

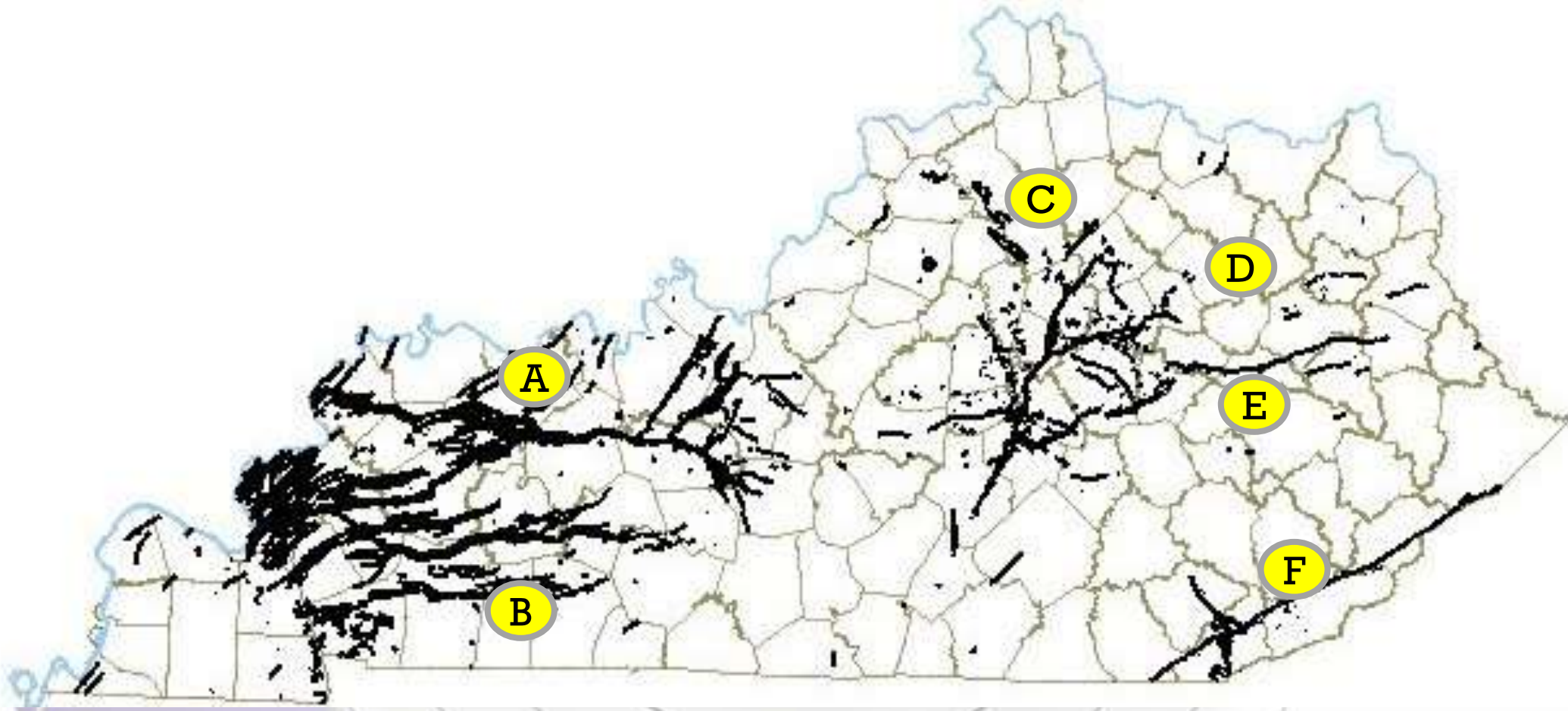
# KYEM EARTHQUAKE PROGRAM



[www.kyem.ky.gov/earthquake](http://www.kyem.ky.gov/earthquake)

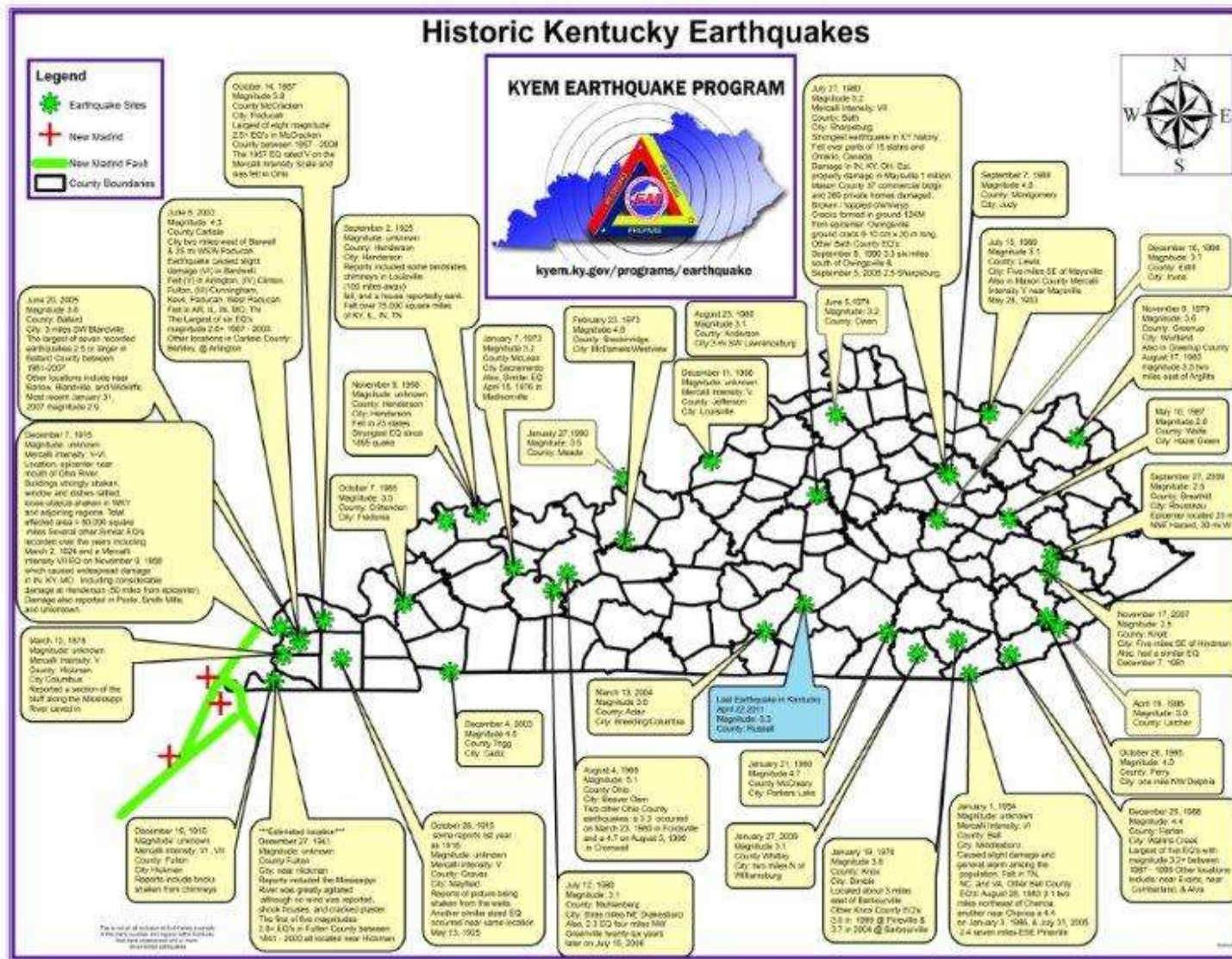
# KY Fault Zones

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# KY Earthquake History



**52 of 120  
Kentucky  
counties have  
experienced a  
documented  
earthquake**

# 2013 February 7<sup>th</sup>, ShakeOut

---

**Final ShakeOut registration #'s in Kentucky;  
543,346. Total KY Pop ~ 4.38 million**

**This is up from 429,925 in 2012, 26% increase  
is directly attributed to the State PIO  
acquiring a Governors' Proclamation  
declaring February Earthquake Awareness  
Month which included a Governors'  
recommendation to participate in the  
ShakeOut.**



# Proclamation

by  
Steven L. Beshear  
Governor

of the  
Commonwealth of Kentucky



*To All To Whom These Presents Shall Come:*

- WHEREAS, Several active geologic areas capable of producing damaging earthquakes are situated in or near Kentucky; and
- WHEREAS, Geologic and seismic experts believe future earthquakes are inevitable, especially in the area known as the New Madrid Seismic Zone; and
- WHEREAS, Kentucky Emergency Management (KYEM) is responsible for preparing the state for all forms of natural disasters, including earthquakes; and
- WHEREAS, It is appropriate that KYEM cooperate with other state and federal government agencies, the Central United States Earthquake Consortium, members of the Kentucky Voluntary Agencies Active in Disaster, local emergency officials and the private sector to prepare Kentuckians for earthquakes; and
- WHEREAS, All Kentuckians are encouraged to participate in the 2013 Great Central U.S. ShakeOut Earthquake Preparedness Drill - DROP, COVER and HOLD ON!, to be held February 7, 2013 at approximately 11:15 a.m. EST;
- NOW, THEREFORE, I, STEVEN L. BESHEAR, Governor of the Commonwealth of Kentucky, do hereby proclaim February 2013 as

## EARTHQUAKE AWARENESS MONTH

in Kentucky.



DONE AT THE CAPITOL, in the City of Frankfort  
the 9<sup>th</sup> day of January, in the year of Our Lord  
Two Thousand Thirteen and in the 221<sup>st</sup> year of  
the Commonwealth.

STEVEN L. BESHEAR  
GOVERNOR

ALISON LUNDERGAN GRIMES  
SECRETARY OF STATE

# EQ Awareness Month Governors' Proclamation

**WHEREAS, All Kentuckians  
are encouraged to  
participate in the 2013  
Great Central U.S.  
ShakeOut Earthquake  
Preparedness Drill- DROP,  
COVER and HOLD ON!, to  
be held February 7, 2013  
at approximately 11:15 a.m.  
EST**

5/28/2013

# House Bill 8 – Effective July 25, 2013

## **158.163 Earthquake and tornado emergency procedure system.**

(1) A drop procedure and safe area evacuation practice shall be held at least twice during each school year, with the first practice for a drop procedure and a safe area evacuation being held within the first thirty (30) instructional days of each school year and one (1) practice being held during the month of January;



# Awaiting FEMA Approval



# Earthquake Preparedness Coloring Book



Introducing:  
**Shakey the  
Squirrel**

## KYEM EARTHQUAKE PROGRAM



[www.kyem.ky.gov/earthquake](http://www.kyem.ky.gov/earthquake)

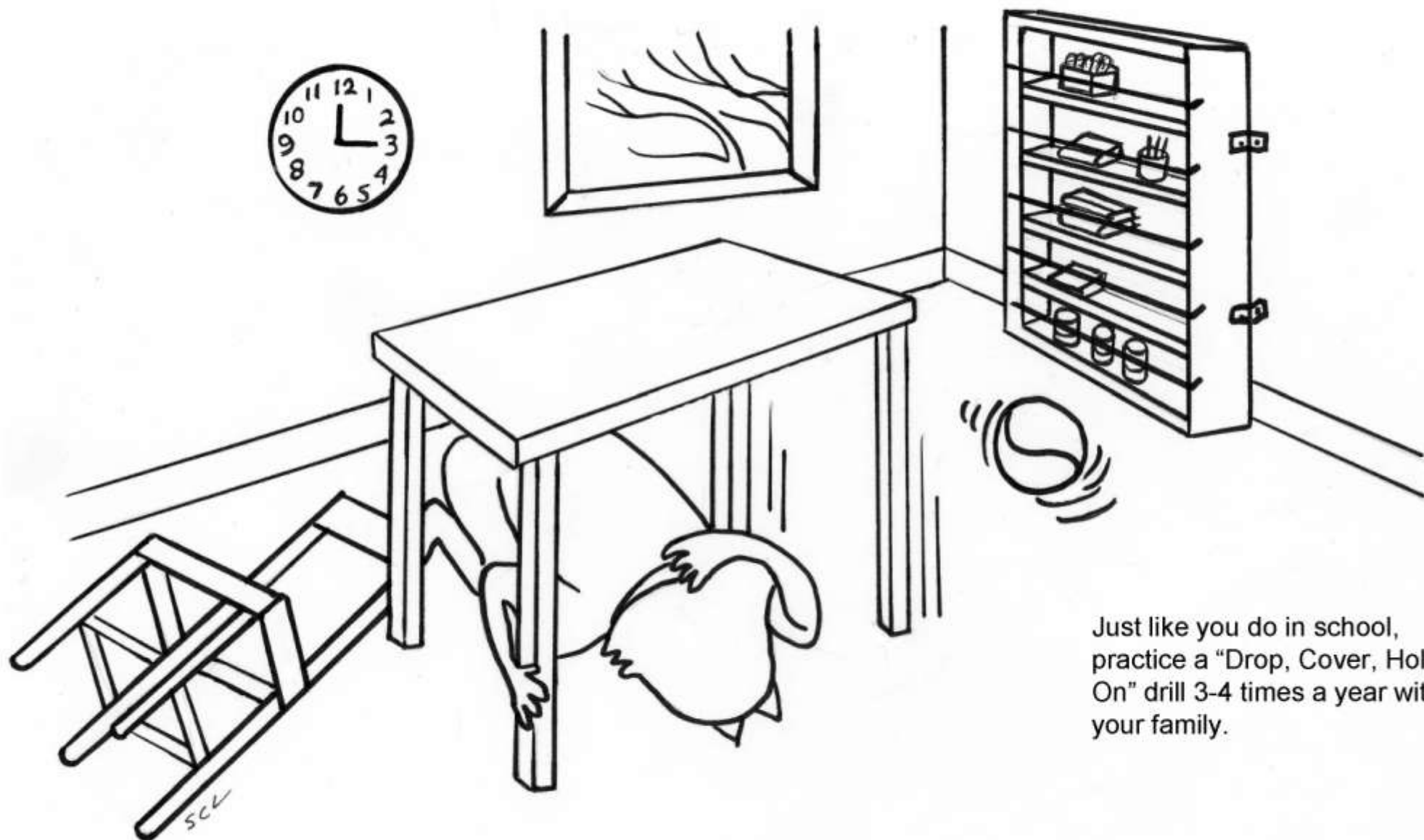
**Be Aware – Be Prepared  
Have a Plan!**

5/28/2013

*Become an  
Honorary  
member of the  
KYEM  
Earthquake  
Program –  
See back cover  
for details.*



The most important thing you can do in an earthquake is **Drop, Cover, Hold On!** We **drop** so the shaking doesn't knock us over. We **cover** so falling stuff doesn't land on us, and we **hold on** so that if the table slides in the shaking we will keep it over us. Stay calm, shaking will only last for a minute or two.



Just like you do in school, practice a “Drop, Cover, Hold On” drill 3-4 times a year with your family.

**Learn more about the “Drop, Cover, Hold On” procedure:**

[www.kyem.ky.gov/drop](http://www.kyem.ky.gov/drop)

5/28/2013

## 2013 KYEM Earthquake Poster Contest

As part of the **Earthquake Awareness & "ShakeOut"** Teacher's Toolkit, Kentucky Emergency Management (KYEM) would like to challenge all 3rd, 4th, & 5th grade students to a statewide poster contest promoting earthquake awareness.

**Win an eReader!!!**



Madison McCombs  
5th Grade  
Edmonson County  
5th/6th Center  
2012



The winner of the contest will receive an e-Reader and have a digital photograph of their poster displayed on KYEM's website.

Winning posters, like 2012 5th grade winner Madison McCombs, will be used to promote Earthquake Awareness 2014.

Full details included in *Earthquake Awareness & "ShakeOut"* Teacher's Toolkit  
<http://kyem.ky.gov/programs/Pages/Teachers.aspx>



**February 2013  
Earthquake  
Awareness Month**

More Information:  
**KYEMEQ@gmail.com**



# 2012 Poster Contest

Open to all 3<sup>rd</sup>, 4<sup>th</sup>, & 5<sup>th</sup> grades through Earthquake Awareness & "Great ShakeOut" instructional unit

Winning posters will highlight Earthquake Awareness 2014

Winners displayed at [kyem.ky.gov](http://kyem.ky.gov)

3 winners receive Kindle Fire eReader

1 teacher wins Kindle Fire eReader





2013  
5th Grade  
Winner!

911

# E arthquakes

By: Kayleigh Bates Science-5th grade  
Letcher Elementary School

How do you prepare for an earthquake?

Shake

Family Communication Plan	
Family Member's Name: _____	Phone Number: _____
Address: _____	Cell Number: _____
	Work Number: _____
Local Fire Department: _____	Address: _____
Phone Number: _____	
Mom's Name: _____	Dad's Name: _____
Cell Number: _____	Cell Number: _____
Work Number: _____	Work Number: _____

It is very important that you are prepared for an earthquake because they can happen at any time without warning.

To be prepared for an earthquake you will need to have a first aid kit, a flashlight, non-perishable food, water, spare batteries, a portable radio, and a ham radio. These supplies can be used for any kind of disaster.

Be

911

Prepared!

Shake

To be prepared for an earthquake you will also need a "Family Communication Plan." With this information you can call your parents, local fire department, local police, or any of your family relatives.

911



Kayleigh Bates  
5th Grade Letcher Elementary

5/28/2013



KYEM EARTHQUAKE PROGRAM



2013  
4th Grade  
Winner!



Allison Cleary

4th Grade Tompkinsville Elementary

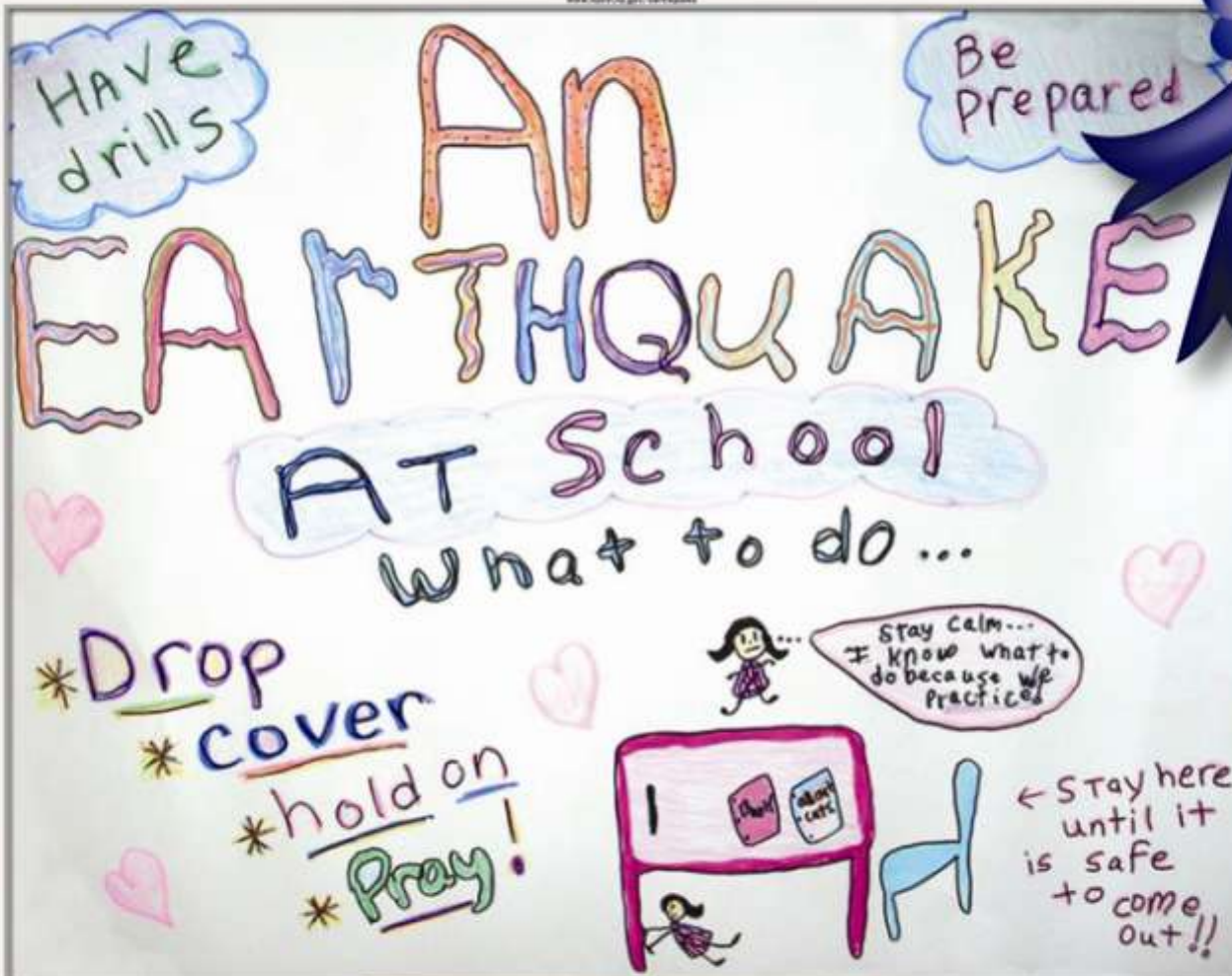
5/28/2013



KYEM EARTHQUAKE PROGRAM



2013  
3rd Grade  
Winner!



Maria Centers  
3rd Grade Berea Community

5/28/2013

# Louisa, VA Earthquake

- ◉ August 23, 2011
- ◉ 5.8 magnitude
- ◉ **Louisa, VA to:**
  - Lexington – 458 miles**
  - Frankfort – 480 miles**
  - Louisville – 530 miles**
  - Pikeville – 335miles**
  - Richmond – 461 miles**



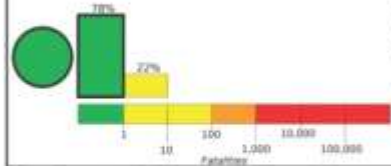
# M 5.8, VIRGINIA

Origin Time: Tue 2011-08-23 17:51:04 UTC (13:51:04 local)

Location: 37.94°N 77.93°W Depth: 6 km

Created: 2 hours, 5 minutes after earthquake

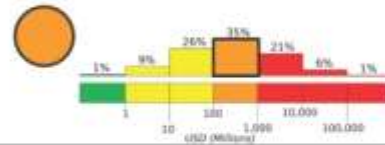
## Estimated Fatalities



Orange alert level for economic losses. Significant damage is likely and the disaster is potentially widespread. Estimated economic losses are less than 1% of GDP of the United States. Past events with this alert level have required a regional or national level response.

Green alert level for shaking-related fatalities. There is a low likelihood of casualties.

## Estimated Economic Losses



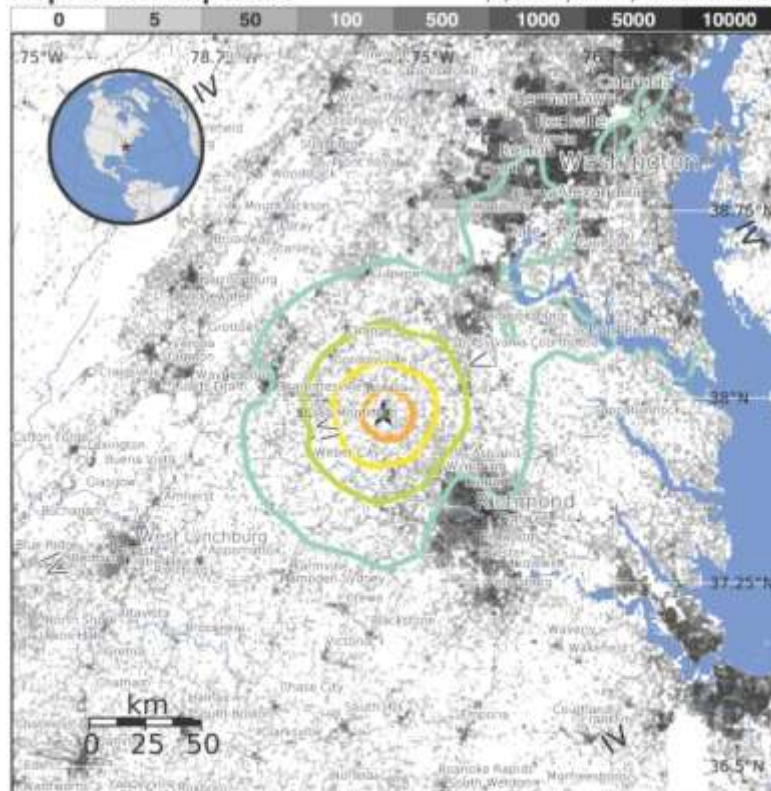
## Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)	--*	19k*	9,627k*	2,285k	76k	23k	10k	0	0
ESTIMATED MODIFIED MERCALLI INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

\*Estimated exposure only includes population within the map area.

## Population Exposure

population per ~1 sq. km from Landsat



## Structures:

Overall, the population in this region resides in structures that are resistant to earthquake shaking, though some vulnerable structures exist.

## Historical Earthquakes (with MMI levels):

There were no earthquakes with significant population exposure to shaking within a 400 km radius of this event.

## Selected City Exposure

from GeoNames.org

MMI City	Population
VII Louisa	2k
VI Gordonsville	2k
VI Newington	21k
VI Orange	4k
VI Weber City	1k
VI Lake Monticello	10k
V Virginia Beach	425k
V Washington	552k
IV Richmond	191k
IV Baltimore	611k
IV Annapolis	36k

bold cities appear on map

(k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage.

Limitations of input data, shaking estimates, and loss models may add uncertainty.

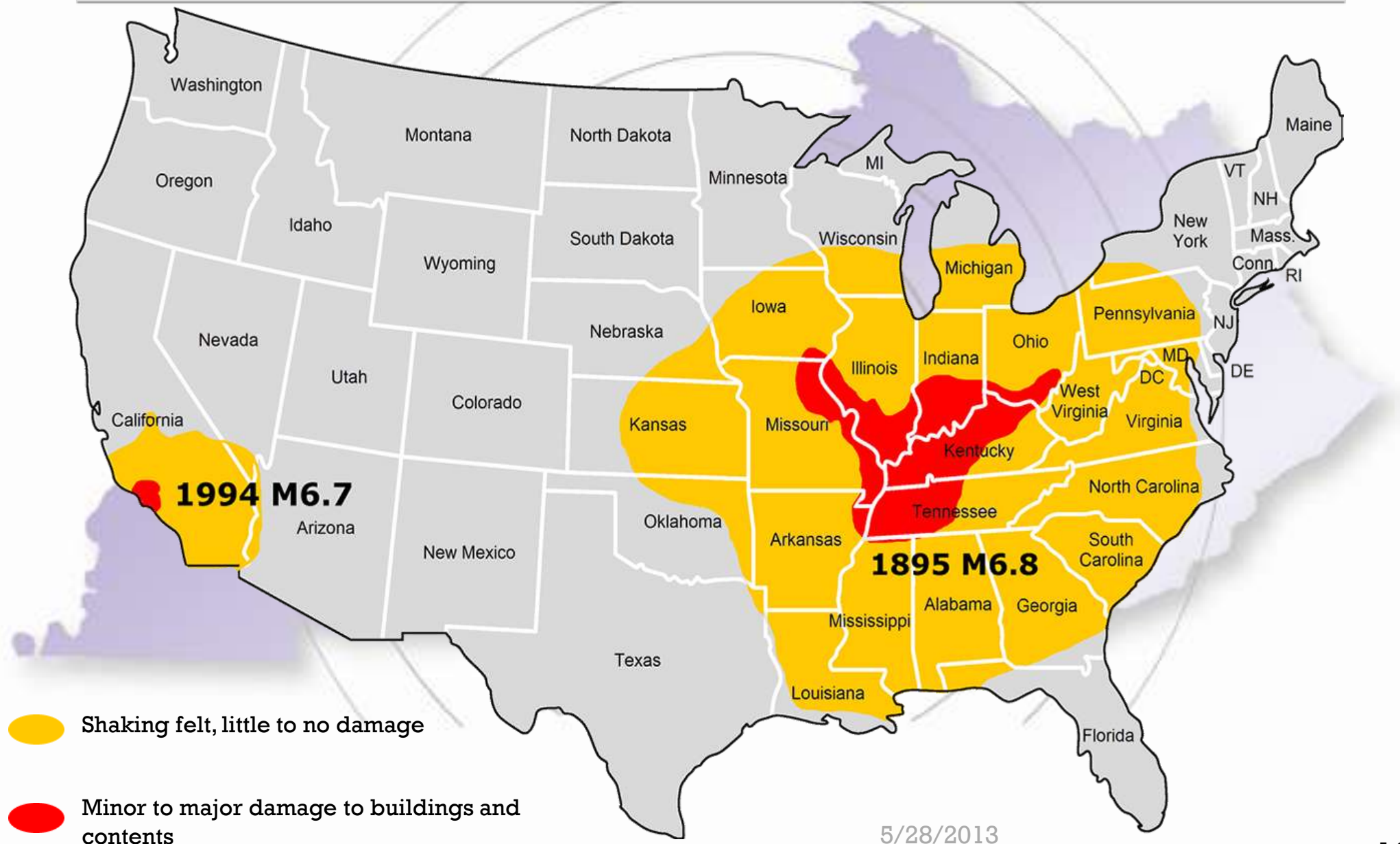
<http://earthquake.usgs.gov/pager>

Event ID: us082311a

# Louisa, VA Earthquake PAGER

5/28/2013

# Louisa, VA to Pikeville = 335 miles



5/28/2013



# Louisa, VA Earthquake



# Louisa, VA Earthquake





# Louisa, VA Earthquake



# M 4.3, EASTERN KENTUCKY

Origin Time: Sat 2012-11-10 17:08:12 UTC (12:08:12 local)

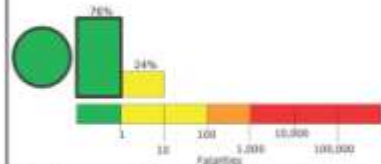
Location: 37.14°N 82.98°W Depth: 1 km

ANSS

**PAGER**  
Version 1

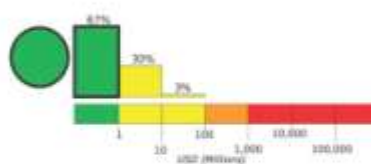
Created: 12 minutes, 24 seconds after earthquake

## Estimated Fatalities



Green alert for shaking-related fatalities and economic losses. There is a low likelihood of casualties and damage.

## Estimated Economic Losses

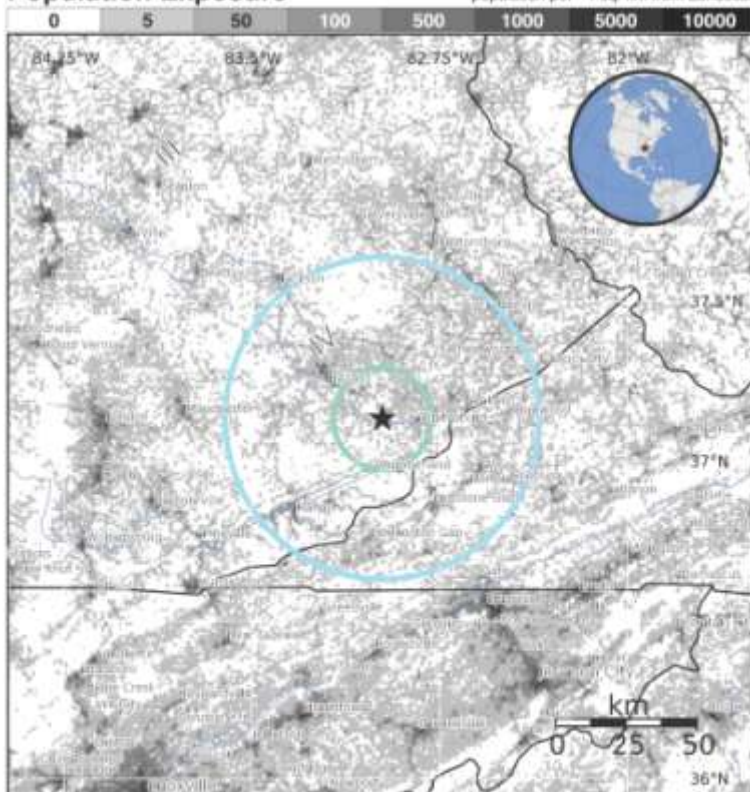


## Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)	~*	2,271k	223k	24k	0	0	0	0	0
ESTIMATED MODIFIED MERCALLI INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

\*Estimated exposure only includes population within the map area.

## Population Exposure



### Structures:

Overall, the population in this region resides in structures that are resistant to earthquake shaking, though some vulnerable structures exist.

### Historical Earthquakes (with MMI levels):

Date (UTC)	Dist. (km)	Mag.	Max MMI(#)	Shaking Deaths
1980-07-27	146	5.0	VI(44k)	0
1974-08-02	365	4.9	VII(29)	0

## Selected City Exposure

from GeoNames.org

MMI City	Population
V Whitesburg	2k
V Cumberland	2k
IV Hazard	5k
IV Wheelwright	1k
IV Appalachia	2k
IV Jenkins	2k
III Kingsport	44k
III Johnson City	59k
III Knoxville	172k
III Lexington-Fayette	272k
III Lexington	225k

bold cities appear on map

(k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage.

Limitations of input data, shaking estimates, and loss models may add uncertainty.

<http://earthquake.usgs.gov/pager>

Event ID: usc000dqhx

# Whitesburg, KY Earthquake PAGER

5/28/2013



# Whitesburg, KY Earthquake



# Whitesburg, KY Earthquake

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# Thank You

## Questions?

[www.kyem.ky.gov/earthquake](http://www.kyem.ky.gov/earthquake)

**David M Davis**

**KYEM Earthquake Program Manager**

**Division of Emergency Management**

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5/28/2013