Earthquake Tabletop Exercise (TTX)

After-Action Report

October 12th, 2017

The After-Action Report (AAR) aligns exercise objectives with preparedness doctrine to include the National Preparedness Goal and related frameworks and guidance. Exercise information required for preparedness reporting and trend analysis is included; users are encouraged to add additional sections as needed to support their own organizational needs.

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EXERCISE OVERVIEW

Exercise Name	Earthquake Tabletop Exercise (TTX)
Exercise Dates	October 12th, 2017
Scope	This is a discussion based exercise, planned for four hours hosted by the Oklahoma County Local Emergency Planning Committee (LEPC)
Mission Area(s)	Response and Recovery
Core Capabilities	Planning, Public Information and Warning, Operational Coordination, Infrastructure Systems, Mass Care Services, Situational Assessment, Economic Recovery, and Health and Social Services
Objectives	1. Test participant knowledge, skills, and abilities to effectively conduct all-hazards emergency response and recovery. 2. Enable participants to better coordinate response operations with counterparts from State governments, local governments, private sector organizations, and nongovernmental agencies. 3. Share real-time Earthquake related preparation, response, and recovery solutions with all participants.
Threat or Hazard	Earthquake and Hazardous Material
Scenario	This earthquake TTX was designed around the realistic scenario of an earthquake impacting central Oklahoma. The earthquake causes significant effort and actions by the participating jurisdictions and agencies.
Sponsor	Oklahoma County LEPC
Participating Organizations	State, local, private sector, and nongovernmental agencies
Point of Contact	Oklahoma County LEPC at okcountylepc@gmail.com

This after action report was developed by members of the Oklahoma County Local Emergency Planning Committee Training and Exercise Subcommittee. Information contained herein is based on participant feedback form documentation and participant responses during the out-brief of each module during the exercise.

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Exercise Overview

PURPOSE AND SCOPE

The purpose of this tabletop exercise (TTX) was to identify roles, responsibilities, and capabilities of each organization and assess existing emergency response and crisis management plans in response to an earthquake impacting central Oklahoma. Specifically, the TTX focused on:

1. Operational coordination between multiple agencies during an event that impacted a wide area, presented multiple complex problems, and included multiple jurisdictions.

2. The ability of participating agencies to deliver coordinated, prompt, reliable, and actionable information to the whole community.

3. Decision-making and coordination between federal, state, local, private sector, and nongovernmental organizations.

EXERCISE MISSION AREAS, CORE CAPABILITIES, AND OBJECTIVES

Mission Areas: Response and Recovery

Core Capability: Operational Coordination **Objective:** Discuss the capability to establish and maintain a unified and coordinated operational structure and process that integrates all critical stakeholders during a response to an earthquake.

Core Capability: Planning **Objective:** Discuss the ability to conduct a systematic planning process which has engaged the whole community.

Core Capability: Public Information and Warning **Objective:** Discuss the capability to deliver prompt, coordinated, reliable and actionable information to the whole community.

Core Capability: Infrastructure Systems **Objective:** Discuss the ability to stabilize critical infrastructure functions, minimize health and safety threats, and efficiently restore vital systems and services.

Core Capability: Mass Care Services **Objective:** Discuss the capability to provide life sustaining services to the affected population.

Core Capability: Situational Assessment **Objective:** Discuss the capability to provide decision-makers with decision-relevant information regarding the nature and extent of the hazard.

Core Capability: Economic Recovery **Objective:** Discuss the capability to return economic and business activities to a health state.

Core Capability: Health and Social Services **Objective:** Discuss the capability to restore and improve health and social services.

SCENARIO

The scenario for this exercise was developed by members of the Oklahoma County Local Emergency Planning Committee with functional expertise and support from Burlington Northern Santa Fe Railway, Plains All American Pipeline, Oklahoma Geological Survey (OGS), and the United States Geological Survey (USGS).

USGS and OGS jointly developed the Prompt Assessment of Global Earthquakes for Response (PAGER) documentation provided to exercise participants as well as supporting scenario maps and data. This information aided in establishing realistic expectations regarding the extent of damage and injuries that may be experienced with a magnitude 6.0 earthquake in central Oklahoma.

***Note: Full PAGER document located on Page 10 of this AAR*

Module 1: Initial Response

At 10:25 a.m. on October 12th, 2017, Oklahoma County is hit by the main shock of an earthquake of surface wave magnitude, MS=6.0 (Richter Scale). The main shock lasts 34 seconds. Most of the Oklahoma City metropolitan area experienced very strong ground shaking with the potential to cause moderate damage, especially to unreinforced masonry structures. With severe ground shaking causing moderate to heavy damage within 6 miles of the earthquake epicenter near Jones, Oklahoma. A train has derailed south of Memorial Road and west of Broadway extension. Fire crews are responding to the scene.

Module 2: Extended Response

As of 2:30 p.m. on October 12th, 2017, damage is widespread across the area surrounding the epicenter of the earthquake. Streets and roadways are blocked due to debris, an overpass has collapsed, the North Canadian Water Treatment Plant has reported minor damage to the chlorine plant, and a pipeline has been ruptured in eastern Oklahoma County. Plains All American Pipeline has crews en route to respond to the ruptured pipeline. BNSF is supporting response to the train derailment that resulted in the release of approximately 300 gallons of crude oil. As the day progresses, efforts are focused on mitigating the effects of the hazards. Responders are beginning to become fatigued after ten hours of continuous work. Supplies are needed to support food, water, and shelter for responders and displaced citizens.

Module 3: Recovery

It is the afternoon the day after the earthquake hit central Oklahoma. Estimates of displaced citizens range from 300-500. The Red Cross has established temporary shelter for residents, but additional locations are still needed. Initial damage assessments show that the power infrastructure is not severely damaged, but will take time to repair. The local telephone network is out of operation and will take significant time to repair. The community is looking for more information regarding repair efforts and status of roadways and facilities. There were 3 fatalities and an estimated 250 citizens injured, 62 that required hospitalization. Damages have been estimated at $100 million residential, commercial, and office units, out of 350 considered. Public concern is starting to shift to financial reimbursement for losses.

Operational Coordination

Objective: Discuss the capability to establish and maintain a unified and coordinated operational structure and process that integrates all critical stakeholders during a response to an earthquake.

Strengths

- Participants discussed that the RMACC will stand up and request agency representatives from Fire, Police, EMS, Public Works, Public and Private Utilities, Oklahoma Highway Patrol, Public Information and Marketing, and Storm Water Quality.
- Participants recognized an opportunity to set up an area command, because there are multiple incidents occurring over a large geographic area.
- Public Works has an extensive list of all the public works companies used during normal operations. This has helped to expedite debris removal or at least movement enough to open up streets expediently.

Areas for Improvement

- Need to identify additional players and take steps to encourage participation in future exercise events. Based on feedback from multiple exercise participants, the following agencies need to be better represented at future exercises: VOAD, Airports, private utilities, Police, ODEQ, Centralized Waste Treaters, Landfill Operators, OK OEM, and contractors who may be involved in recovery.
- Need to identify (pre-plan) personnel (stakeholders) and resources necessary for this type of event.

Additional Exercise Comments

- OKC Fire evolves and tweaks their strategy for managing large scale events---such as flooding---ice storms and those types of events. Especially establishing the area command concept where they would have a battalion chief who would be in command of each area depending on what was going on downtown.
- Stop doing what you normally do---which is when the 9-1-1 operator gets a call, it is assigned to a police officer or a fire unit, and then they send that response and so on and so on. You have to stop that during a disaster because you do not have enough units to support that operation in a real disaster. Train the dispatchers when to transition from normal operations and with coordination to the command that is on duty to help coordinate response to those calls via the battalion chiefs taking care of those areas.

Planning

Objective: Discuss the ability to conduct a systematic planning process which has engaged the whole community.

Strengths

- There are a wide variety of capabilities in central Oklahoma to address the issues this scenario would generate.
- There is a lot of institutional knowledge in the central Oklahoma region that helps us to better prepare for events like these.

Areas for Improvement

- Increase capacity---it is not realistic to keep all necessary resources on the payroll, but have more discussions on what resources we would need for a scenario like this one and include this in our pre-planning---how would we get it, who would we request it from, how much would it cost.
    - Need to develop detailed resource lists to address gaps in capacity. Develop plans and procedures to acquire resources to fill capacity gaps. Conduct planning meetings to develop list of resource requirements, available resources, and resource needs. Then develop a plan of action to acquire them in the event of a disaster.
- More frequent practice in utilization of mutual aid from areas outside of the Oklahoma City metropolitan area.

Public Information and Warning

Objective: Discuss the capability to deliver prompt, coordinated, reliable and actionable information to the whole community.

Strengths

- Good communication across disciplines during this exercise event.
- OKC utilizes the Accessible Hazard Alert System (AHAS) to send accessible alert messages to registered subscribers who are deaf, blind, hard of hearing, or deaf/blind.
- OKC Public Information and Marketing (PIM) has a plan in place to use and monitor social media to share information and control rumors.
- Oklahoma Communications Unit Program-In an event of this magnitude your communication folks would be playing a huge role. That team would be able to help with the challenges that you might have during a public safety response with a scenario of this nature.

Area for Improvement

- Communications to people without power is a weakness. Need to identify and network with groups that have resources to check on at risk people they're connected with.
- Participants in multi-discipline exercises should limit the use of jargon and utilize plain language to the greatest extent possible.
- Language barriers in the community need to be addressed in future exercises---especially access and functional needs.
- Increase cross communication between all agencies by continuing to attend training, exercises, and committee meetings.

Infrastructure Systems

Objective: Discuss the ability to stabilize critical infrastructure functions, minimize health and safety threats, and efficiently restore vital systems and services.

Strengths

- Participants identified the importance of restoring communications systems because once communications are restored people start to understand the situation better and it helps relieve stress by allowing people to communicate with loved ones.
- Participants identified the need to work with cell companies to bring in cell on wheels (COWs) and noted that the cellular providers may pay for COWs because it would be restoring service for their customers.
- Participants identified that electrical may be easier to restore than ground utilities, but that a consequence would be potential house fires after power is restored.
- Anything above a 4.4 magnitude earthquake will result in temporary shutdown of Plains Pipeline operations in that area until the company can verify there is no significant damage.
- BNSF Rail has a structure crew that will go out and start inspecting bridges, high rails, and all the rail lines to check for damages and do repairs as necessary.

Areas for Improvement

- Look at trying to relocate and reinforce utilities that are underground. There are a number different sources including federal funds, disaster funds, private partnerships, charities, other sources of funding specifically to support disaster recovery and hazard mitigation.

Mass Care Services

Objective: Discuss the capability to provide life sustaining services to the affected population.

Strengths

- American Red Cross will utilize their own volunteers who are already trained and vetted to manage shelter operations.
- Numerous agencies within Oklahoma County that have agreed to be shelter partners with the American Red Cross and the national sheltering system. As soon as the disaster takes place they can put people on standby and as the need grows they can utilize more people as necessary.

Areas for Improvement

- Utilize established partnerships with NGOs and continue to include these organizations in planning, training, and exercises.

Situational Assessment

Objective: Discuss the capability to provide decision-makers with decision-relevant information regarding the nature and extent of the hazard.

Strengths

- Utilize people on the ground in the disaster area including responders, NGOs, and faith based organizations.

Areas for Improvement

None.

Economic Recovery

Objective: Discuss the capability to return economic and business activities to a healthy state.

Strengths

- Participants acknowledged the importance of having a one stop disaster assistance center to help make all of those resources for recovery available at one site. Potential resources for financial assistance to individuals include private insurance, tribes may offer their members personal assistance, Oklahoma EM Individual Assistance, assistance from non-profit organizations and private businesses in the form of donations.

Areas for Improvement

None.

Additional Comments

- One point for clarification is that Public Assistance (PA) is for your fire stations, lift stations, etc. Individual Assistance (IA) is for individual members of the public.
- In Oklahoma County, there is a huge threshold of need that needs to be met before reimbursement.
- If the disaster was declared and FEMA assistance is provided—the SBA could provide low interest loans.
- After a disaster a lot of community partners will form a long term community group and they will be able to help with addressing individual needs.
- As far as sheltering and donations go the ARC takes monetary or "text for money" donations for recovery. Then the money can be given to the client to purchase what they need. If a person has supplies and not monetary donations they will be directed to a partner organization that has the infrastructure to support those types of donations. Lists of partners are consistently updated and donations may be mailed to those sites as well. Water can be taken, but it may be stored to support the current disaster or other additional disaster that may occur later on.

Health and Social Services

Objective: Discuss the capability to restore and improve health and social services.

Strengths

- Medical Reserve Corps has a behavioral health unit that can help in instances like this. EAPs can help to support employees through counseling services. Response agency chaplains. ARC and school/higher ed counselors to help students through the process as well and pay attention to the mental health needs of the community.

Areas for Improvement

None. Appendix B: Exercise Participants

Participating Organizations
American Red Cross
Burlington Northern Santa Fe Railway
Boomer Environmental
Centek
Edmond Emergency Management
Integris Health
Midwest City Emergency Management
Midwest City Fire Department
Oklahoma Department of Environmental Quality
Oklahoma Geological Survey
Oklahoma County Emergency Management
Oklahoma Office of Homeland Security
Oklahoma City-County Health Department
Oklahoma City Emergency Management
Oklahoma City Fire Department
Oklahoma City Public Information and Marketing
Oklahoma City Public Works
Oklahoma City Storm Water Quality
Oklahoma City Utilities
Plains All-American Pipeline
Tinker Air Force Base Medical Readiness
Tinker Air Force Base Emergency Management
Waste Connections

List of Acronyms
AAR-After Action Report
AHAS-Accessible Hazard Alert System
ARC-American Red Cross
BNSF-Burlington Northern Santa Fe Railway
COW-Cell on Wheels
EAP-Employee Assistance Programs
EM-Emergency Management
FEMA-Federal Emergency Management Agency
LEPC-Local Emergency Planning Committee
NGO-Non-Governmental Organization
ODEQ-Oklahoma Department of Environmental Quality
OEM-Office of Emergency Management
OGS-Oklahoma Geological Survey
OKC-Oklahoma City
PAGER-Prompt Assessment of Global Earthquakes for Response
PIM-Public Information and Marketing
RMACC-Regional Multi-Agency Coordination Center
SBA-Small Business Association
TTX-Tabletop Exercise
USGS-United States Geological Survey
VOAD-Volunteer Organizations Active in Disaster

All USGS provided scenario documentation is located at:
https://earthquake.usgs.gov/scenarios/catalog/ok2017/

USGS
science for a changing world

Earthquake Shaking Red Alert

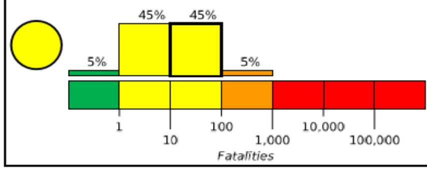
USAID FROM THE AMERICAN PEOPLE
GSN ANSS

M 6.0, Oklahoma County Scenario

Origin Time: 2017-10-12 15:25:00 UTC (Thu 10:25:00 local)
Location: 35.5740° N 97.2814° W Depth: 9.0 km

PAGER Version 2

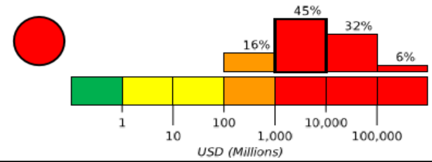
Estimated Fatalities



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

Yellow alert for shaking-related fatalities. Some casualties are possible.

Estimated Economic Losses



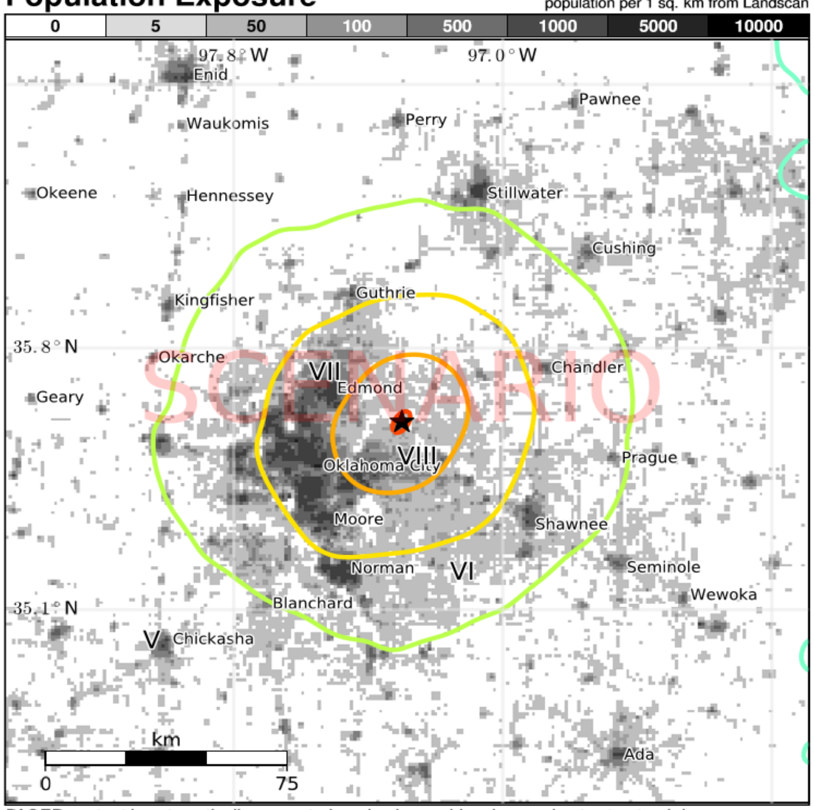
Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k=x1000)		–*	–*	12k*	432k	351k	869k	136k	6k	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	Mod./Heavy	Heavy	V. Heavy
	Vulnerable Structures	None	None	None	Light	Moderate	Mod./Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area.

Population Exposure

population per 1 sq. km from Landscan



Structures

Overall, the population in this region resides in structures that are resistant to earthquake shaking, though vulnerable structures exist. The predominant vulnerable building types are unreinforced brick masonry and reinforced masonry construction.

Historical Earthquakes

Date (UTC)	Dist. (km)	Mag.	Max MMI(#)	Shaking Deaths
1974-02-15	323	4.6	IV(8k)	–
1997-09-06	127	4.5	V(3k)	–

Selected City Exposure

from GeoNames.org

MMI	City	Population
IX	Jones	3k
VIII	Nicoma Park	2k
VIII	Choctaw	11k
VIII	Spencer	4k
VIII	Luther	1k
VIII	Midwest City	54k
VII	**Edmond**	81k
VII	**Oklahoma City**	580k
VII	**Moore**	55k
VI	**Norman**	111k
V	**Enid**	49k

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/data/pager/

Event ID: usoklahoma_m6_se

Prompt Assessment of Global Earthquakes for Response

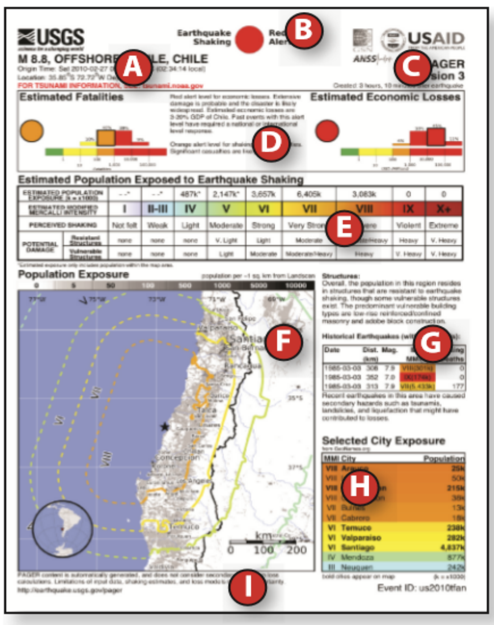
Background

PAGER provides shaking and loss estimates following significant earthquakes anywhere in the world. These estimates are generally available within 30 minutes and are updated as more information becomes available. Rapid estimates include the number of people and names of cities exposed to each shaking intensity level as well as the likely ranges of fatalities and economic losses. PAGER does not consider secondary effects such as landslides, liquefaction, and tsunami in loss estimates at this time. For tsunami warnings see http://tsunami.noaa.gov/.

Information on the extent of shaking will be uncertain in the minutes and hours following an earthquake and typically improves as additional sensor data and reported intensities are acquired and incorporated into models of the earthquake's source. Users of PAGER need to account for uncertainty and always seek the most current PAGER release for any earthquake.

PAGER alerts are available in a one-page summary and Web pages with extended content at http://earthquake.usgs.gov/pager/.

A **Summary of the basic earthquake parameters**, including origin time, local time, magnitude, hypocenter, and the name of the region where the earthquake took place. For events with high likelihood of a tsunami, a link to the NOAA tsunami Web page is provided (bold red text).



H **Table of MMI estimates for selected settlements**. A maximum of 11 settlements that fall within the map boundary are included in the table. The table contains country capitals and the six settlements with the highest estimated intensity. The remaining settlements listed are selected by population. Settlement name, location, and population are obtained from the freely-available GeoNames geographical database (GeoNames.org).

B **Earthquake Impact Scale summary alert level**. The higher of the two alert levels (D) is shown as the summary alert at the top-center of the page.

C **The version of the PAGER alert and the time the alert was created**. New versions of the alert are generated when the earthquake information is improved as supplemental ground-shaking constraints become available.

D **Earthquake Impact Scale alert levels** for fatalities (left) and economic losses (right). The alert levels are based on the range of most likely losses due to earthquake shaking; the uncertainty in the alert level can be gauged by the histogram, depicting the percent likelihood that adjacent alert levels (or fatality/loss ranges) occur. Accompanying text clarifies the nature of the alert based on experience from past earthquakes. If the economic alert is yellow or greater, the text will also give a range of economic losses in terms of the country's Gross Domestic Product. The higher level of the two alerts is shown as the summary alert at the top-center of the page (B).

E **Table showing population exposed** to different estimated Modifed Mercalli Intensity (MMI) levels and the possible damage at different intensity levels for resistant and vulnerable structures. MMI describes the severity of an earthquake in terms of its effect on humans and structures and is a rough measure of the amount of shaking at a given location. Unlike earthquake magnitude, intensity varies with distance from the fault. Population outside the map bounds are not included in the totals.

F **Map of MMI contours** plotted over the Landscan (Oak Ridge National Laboratory) population base map. The regions labeled with Roman numeral MMI values are separated by half intensity unit contour lines, e.g., 5.5, 6.5, 7.5. The total population exposure to a given MMI value is obtained by summing the population between the contour lines. This total is shown in the population exposure table (E).

G **Region-specific structure and earthquake commentary**. The Structures comment may contain the most vulnerable building type(s) in the region or a general description of the vulnerability of the buildings in the region. The Historical Earthquakes section includes a table of population exposure and fatalities for three previous nearby earthquakes, and, in some cases, the potential for fires, landslides, liquefaction, or other hazards, based on past earthquakes in the region, will be noted.

I **Footer**, including a link to the PAGER Web page, the event-identification number, and a disclaimer noting that the content was automatically generated and has additional sources of uncertainty. All possible uncertainties are not considered in the determination of estimated earthquake fatalities and economic losses; the actual impact of the earthquake may differ from PAGER's automatically generated estimate.