one standard deviation of the mean or do they reproduce the entire distribution as to relative frequencies?

13. As to epicenters how are they selected for iterations?

14. Is the probability of an earthquake on the New Madrid fault greater than or equal to VIII (Mercalli) in the year 1999?
15. What is the probable cost of loss of insured property after such an earthquake—cite assumptions needed?

16. To what degree are estimates based on tectonic plate movement?

17. In what ways have data drawn from earthquakes on the Pacific Rim been modified to reflect earthquake forces in the central United States (New Madrid Zone)?

18. Discuss the rational for your decisions related to parameterizing the seismic activity and attenuation of the state. Include a list of the references of (Alaska, New Madrid) seismology and geology that were used as input for the model (other than the summary of historic earthquakes).

19. What analyses has been done on different soil types?

20. What seismic attenuation relationships were used? Are they the same for an entire state and for different earthquake source depths?

**Philosophical Questions for Regulators to Consider**

1. Is insurance the solution?

2. If insurance is the solution, or a part, thereof, do we allow insurers to use computer modeling to develop premium rates of loss costs?

3. Do states have the necessary regulatory mechanisms to evaluate complex computer models?

4. How will regulators decide if rates are inadequate, excessive or unfairly discriminatory in an environment where industry loss ratios are zero?

5. If models are allowed, will regulators be able to adequately explain rate increases to policyholders when no damaging earthquakes have occurred?
APPENDIX F

Earthquake Study Group of the Catastrophe Insurance Working Group
Interim Meeting
Catastrophe Modelers Interview Sessions
February 8-9, 1999
Omni Majestic Hotel
St. Louis, MO

ATTENDEES:
Brad Connor, Chair Missouri Becky Harrington Arkansas
Susan Schulte Missouri Coit Holbrook Tennessee
Mark Doerner Missouri Judy Pool Illinois
Jeff Adams Missouri Sarah McNair-Grove Alaska
Lenita Blasingame Arkansas

A two-day session was held in order to provide catastrophe modelers the opportunity to discuss their earthquake models and the use of such models by the insurance industry in the ratemaking process for earthquake insurance. Each modeler gave a two-hour presentation including a Q&A period. The catastrophe modeler companies represented were:

- Applied Insurance Research, Inc. represented by Ms. Karen Clark and Dr. Mohammad Yazd;
- EQECAT, Inc. represented by Dr. Kenneth Campbell and Rick Clinton;
- Risk Management Solutions, Inc. represented by Dr. Fouad Bendimerad and Dr. Don Windeler; and
- Risk Engineering, Inc. represented by Dr. Robin McGuire.
- Information Packets were provided by E.W. Blanch Co. on its Catalyst New Madrid Earthquake Model™, however no representative was able to attend.

Dr. Bob Bauer, a seismologist with the Illinois State Geological Survey and Dr. Robert Hermann a seismology professor with the St. Louis University’s Earthquake Center attended portions of the interviews as consultants. Both participated in the interview sessions and provided their expertise to regulators in the analytical discussion periods following each session.

Because of the confidential nature of the information provided, three of the modelers required the regulators and their advisers to sign Confidentiality/Non-Disclosure agreement forms, limiting the public disclosure of information provided in this forum. As such, this summary provides only a general synopsis of areas of discussion during this two-day session.

The modelers were asked to respond to the list of 20 questions drafted by the study group regarding the potential for earthquake hazards in areas outside of California, components of computer models, assumptions and formulas used to develop results, and so forth. They did so in varying levels of detail. The presenters discussed the geological, geophysical, geographical and seismic data used in the respective models and explained how model results are used by their clients in determining probable insured loss information. Topics of discussion included but were
not limited to deterministic v. probabilistic models, hazard and vulnerability parameters, earthquake characteristics, soil mapping, attenuation of ground motion, impact of local soil on ground shaking intensity, structural building characteristics and impact on damage.

Modelers also discussed the differences between earthquake conditions in the Midwest, Alaska and the Pacific Northwest compared to other areas, and the methods of modifying or extrapolating model results from areas with more frequent earthquakes in developing input assumptions for the New Madrid area because of the lack of earthquake experience in New Madrid. A question and answer period followed each of the presentations; however, questions were encouraged and asked throughout the course of the presentations.

What was learned in St. Louis?

From the presentations of several earthquake modeling firms: Applied Insurance Research (AIR), EQECAT, Risk Management Solutions (RMS) and Risk Engineering, Inc. and from the information packets supplied by another—E.W. Blanch:

1. A two-hour presentation can provide a good overview of a model, but will leave many questions for further inquiry. Covering multiple regions of the country in two hours is difficult; most of the discussion, in St. Louis, centered around the New Madrid Seismic Zone (NMSZ), with some discussion of the Pacific Northwest and Alaska, which are much different, geologically.

2. All of the earthquake models presented break the problem into the same general subdivisions:

   A. An earthquake hazard model providing a probability distribution of the estimated number and magnitude of future earthquakes in a given area during a given period of time.

   B. An engineering model on how different types of structures respond to different earthquakes.

   C. An insurance model translating building damage from “modeled” earthquakes into loss costs.

3. The modeler’s assumptions will affect the model’s output. Key assumptions or decisions are generally based on government sources (e.g., the United States Geographical Survey—USGS) or peer-reviewed scientific publications, but these may be modified based on the modeler’s staff’s professional judgement. Key assumptions or decisions include:

   A. Whether to use a time-dependent or time-independent approach. (The presenters selected the time-independent approach for the NMSZ.)

   B. Whether the relationship of frequency of earthquakes to magnitude follows the standard “Gutenberg-Richter” relationship. (The presenters generally followed G-R for the NMSZ.)
C. What the maximum possible earthquake magnitude might be in a given region.

D. The “attenuation” relationships on how the intensity of an earthquake dissipates over distance. Such relationships are much different in the mid-continental United States than they are in the western United States.

E. What soil condition data to use and how many different types of soil conditions to model. (One modeler used four soil types while another used eight.)

F. How to adjust the damage predictions from ATC-13 (Earthquake Damage Evaluation Data for California) to reflect non-California building environments. (The modelers used various levels of judgement to reflect their engineers experience with various non-California and pre-building-code California earthquakes.)

G. How many different types of building classifications to use.

4. The St. Louis presentations did not provide enough information to compare models as to loss cost predictions.

5. New areas of scientific study have to be analyzed in future versions of the models. For the NMSZ, these areas of study include paleoliquefaction studies, Global Positioning System (GPS) strain accumulation studies and on-going improvements to soil maps.

6. The modelers review recent scientific developments and update their models (or portions thereof) as needed, usually at least once every few years.

7. One modeler discussed an analysis of historic eastern United States. Earthquakes since 1800, with estimates of the dollar impact of those events as they occurred with today’s insured exposure. The New Madrid earthquakes in 1811-1812 would have produced insured losses of $70 billion by this analysis. Further review of this analysis is warranted.
APPENDIX G

Earthquake Insurance Computer Model
Certification and Interrogatories
(Adopted 10/5/99 by the Earthquake Study Group)

The Department of Insurance may require an insurer or rating organization to support a rate filing with supplemental information whenever the Department needs such information to determine whether or not the filing meets the requirements of the state insurance laws. When a filing relies in part on a computer model to estimate expected losses or expenses, such supplemental information is often necessary. To expedite our review of such filings, in addition to other materials normally included in filings, we ask that the insurer or rating organization complete the attached forms. While these forms give us the minimal level of information necessary to complete our review, we may need to ask follow-up questions for additional information.

An insurer that files rates or relies on advisory loss costs adopted without modification from filings made by a rating organization need not complete the attached forms.

The amount of information requested is lengthy. Please follow all instructions carefully. If there is insufficient space on the form for your response to a particular question, please attach a separate sheet and place the relevant question number at the beginning of each response.

Completion of the forms will require input from both the filer and the modeler. If you have previously filed the modeler form for a specific release of a model, you do not have to resubmit it. There is a space on the filer certification form for you to identify when you previously filed the modeler form for the same model release. For a filing that uses more than one model, please submit a separate set of forms for each model and an explanation of how the models interact.

These filings and all information pertaining to them are public record and are therefore normally open to inspection. If you consider any of the information contained in them to be confidential, you may submit the forms or exhibits under separate cover letter and clearly label them as confidential materials. We will not release the materials you so label without resolving any confidentiality issues with our counsel and with you.

**Drafting Note:** You may need to revise the wording of this paragraph to conform to state public records law.

Note: You may have selected final rates or rating values for inclusion in your filing that reflect expected losses or expenses that differ from the loss projections indicated by the model. If this is the case, please include as part of the actuarial justification accompanying this filing a detailed explanation of what adjustments you made and why you made them.
EARTHQUAKE INSURANCE COMPUTER MODEL
CERTIFICATION BY INSURER OR RATING ORGANIZATION

This form should be completed by the rating organization or independently-filing insurer and must accompany any filing for rates or rating values based in whole or in part on results from modeling.

Type or print—except for signature.

I, ____________________________________________________________________, hereby certify that I am the

(NAME)

_____________________________ of _____________________________________________

(TITLE) (INSURANCE COMPANY OR RATING ORGANIZATION)

doing business in the State of ___________________ and that I am authorized to make this
certificate. I hereby further certify that responses to Part A, Insurer or Rating Organization
Interrogatories are true and correct to the best of my knowledge. This certification applies to:

Name of Model: ___________________________________

Model Release Reference: ___________________________

Date of Model Release or Latest Revision: ___ / ___ / _____

(MM) (DD) (YYYY)

The modeler from which we obtained this model has provided Part B, Modeler Interrogatories, at
our request. Part B is attached unless previously submitted with an earlier filing from us.

If filer has previously submitted Part B, Modeler Interrogatories, form for the
model release used for this filing, then identify the filing and filing date below:

Part B, Modeler Interrogatories, was previously submitted for this model release
with our filing for ____________________________

(Description or caption of filing)

Identified as: ____________________ and dated: ___________

(Filing number or identifier) (Month) (Day) (Year)

This certification is offered on the __________ day of __________, ________.

(NUMBER) (MONTH) (YEAR)

Signature: __________________________________________

Address: __________________________________________

_____________________________________________________________________

City/State/Zip: ________________________________

Toll-free phone number or e-mail address: ____________________________
EARTHQUAKE INSURANCE COMPUTER MODEL

PART A
INSURER OR RATING ORGANIZATION INTERROGATORIES

This form should be completed by the rating organization or independently-filing insurer and must accompany any filing for rates or rating values based in whole or in part on results from modeling.

Completion date for this form: _________ _____, _______.
(Month) (Day) (Year)

1. Filing reference for which model results are used:

Company(ies):____________________________________________
Line or Sublines:_________________________________________
Filing Title:______________________________________________
Filing identifier:__________________________________________

2. Name of organization that provided the model: _________________________________

Name of Model: _________________________________
Model Release Reference: _____________________________

3. Has someone in your company run the model? ____Yes _____ No
   If ‘Yes,’ could this person replicate the model results? ____Yes _____ No

4. Provide a contact person in your company who is familiar with the model used:

Name: _________________________________________________________
Title: ___________________________________
Toll-free phone or e-mail address: ___________________ Fax: ______________

5. Which perils were included in the model used to establish rates for this filing?

_____ Earthquake   _____ Tsunami
_____ Fire Following Earthquake   _____ Volcanic Action
_____ Other: (specify)______________
6. a. What type of data did your company supply for input to the model?
   Exposure data: ___ In-force ___ policy-year ___ calendar-year ___ Other: ________
   for _________(years) valued as of: ____ / ____ / ______.
   Expense data: ___ policy-year ___ calendar-year ___ Other: ________
   for _________(years) valued as of: ____ / ____ / ______.
   Loss data: ___policy-year ___ accident-year ___calendar-year ___Other: ________
   for _________(years) valued as of ____ / ____ / ______.
   Describe any other data supplied by your company:
   ____________________________________________________
   ____________________________________________________

   b. Describe the level of geographical detail of your company-input data:
   ____ Address ____ Zip Code ____ County ____ Geo-code ____ Other:________

   c. Did you project your company-input data to a future period? ___Yes ___ No
   Briefly describe your trending method and give the projected date or period:
   _______________________________________________________; ____ / ___ / ______
   (MM) (DD) (YYYY)

   d. If you did not supply company-input data, describe the input data used to generate
   model results for your company and how the data were projected:
   _________________________________________________________
   _________________________________________________________
   _________________________________________________________; ____ / ___ / ______
   (projected date)
   (MM) (DD) (YYYY)

7. Regional Adaptation of Model Components (If you relied on the modeler to run
   the model with adaptation to this region, please obtain and attach responses to the following
   from the modeler)

   a. Attach a map for this region indicating the faults or source zones included in the
   model.
   What is the maximum magnitude possible in this region?____________________
   What is your estimate of your maximum gross insured loss? $ ____ as of: ___ / ____
   (MM) (YY)

   b. How have damage patterns been adjusted for building environments and codes in
   this region? ____________________________________________________________
   ____________________________________________________________
8. List independent experts that you have contracted to provide written reviews for your current model release:

a. Seismologist/Geologist: ________________________________
   Phone or e-mail address: ______________ Date of review: (mm/yyyy) ______

b. Structural Engineer: ________________________________
   Phone or e-mail address: ______________ Date of review: (mm/yyyy) ______

c. Casualty Actuary: ________________________________
   Phone or e-mail address: ______________ Date of review: (mm/yyyy) ______

d. Other: ________________________________
   Phone or e-mail address: ______________ Date of review: (mm/yyyy) ______

EARTHQUAKE INSURANCE COMPUTER MODEL

PART B
MODELER INTERROGATORIES

This form should be completed by the modeler and supplied to the insurer or rating organization to accompany any filing for rates or rating values based in whole or in part on results from modeling.

Completion date for this form: _________ _____, _______.
(Month) (Day) (Year)

1. Name of Modeler: ________________________________________
Name of Model: ____________________ Model Release Reference: _____________
Date of Model Release or Latest Revision: ___ / ___ / ______
(MM) (DD) (YYYY)
This form is provided to: __________________________________________
(NAME OF INSURER OR RATING ORGANIZATION)

2 a. Provide an overview of how the model operates: _____________
___________________________________________________________________
___________________________________________________________________

b. Attach a sample step-by-step calculation for a representative structure, such as a single-family dwelling, showing formulas and definitions of variables.

3. Earthquake Hazard Model Components

a. Describe the relationship between frequency and magnitude assumed by the model: __________

b. Describe how the model considers attenuation over distances: __________

c. What soil condition types does the model use? __________

d. How detailed is the soil data? __________

e. What is the source of the data? __________

4. Structural Engineering Model Components

a. What types of building classifications does the model use? __________

b. Are damage predictions based solely on California studies? ___ Yes ___ No
5. Describe scientific studies incorporated into the latest model version and provide specific source references: ________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

6. Describe how the model parameters can be altered for specific clients: ________________
_____________________________________________________________________
_____________________________________________________________________

7. Mark the insurance considerations below for which this model is capable of adjusting loss estimates for a specific client on request:
   _____ Distribution of different policy forms and endorsements
   _____ Distribution of policy deductibles
   _____ Distribution of amounts of insurance (policy limits)
   _____ Effects of existing or proposed reinsurance contracts
   _____ Multi-storied structures
   _____ Appurtenant structure loss
   _____ Contents losses
   _____ Additional living expenses
   _____ Business interruption coverage
   _____ Replacement cost coverage
   _____ Underinsured property and coinsurance provisions
   _____ Uninsured property
   _____ Losses attributable to public structures
   _____ Pooling arrangements (e.g., FAIR plans)
   _____ Non-property losses: liability, life, health, workers’ compensation, etc.
   _____ Demand surges in construction costs
   _____ Debris removal

8. Describe the source of exposure input data used in this model: ________________
_____________________________________________________________________
_____________________________________________________________________

9. Explain how and how far this model projects exposure or loss data to a future date:__________________
_____________________________________________________________________
_____________________________________________________________________

© 2000 National Association of Insurance Commissioners 38
10. Describe the geographic detail at which this model is capable of distinguishing insured exposure locations:
___ Address ___ Zip Code ___ County ___ Geo-code ___ Other:________

11. List your principal technical staff persons who developed and tested this model and their years of experience with modeling for insurance ratemaking:
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

12. List the independent experts you have contracted to provide written reviews for your current model release:
   a. Seismologist/Geologist: ________________________________
      Phone or e-mail address:_____________________ Date of review: (mm/yyyy)_______
   b. Structural Engineer: ________________________________
      Phone or e-mail address:_____________________ Date of review: (mm/yyyy)_______
   c. Casualty Actuary: ________________________________
      Phone or e-mail address:_____________________ Date of review: (mm/yyyy)_______
   d. Other: ________________________________
      Phone or e-mail address:_____________________ Date of review: (mm/yyyy)_______

13. As of the date this form is completed, are there any unresolved or outstanding problems remaining from peer reviews? ___Yes ___ No; If ‘Yes,’ please describe:
_________________________________________________________________________
_________________________________________________________________________

14. Provide a contact person for the modeler who is familiar with this model:
   Name: _________________________________________________________
   Title: _______________________________________________________
   Toll-free phone or e-mail address: _______________________ Fax: ________________
APPENDIX H

Property/Casualty Insurers and Earthquake Mitigation

National Association of Insurance Commissioners
Property/Casualty Insurance Committee
Earthquake Study Group
Atlanta Hyatt Hotel
Atlanta, GA
October 2, 1999

Download this presentation at:
http://www.iii.org/media/naic/index.html

Robert P. Hartwig, Ph.D.  •  Vice President & Chief Economist
Insurance Information Institute  •  110 William Street  •  New York, NY 10038
Tel: (212) 669-9214  •  Fax: (212) 732-1916  •  bhartwig@iii.org  •  www.iii.org

Mitigating Earthquake Risk

Education  Regulation  Financial Incentives

Mitigation

What Really Happened in 1811-1812?

• 3 Main shocks late 1811–early 1812:
  – Each had estimated magnitudes of 8.0+
  – Feb. 7, 1812 largest quake in cont. US history

• Aftershocks (felt for more than 1 year)
  – 5 magnitude 7.7 aftershocks
  – 10 magnitude 5.3 aftershocks
  – 89 magnitude 4.3 aftershocks

Source: Center for Earthquake Research Information
Note: All magnitude figures are estimates

US Seismic Zones

The New Madrid Seismic Zone

Quake Activity in the NMSZ

Source: US Geological Survey

Source: US Geological Survey

Source: US Geological Survey

Source: US Geological Survey
What is the True Risk?

‘Traditional’ Recurrence Estimates

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<th>Magnitude</th>
<th>Recurrence</th>
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<tr>
<td>6</td>
<td>70-90 yrs</td>
</tr>
<tr>
<td>7</td>
<td>254-500 yrs</td>
</tr>
<tr>
<td>8</td>
<td>550-1200 yrs</td>
</tr>
</tbody>
</table>

This scenario suggests that some mitigation expenses are justified

Source: Center for Earthquake Research Information

What is the True Risk?

Science (23 April 1999, pp. 619-621)

<table>
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<th>Magnitude</th>
<th>Recurrence (years)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>140 +/- 26</td>
</tr>
<tr>
<td>7</td>
<td>1400 +/- 600</td>
</tr>
<tr>
<td>8</td>
<td>14000 +/- 7000</td>
</tr>
</tbody>
</table>

This scenario suggests that mitigation expenses are difficult to justify

Seismic Risk in the NMSZ

New Madrid Seismic Zone

Frequency-Magnitude Relationship

Temporal Variations of Seismicity

What Insurers are Doing: Financial Preparedness

“CAT Bonds”

- Kemper obtained $100MM for 37 months of coverage by issuing CAT bonds covering period beginning 5/1/99
- Issued on INEX Insurance Exchange
- Trigger: Magnitude 5.0+ quake w/ epicenter in: AR, IL, IN, KY, MS, MO or TN
- Underwritten & distributed by Aon Capital Markets

What Insurers are Doing: Financial Preparedness

“Exposure Management”

- ISO: Large quake could cost $50-70B
- Reducing exposure (e.g., to 1994 levels)
- Sales moratorium
- Cessation of local operations (rare)
- Raising deductibles
- Raising premiums

There is no avoiding greater sharing of risk in catastrophe-prone areas

U.S. Insured Catastrophe Losses

First-Half 1999 Cat losses: $5.2B

Source: Property Claims Service, Insurance Information Institute
### What Insurers are Doing: Disaster Preparedness

- Most insurers have CAT centers
- CAT teams/CAT plans: “Florida Plan”
- Communications plans w/staff and policyholders (e.g., CNA)
- Staff training
- “Pre-agreements” with service providers (e.g., engineers, disaster crews)

### What Insurers are Doing: Education

- Most insurers have earthquake safety information on their web sites:
- Similar information available through trade associations:
  - Insurance Information Institute: [www.iii.org](http://www.iii.org)
  - Institute for Building and Home Safety: [www.ibhs.org](http://www.ibhs.org)

### What Insurers are Doing: Education (continued)

Information on company/association web sites typically covers what to do before, during, and after an event:

- **Before:**
  - Preservation of life paramount
  - Mental preparation: important since no warning as with hurricanes. **KNOW WHAT TO DO!**
  - Physical preparation: supplies, food, water, etc.

### What Insurers are Doing: Education (continued)

- **During:**
  - Preservation of life paramount
  - Where to go, what to look out for: indoors/outdoors/in car, etc.
- **After:**
  - Preservation of life paramount
  - Beware of power lines, gas, & other hazmats

- Earthquake checklists

### What Insurers are Doing: Education (continued)

- Mitigation of Property Damage
  - Secondary issue in earthquakes (though not mutually exclusive from preservation of life)
  - Excellent information available from IBHS
- Buying appropriate catastrophe coverage
  - III good source of information
  - Banks/agents sometimes weak link in chain
  - Lessons from Floyd: Flood insurance, windstorm deductibles

### What Insurers are Doing: Education (continued)

Available free from IBHS at [www.ibhs.org](http://www.ibhs.org) by Oct. 7

- Also from IBHS “Open for Business: Disaster Recovery Guide for Small Business”
- III Brochures/web: “Am I Covered: Common Questions Asked by Homeowners about Insurance”
  - “Settling Insurance Claims after a Disaster”
  - “Insuring Your Business Against a Catastrophe”
What Insurers are Doing: Mitigation

- Sponsor research (and education) through IBHS and other organizations
- Support state and local efforts to strengthen building codes (ISO BCEGS Program):
  - Building Code Effectiveness Grading Schedule

What Insurers are Doing: Partnerships in Mitigation

Public/Private Partnerships
- IBHS Partnership with SBA
- Academic partnerships
- Government
- Insurance Information Centers

What Insurers are Doing: Partnerships in Mitigation

“Florida Plan”
- Partnership between National Emergency Management Association (NEMA) and IBHS modeled after 1998 plan adopted in Florida
- 3-pronged approach to rapid response & recovery
  1. Early Access Procedures
  2. Insurance Disaster Assessment Teams (IDAT)
  3. Emergency Operations Center (EOC) with insurance industry

The Electrons Are Coming...

Quake Insurance on the Web!

- Residential Insurance
- Commercial Insurance
- Safety Facts
- Earthquake News
- Retrofitting
- Seismic Rating Report ($150 from EQE)
  - 5% discount on retrofitted homes valued at $1 million +

What the Private Sector is Doing: Mitigation

Table of Contents
- Earthquakes in California
- How Safe is Your Home
- Projects Everyone Should Do
- Masonry Chimneys
- Earthquake Insurance
- Preparedness Planning
- Develop a Family Plan
- After an Earthquake

www.eqe.com/publications/homeprep/index.html
**What the Private Sector is Doing: Mitigation**

We are a full-time seismic retrofit company serving the entire San Francisco Bay Area. Our website answers questions such as:

- Does my home need to be seismically retrofitted and how much will it cost?
- Do I need an engineer, architect or contractor, and how do I pick one?
- What are the real chances of a large earthquake in the Bay Area?
- Should I have earthquake insurance and what would it cover?

![Bay Area Retrofit](image)

**Direct Written Premiums: Missouri Earthquake Insurance**

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<tr>
<td>1998</td>
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</table>

Source: A.M. Best, Insurance Information Institute

**What Homeowners are Doing**

- About 65% on homeowners in SE Missouri purchase earthquake insurance
- Only about 17% of California homeowners have earthquake insurance, down from 25-30% (No major quake since Northridge in January 1994)
- Private sector building quake-resistant structures

**Insurance Information Institute On-Line**

- [www.iii.org](http://www.iii.org)
- Tips on safety, disaster preparedness
- Consumer advice
- Information for Insurance Professionals
- Media Resources
- Industry Financial Results, Presentations
- Surveys & Polls

Download/View this presentation at: [http://www.iii.org/media/naic/index.htm](http://www.iii.org/media/naic/index.htm)
APPENDIX I

Institute for Business & Home Safety

BUILDING CODE NEWS

Summary of ICC Model Code Hearings

St. Louis, MO • September 1999

What is a Model Building Code?

A model building code establishes minimum acceptable requirements for commercial and residential construction. Its intent is to preserve the public health, safety and welfare. Although the model code applies primarily to new or proposed construction, it also applies to existing buildings that undergo reconstruction, rehabilitation or alteration.

The model building code is developed on the national level. State and local authorities then adopt the model code in its entirety or with modifications which reflect local conditions. States that adopt a model building code with technical modifications often weaken the requirements for natural disaster mitigation due to pressure from special interest groups.

Who promotes and maintains the model codes?

Currently, there are three model code organizations in the United States, which in the past, published their own separate model codes:

- Building Officials and Code Administrators International (BOCA) maintained the National family of codes;
- International Conference of Building Officials (ICBO) maintained the Uniform family of codes; and

These organizations are nonprofit, public benefit corporations that are owned and governed by their members, which are primarily units of city, county and state governments. Their purpose is not only to promote a model code that reflects their respective concerns and experience, but also to provide a forum for the exchange of ideas.

Recently, these three model code organizations joined together to create a new entity known as the International Code Council (ICC). The ICC’s governing body, which is comprised of the directors of BOCA, ICBO and SBCCI, is currently developing a new family of model codes known as the International Codes. Upon publication in the year 2000, this single set of new International Codes will replace the three sets of model codes that now exist. This will greatly simplify the building design and construction process in the United States.

Who can be a member?

Membership in model code organizations is voluntary and consists of local and state building department officials, engineers, construction-related trade associations, building material organizations, suppliers and research organizations.

How often are the model codes updated?

Updates to the National, Uniform and Standard families of codes have been suspended permanently. Instead, all three model code organizations are working together to maintain the International family of codes. New editions of
the International Codes will be published on a three-year cycle starting in 2000. Code hearings for proposed changes are conducted several times in between publication years.

**Who can modify and update the model codes?**

In the model code process, anyone can submit a proposal to change the code. The proposals must identify the appropriate code and section to be revised, the reasons for making the proposed revision and a statement on the cost impact of the revision. The code change committees, which are comprised of industry representatives, then review the proposed code changes in an open hearing and publish their recommendations. Hearings for the new ICC International Codes took place in March 1999 in Costa Mesa, California.

If individuals or organizations disagree with the change, they have an opportunity to object and request a hearing before the model code organization’s full membership, or assembly. Those proposals that are not challenged are placed on a consent agenda and processed in accordance with the code change committees’ recommendations. The full membership of all three organizations met September 1999 in St. Louis, Missouri, to hear the final challenges for the new International Codes.

**Why does IBHS participate in the model code process?**

Strong disaster-resistant buildings start with a strong model code. The model code serves as the basis for state and local codes and helps determine the quality of construction in those jurisdictions. Consequently, the insurance industry has a major stake in the model code requirements.

As a representative of the insurance industry, the Institute for Business & Home Safety is actively involved in drafting and shaping the new generation of model codes. In particular, IBHS focuses on two of the International Codes: the International Building Code (IBC) and the International Residential Code (IRC). These codes deal primarily with natural disaster mitigation issues.

In September 1999, IBHS represented its member companies at the ICC Code Hearings in St. Louis, Missouri. There were several code change proposals that were of interest to our member companies. The following discussion lists the proposal, gives a summary, discusses IBHS’ position, and lists the action that the assembly took and categorizes it as a “Win” or “Loss” for IBHS.

**Hail**

Hail damage to asphalt roofing material is a costly problem in many parts of the United States. Damage caused by hail can lead to localized roofing failure, water leakage and premature aging of the roof covering. Hail damage is more apt to occur under three conditions:

1. Older, more brittle roof coverings are more readily damaged during a hailstorm;
2. Large, wind-driven hailstones clearly can cause more damage than smaller stones; and
3. The surface upon which the roof covering rests is critical for its performance. Studies have shown that shingles placed over an old layer of shingles are more susceptible to hail damage than a single shingle layer applied directly to a solid deck.

Two code change proposals focused on hail damage to asphalt roof coverings.

**Proposal**

**IBC Fire Safety #FS372-99**

**Proposal Summary**

This proposal would have inserted language into the IBC requiring a single layer of asphalt shingles on roofs located in areas of the country with a high incidence of hail.
In Costa Mesa, the Committee initially voted for disapproval. State Farm then submitted a public comment requesting approval as submitted. IBHS supported State Farm’s position in St. Louis.

**Assembly Action**  
Disapproval, IBHS Loss

**Proposal**  
IRC Residential Building #RB570-99

**Proposal Summary**  
We had better luck with this provision in the IRC, whose initial draft already had a section requiring a single layer of asphalt shingles on roofs located in areas of the country with a high incidence of hail. The National Association of Home Builders (NAHB) attempted to remove this limitation.

In Costa Mesa, IBHS was successful in obtaining the Committee’s disapproval of the NAHB proposal. NAHB then submitted a public comment requesting approval as submitted. In St. Louis, IBHS supported disapproval.

**Assembly Action**  
Disapproval, IBHS Win

IBHS will continue to work toward incorporating this language into the IBC in the future.

Asphalt Shingle Performance in High Winds

During a windstorm, asphalt roof shingles are usually the first item to blow off of a structure. Traditionally, the model codes have exempted asphalt shingle roof coverings from meeting the design wind speed for the region. Asphalt shingles are tested only to 60 mph, while the lowest design wind speed allowed in the United States is 90 mph. There is no adequate justification for allowing this exemption when other roof covering materials are required to prove that they can withstand the design wind speeds, yet the exemption is still present in the IBC and the IRC.

Two code change proposals focused on asphalt shingle performance in high wind regions.

IBHS was unsuccessful in both attempts to eliminate this exemption. The industry needs to develop and support research to bring about change. This issue is a high priority activity for next year.

**Proposal**  
IBC Structural #S6-99

**Proposal Summary**  
This proposal for the IBC would have required asphalt shingle roof coverings to meet the design wind load requirements. Removing the exception is consistent with actions taken by BOCA and SBCCI.

In Costa Mesa, the Committee disapproved of this proposal. They stated that the current prescriptive approach for the attachment of asphalt shingles is needed because there is not enough information to establish new criteria. Public comment submitted by the National Roofing Contractors Association (NRCA) and others urged approval as submitted. In St. Louis, IBHS supported approval as submitted.

**Assembly Action**  
Disapproval, IBHS Loss

**Proposal**  
IRC Residential Building #RB538-99

**Proposal Summary**  
This IRC proposal would have removed the exception that allows asphalt roof shingles to be installed without being designed to withstand the wind load design criteria. The basis for this proposal comes from the 1998 changes to the SBC.
In Costa Mesa, IBHS was not successful in obtaining a favorable recommendation—the Committee voted for disapproval, believing that the proposal would create an unfair advantage for the use of tiles and because there is a lack of a consensus standard for the resistance to high winds. IBHS submitted a public comment requesting approval as submitted by the assembly in St. Louis.

Assembly Action
Disapproval, IBHS Loss

ASCE 7-98 Wind Design Provisions

Many code change proposals deal simply with updating the International Codes to reflect new developments in the industry. Recently, the American Society of Civil Engineers (ASCE) completed the wind design provisions for ASCE 7-98 Minimum Design Loads for Buildings and Other Structures. A code change proposal was required to incorporate the provisions of the new standard into the code.

Proposal
IBC Structural #S46-99

Proposal Summary
This proposal added low-rise wind design provisions based on ASCE 7-98 to both the IBC and the IRC. This proposal also contained requirements for wind-borne debris protection. IBHS wrote the language for the IRC in conjunction with other partners.

In Costa Mesa, the Committee approved this proposal as modified. In St. Louis, IBHS supported the maintenance of this language in both the IBC and the IRC.

Assembly Action
Approval As Modified, IBHS Win

ASTM Standards E1886 & E1996

This code change proposal was an attempt to update the International Codes to reflect new developments in the industry. Recently, the American Society for Testing Materials (ASTM) completed a national consensus wind-borne debris impact standard for hurricanes. IBHS played a critical role in developing ASTM E1886 and E1996, defending them against the NAHB Research Center and having them referenced in the new International Codes.

Proposal
IBC Structural #S50-99

Proposal Summary
This proposal updated the impact test standard in the IBC from the SBCCI standard (SSTD-12) to the ASTM Standards (E1886 & E1996). ASTM’s Committee on Standards denied the NAHB Research Center’s appeal of E1996 on Aug. 25, 1999.

In Costa Mesa, the Committee approved this proposal as modified. The Committee Chairman submitted public comment requesting disapproval because the ASTM documents had not yet been published. The documents were widely available in time for the St. Louis meetings. IBHS supported the Committee’s original action.

Assembly Action
Approval As Modified, IBHS Win

Quality Assurance Plan in High-Wind Regions

Buildings in severe earthquake zones currently are required to have a quality assurance plan for new construction. Since high winds kill more Americans and destroy more property than any other natural disaster, including earthquakes, construction in high-wind areas should have comparable plans. A quality assurance plan would
ensure that proper attention is paid to the wind-critical details during design, construction and inspection of the building.

Proposal
IBC Structural #S134-99

Proposal Summary
This proposal added a requirement for a quality assurance plan for buildings in high wind zones. IBHS assisted in drafting the proposal and will seek to maintain its inclusion in the code.

In Costa Mesa, the Committee approved this proposal as modified. NAHB submitted public comment requesting disapproval. IBHS supported the Committee’s original action in St. Louis.

Assembly Action
Approval As Modified, IBHS Win

Fiberboard in Seismic Regions

The seismic community currently is concerned about shear capacity of fiberboard. Cyclical testing has not yet been performed demonstrating that fiberboard can provide satisfactory performance in a seismic event. Consequently, shearwall materials should be limited to those that can provide reliable structural strength and ductility in regions of high seismicity.

Proposal
IBC Structural #S329-99

Proposal Summary
This proposal eliminated the use of fiberboard for resisting seismic forces in structures in Seismic Design Categories D, E and F—the three most severe seismic zones.

In Costa Mesa, the Committee voted for disapproval. Several TX building code officials submitted public comments requesting approval as submitted. In St. Louis, IBHS supported the Committee’s original action for disapproval.

Assembly Action
Disapproval, IBHS Win

Requirements for Exterior Windows and Doors:

Site-built window assemblies often fail more easily in wind and rainstorms, because past model codes have exempted these windows from the rigorous standards required for manufactured window assemblies. It is time the playing field

Proposal
IBC Structural #S347-99

Proposal Summary
This proposal would have eliminated the use of roof uplift connectors in areas outside high-wind zones.

In Costa Mesa, the Committee approved this proposal as submitted. The American Forest & Paper Assoc. (AF&PA) submitted a public comment pointing out that the code already substantially restricts the use of fiberboard and requested disapproval. IBHS supported the Committee’s action for approval as submitted.

Assembly Action
Approval As Submitted, IBHS Win

Roof Uplift Connectors Outside High-Wind Regions

The Building Officials Association (BOA) of Texas submitted a proposal that would have eliminated uplift connectors on buildings outside of the high-wind areas. They argued that traditional nailing requirements were sufficient for the brief high straight-line winds experienced during thunderstorms, which they claimed do not tear. IBHS opposed this proposal because our members do report roof damage from thunderstorm winds.
was leveled. This code change proposal called for quality control for all types of window assemblies.

Proposal
IBC Structural #S358-99

Proposal Summary
This proposal brought all the requirements for exterior windows and doors into the appropriate sections of the code and clarified the intent of the quality control.

In Costa Mesa, the Committee voted for approval as modified. The NAHB submitted a public comment requesting disapproval based upon the fact that site-built windows glazed on the job (common in many parts of the country) are impossible to test to the AAMA/NWWDA test standard. IBHS supported the Committee’s original action in St. Louis.

Assembly Action
Approval as Modified, IBHS Win

Requirements for Patio Enclosures

The National Patio Enclosure Association submitted three proposals that would have exempted its products from meeting the design wind speeds in both the IBC and the IRC. They argued that their products are “...obviously not intended to prevent air infiltration or provide security.” However, this is not the case. Homes today are utilizing these spaces as an integral part of the overall structure. As such, they should be designed to the same level as the rest of the house. This will significantly reduce losses from enclosures in mild windstorms.

Proposal
IBC Structural #S362-99

Proposal Summary
This proposal would have exempted window and doors in patio enclosures from the requirements of the wind design standards in the IBC.

In Costa Mesa, IBHS successfully opposed this item and the Committee voted for disapproval. In a public comment, the National Patio Enclosure Association (NPEA) requested approval as submitted. IBHS supported the Committee’s original action for disapproval in St. Louis.

Assembly Action
Part 1: Disapproval , IBHS Win

Proposal
IRC Residential Building #RB502-99

Proposal Summary
This proposal would have exempted windows installed in patio covers from the wind design provisions of the IRC.

In Costa Mesa, IBHS was successful in obtaining the Committee’s recommendation for disapproval, since it appeared to be an attempt to circumvent the requirements of the IBC. The NPEA submitted public comments requesting approval as submitted. IBHS supported the Committee’s original action for disapproval in St. Louis.

Assembly Action
Withdrawn by proponent, IBHS Win

Proposal
IRC Residential Building #RB504-99

Proposal Summary
This proposal would have exempted sliding glass doors installed in patio covers from the wind design provisions of the IRC.

In Costa Mesa, IBHS was successful in obtaining the Committee’s recommendation for disapproval, since it appeared to be an attempt to circumvent the requirements of the IBC. The NPEA submitted public comments requesting approval as submitted. In St. Louis,
IBHS supported the Committee’s original action for disapproval.

Assembly Action
Withdrawn by proponent, IBHS Win

Requirements for Affordability

The first section of the IRC describes the general purpose of the IRC, which is to protect public life, health and welfare. The NAHB also wanted to include affordability as one of the main purposes of the code. However, allowing expense to trump any improvement in the design and construction of a building, regardless of the degree of expense and the benefit to the public, is contrary to the basic reasons for a building code. We believe that affordability is an important factor but not an end in itself.

Proposal
IRC Residential Building #RB5-99

Proposal Summary
This proposal eliminated the reference to affordability as one of the main purposes of the IRC.

In Costa Mesa, the Committee disapproved of this proposal. The assembly voted for approval as submitted. In St. Louis, IBHS supported the committee action for approval as submitted.

Assembly Action
Approval as Submitted, IBHS Win

Proposal
IRC Residential Building #RB8-99

Proposal Summary
This proposal would have expanded the purposes of the IRC to include both property protection and affordability.

In Costa Mesa, IBHS was successful in having the Committee approve the proposal as submitted. The assembly voted for disapproval. In St. Louis, IBHS decided to withdraw it.

Assembly Action
Withdrawn, NA

Proposal
IRC Residential Building #RB10-99

Proposal Summary
This proposal was very similar in nature to RB8-99 (see below). However, it referred only to property protection, not to affordability.

In Costa Mesa, the Committee disapproved of this proposal. The assembly voted for approval as submitted. In St. Louis, IBHS monitored this proposal for inclusion of property protection in the IRC. IBHS would have liked the assembly to approve this proposal, but the votes were not there. IBHS was content to have RB5-99 (above) approved.

Assembly Action
Disapproval, NA

Proposal
IRC Residential Building #RB8-99

Proposal Summary
This proposal would have expanded the purposes of the IRC to include both property protection and affordability.

In Costa Mesa, IBHS was successful in having the Committee approve the proposal as submitted. The assembly voted for disapproval. In St. Louis, IBHS decided to withdraw it.

Assembly Action
Withdrawn, NA

Does IBHS’ participation with building codes end with the model building code process?

No. The model building code process is only one aspect of our building code strategy. To ensure buildings are designed and built to resist disasters, IBHS works at the state and local levels to encourage adoption of the most current and up-to-date model code. IBHS publishes the Summary of State-Mandated Building Codes, which details the states that are committed to the building code process. Surprisingly, 19 states still do not have a state-mandated building code covering the construction of residential and commercial buildings.
Once the model building code is adopted at the state level, the next step is to ensure that the code is enforced effectively. In the early 1990s, IBHS initiated the work that led to the development of the Building Code Effectiveness Grading Schedule (BCEGS). The Insurance Services Office, Inc. uses the schedule to evaluate the quality of local codes, how well communities enforce their codes, and what special measures they take to mitigate losses from natural hazards. IBHS continues to encourage communities to participate in the program through our Showcase Programs.
Class 99 Includes
- Communities have elected not to participate in BCEGS survey
- Communities have a building code enforcement program but it is outside the scope of BCEGS
- Communities have no building code enforcement program

BCEGS Driven By:
- Major natural disasters
- Extraordinary loss of life and property
- Rising insurance losses

BCEGS Pro-active Solution:
- Model codes
- Evaluate code enforcement
- Offer incentives to promote good public policy

ISO Field Reps. Interview Building Code Officials
- Adopted building codes?
- Training, certification & experience of employees?
- Plans review procedure?
- Field inspection procedures?
BCEGS Classification Results

- Classification results as of May 1999
- Graphs represent 100% of completed communities surveys through May 1999

New Madrid Vs. Western States
by Classification Number

New Madrid Vs. Remainder of Country
by Classification Number

New Madrid Vs. Western States
by Population

New Madrid Vs. Remainder of Country
by Population

% Of Population Served

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# APPENDIX K

## Mitigation/Disaster Preparedness Websites

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