CAMPBELL COUNTY
EARTHQUAKE PLAN

I. SITUATION AND ASSUMPTIONS

A. Situation

1. An earthquake is a shaking or trembling of the earth's crust, caused by underground volcanic forces or the breaking and shifting of rock beneath the surface. While scientists are able to measure the amount of energy that is building beneath the earth's surface, they are not able to predict exactly when an earthquake will occur. Therefore, earthquakes are unpredictable and can strike without warning. They may range in intensity from slight tremors to great shocks and may last from a few seconds to as long as five minutes. Earthquakes can either occur by themselves or in a series over a period of several days, or even months. However, they are almost always accompanied by aftershocks, which can be equally as damaging as the quakes which they follow.

2. The actual movement of the ground in an earthquake is seldom the direct cause of casualties. Most casualties are from falling objects and debris as a result of shocks that shake, damage, or demolish buildings and other structures. This disruption of communications, power, gas, sewer and water systems can be expected. Earthquakes may also trigger landslides which can cause extensive damage.

3. Earthquakes can be experienced in any part of the Commonwealth with the majority of Kentucky's population at risk from earthquakes. The Commonwealth is vulnerable to a significant threat of damage from earthquakes from both identified and unidentified faults. This threat includes deaths and injuries to residents, as well as widespread property damage.

    a. No part of Kentucky is free from this threat. Thousands of earthquakes have occurred in and around Kentucky from the New Madrid area in the west to Greenup County in the northeast and Bell County in the Southeast.

    b. Every county has at least one fault running beneath it. These faults are overwhelmingly inactive and have been for thousands of years.

    c. Some fault zones are considered active by the Kentucky Geologic Survey.

        1) Five slightly damaging earthquakes, 5.0 – 5.8 and many smaller seismic events have occurred in the Wabash Valley Zone in Illinois and Indiana during the 100 years of historic record with several causing damage in Kentucky.

2) In August 1997, the East Tennessee Seismic Zone produced a 3.8 quake in Tazwell, Tennessee, 15 miles south of Middlesboro in Bell County, Kentucky.

3) A number of small earthquakes have also occurred along the course of the Pine Mountain in the Appalachian Area.

4) Kentucky is also within the seismic risk of the Charleston South Carolina earthquake zone where a large damaging 7.9 earthquake occurred in 1879. A 5.2 earthquake occurred in 1980 near Sharpsburg in Bath County some 30 miles northeast of Lexington. This earthquake is believed to have originated along a buried ancient fault zone from an unmapped area of geologic stress and was, therefore, a geologic surprise. This quake caused $3 million in damages, mostly in Maysville, Kentucky on the Ohio River, not Sharpsburg at the epicenter.

5) Beginning at the eastern edge of the Blue Grass Region, the Kentucky River Fault System runs East-Northeast toward the Morehead/ Ashland areas and into West Virginia. This fault system runs beneath the Clays Ferry Bridge at the 99-mile marker on I-75 at the Madison-Fayette County line, and is part of a larger fault system. The southern band of the Kentucky River Fault System is the Paint Creek Fault, which runs through Hazard and further south.

d. There is thus an urgent need to increase public awareness of all Kentuckians and for planners to prepare for the contingency of such an event in all areas of the state in order to mitigate the inherent dangers.

4. The infrastructure of this part of the country has not experienced a major earthquake since 1812.

a. Effects of an earthquake would include:

1) Ruptured natural gas and petroleum pipelines.

2) Ruptured water and sewer lines.

3) Downed electrical lines.

4) Release of hazardous materials.

5) Fires resulting from broken gas lines or from other ignition sources.

6) Collapsed bridges and overpasses (affecting transportation and the economy of the entire country).

7) Downed telecommunications lines.

8) Damaged or destroyed critical facilities.

b. The greatest hazard potential is in highly populated areas, although the epicenter may be in a more sparsely populated area.

1) Highly populated areas tend to have a greater number of taller buildings which are more vulnerable to ground shaking.

2) Buildings constructed between the 1920's and the 1960's are generally more susceptible to seismic movement.

3) The same is true of the infrastructure (roads, bridges, etc) and older wooden structures and unreenforced masonry.

5. From December 1811 through February 1812, the New Madrid Fault experienced three earthquakes, each of which was over a magnitude 8 on the Richter scale. These quakes were accompanied by a series of aftershocks, at least 15 of which were felt as far away as Washington D.C.

6. Although this series of earthquakes represents the largest ever recorded in the Continental United States, the New Madrid Fault has not received the same notoriety as the San Andreas Fault in California. There are several reasons.

a. First, because of the primitive communications system of the early 19th Century, it took days for the Atlantic States to learn that the shocks felt on the East Coast had originated in the Mississippi Valley.

b. Also, the newsworthiness of this information was diminished both by slow communication and by events which were leading up to the War of 1812.

c. Another significant factor is the Mississippi Valley was sparsely populated at the time the 1811 – 1812 earthquakes occurred.

7. Today the potential for major disaster is much greater.

a. Cities have sprung up throughout the Mississippi Valley since that time. Today over 12.5 million people live in the region affected by the 1811 – 1812 events. Similar relative population increases have occurred throughout the state.

b. Earth scientists estimate that enough energy has built up in the New Madrid Zone to produce an earthquake of 7.6 on the Richter Scale. This is a comparable magnitude to the 1999 Izmit, Turkey earthquake and the 2001 Bhuj, Turkey earthquake. Such a quake could be felt by half of the population of the United States and by everyone in Kentucky. The Purchase Area of Western Kentucky could be severely damaged. In Louisville, Lexington and Frankfort the ground would shake very strongly

resulting in walls cracking and plaster falling throughout this region.

8. Campbell County may feel the effects from an earthquake event along the Cincinnati Arch Fault.

B. ASSUMPTIONS

1. Primary Assumptions

a. The Commonwealth of Kentucky is vulnerable to a significant threat of damage from earthquakes in the New Madrid Fault Region which could affect the entire state. The maximum probable earthquake along the New Madrid Fault would place Campbell County in a Modified Mercalli Intensity Zone VII, according to the United State Geological Survey (USGS).

b. The fault centered near Charleston, South Carolina could generate an earthquake which could affect the eastern third of the state.

c. Earthquakes may occur in areas where faults have not yet been identified, as with the 1980 Sharpsburg event, and could result in damage to property and injuries to people. Typical damage could be buildings destroyed, infrastructure disrupted, and landslides on steep slopes.

2. Specific Assumptions

a. Medical

1) A major earthquake would create extraordinary requirements for emergency medical services.

2) Injuries serious enough to require hospitalization are estimated to be about four times greater than fatalities.

3) Health care may be seriously impaired by damage, limiting the number of hospital beds and medical supplies that are available immediately following an earthquake.

4) The number of health care professionals available may also be limited in the event of an earthquake because some professionals may be isolated from their work places, as well as among the dead and injured.

5) Existing emergency medical services may be unable to respond in a meaningful manner. In this event, the National Disaster Medical System (NDMS) may be called upon to assist in relief efforts.

6) The number of fatalities may overwhelm the local mortuary services and the county coroner. State and federal assistance may be needed.

7) Additional information can be found in ESF-8 and ESF-6.

b. Economic

1) Business and industry may not be prepared for adequate response to an earthquake. Businesses that rely on computer based systems are particularly vulnerable.

2) Failure of banking systems which use electronic fund transfers could result in widespread economic problems.

3) A damaging earthquake may cause a serious loss of employment which could impact economic factors at the local, state, and national levels.

c. Relief Efforts

1) Following an earthquake, the affected area may be isolated from surroundings areas. Therefore, planning and coordination among communities in the affected area is essential for effective emergency response.

2) In the event rubble and debris resulting from an earthquake prevent access to the affected area for a prolonged time, helicopters may be necessary to bring rescue teams in and remove casualties from the area.

3) Food supply lines could break down.

4) The first few hours following an earthquake are critical in saving the lives of people trapped in collapsed buildings. Therefore, the use of local resources during the initial response period will be essential until state and federal support is available.

5) It may be several hours before personnel and equipment can be mobilized and initial teams deployed to affected areas. Therefore, state and local resources will be relied upon heavily in the period immediately following the earthquake.

d. Secondary Effects

1) The earthquakes and aftershocks may trigger one or more secondary events such as landslides, release of hazardous materials, dam failure or flooding.

2) Fires, burning out of control, involving major portions of a city are possible in the business sections because of the nature and density of construction in the affected areas. Large, uncontrolled fires are less

likely in residential areas because the housing density is less than in the business sections. However, there may be some individual or small group fires that occur as the result of miscellaneous damage related factors or weather conditions.

3) Should high water conditions exist during the time an earthquake occurs levees may be sufficiently damaged to allow flooding to occur behind them, especially in low lying areas.

4) Earthen dams are not expected to be damaged to the extent they will lose their reservoirs.

5) Hazardous material releases ranging from minor environmental impact to major environmental impact may occur.

e. Structural Damage

1) One or more dams may fail. An inventory of Kentucky dams maintained by the U.S. Army Corps of Engineers and the Kentucky Cabinet for Natural Resources and Environmental Protection, Division of Water listed 210 dams as “high hazard”, 75 as “unsafe”, and five as “urgent”. Counties should contact the U.S. Army Corps of Engineers and the Kentucky Cabinet for Natural Resources and Environmental Protection, Division of Water to determine status of dams.

2) Deaths and injuries are expected to be principally the result of the failure of man made structures, particularly older, multi-story and non-reinforced brick masonry buildings built before the adoption of earthquake resistant building codes.

f. Utilities

1) In the civil sector there may be minimal communications for a considerable length of time.

2) Many gas lines which travel from the South to the Northeast cut through the New Madrid Region.

3) A number of crude oil pipelines are in operation in Kentucky. A break in one of these lines could cause significant environmental damage and could impact on portable water service.

4) Commercial telephone service is vulnerable, particularly due to the possible rupture of underground cables that cross faults. Should the commercial telephone system fail, the Amateur Radio Emergency System (ARES) may be implemented to support relief efforts.

5) Also affected will be cellular telephone service. The towers that relay signals to and from satellites may be jarred out of adjustment.

6) Electrical power systems are among the most fragile in the event of an earthquake. Because they are also among the most essential of the utilities, even a short-term loss can be a major setback to a community. The loss of electric power during an earthquake may mean no water to fight fires or for drinking water, no light or heat, no communications, no sewage pumps, etc.

7) Water and sewage systems are vulnerable to ground movement. Disruption of the water system can lead to loss of portable water and a loss of water for firefighting. Disruption of the sewage system can result in environmental damage and increased health risks.

g. Transportation

1) Damage to transportation systems may severely hamper recovery efforts following an earthquake. The loss or impairment of major rail and highway links serving the city may significantly increases the difficulty of rescue and relief efforts, and may also have long term disrupting effect upon regional and national commerce.

2) Riverport cities built on alluvial soil may sustain substantial damage to their infrastructure that limits the usefulness of the facilities in relief efforts.

3) Partial or limited availability of airport facilities is expected following an earthquake. Facilities that rely on electrical power, i.e. navigation aids and runway lighting, may be out of commission for some period of time, even if emergency power is available. Runways may be available at least for limited use, even in severely affected areas.

h. Debris removal may be a major problem, see ESF-14 (Recovery) and the Campbell County Debris Management Plan for debris removal procedures.

II. MISSION

To establish basic policies for direction and control of emergency operations in response to an earthquake.

III. DIRECTION AND CONTROL

Direction and Control for earthquake operations is exercised by the County Judge/ Executive and Mayor(s). State and federal resources which supplement local efforts will be directed by the state or federal government which supplies them. Direction and control will be consistent with guidance found in the Basic Plan, Direction and

Control.

IV. CONCEPT OF OPERATIONS

A. Emergency responsibilities assigned to local agencies for earthquake response parallel those for other disaster operations.

B. When an earthquake occurs, local authorities within damaged areas will use available resources to protect life and property, and reduce to the extent possible the suffering and hardships on individual. If local resources prove to be inadequate, or are exhausted, assistance will be requested from other jurisdictions through mutual aid procedures.

1. These procedures need to be in place before the incident to insure legal and financial conditions are delineated. Jurisdictions in the areas sustaining little or no damage will be called upon to support the affected areas.

2. When requirements are beyond the capability of local government, requests for assistance will be forwarded to KyEM in accordance with this plan.

3. When resource requirements cannot be met with state resources, KyEM will request federal assistance in accordance with applicable federal laws, policies, procedures and plans.

C. Emergency operations will begin with the occurrence of a damaging earthquake and continue until emergency operations are no longer required. Operational procedures for response to an earthquake are discussed in the emergency support functions of the county EOP. For example, information relating to treatment of injuries sustained in an earthquake is addressed in ESF-8 (Public Health). Other functional areas are treated in a similar fashion.

D. Operations and missions required as a result of an earthquake will be carried out during given phases of emergency management: Preparedness, Response, and Recovery.

1. Preparedness Phase

The Preparedness Phase occurs prior to and in anticipation of a catastrophic earthquake. This phase focuses on promotion of increased public awareness of the potential emergency, preparation of necessary materials and equipment for response to the emergency, and training for emergency response personnel. Typical functions of the Preparedness Phase include conducting public information programs, maintaining emergency resource inventory lists and conducting exercise and training programs.

2. Response Phase

The Response Phase occurs from the onset of the earthquake and lasts until

lifeline systems are at least partially restored. It includes the period of aftershocks. During this phase, functions which are critical to saving lives, protecting people and meeting basic human needs are performed.

3. Recovery Phase

   The Recovery Phase usually overlaps the Response Phase. It begins a few days after the earthquake and can last as long as two years. During the Recovery Phase, the federal government provides disaster relief upon Presidential Declaration. Functions during this phase include federal relief under P.L. 93.288, as amended, for public and individual assistance, establishment of Disaster Assistance Centers, establishment of temporary housing facilities, and federal disaster loans and grants. Long term recovery includes restoration of affected areas to their normal or to a substantially improved state. See ESF-14, Recovery.

V. ADMINISTRATIVE SUPPORT

Each agency will develop an internal staff and procedures for administrative support.