All Hazard Mitigation Plan
State of Arkansas

Chapter 1 – Public Process

Updated September 2, 2010

Primary Point of Contact

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Update Revisions for Chapter Since Last FEMA Approval	
Section	Description
Sections 1, 2 and 3	• Changed dates to be relevant to the current revision to the Arkansas All Hazard Mitigation Plan (Version 4).
Section 3	• Updated the committee member table (pages 14 - 18) to accurately reflect changes made since the last FEMA approved plan revision. • Included a description of Meeting Dates for the 2010 revision process (Pages 19 - 39) and made changes to various dates to be relevant to this current revision of the Arkansas All Hazard Mitigation Plan (Version 4). • Updated list of current Local Mitigation Plans for the 2010 revision process (Pages 50 - 51). • Removed e-mails received during the 2007 revision

Section 1: Adoption by the State

Adoption by the State	
IFR REQUIREMENT *201.4(c)(6) and 201.4(c)(7):*	The plan must: - be formally adopted by the State prior to submittal to [FEMA] for final review and approval [and] - include assurances that the State will comply with all applicable Federal statues and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 13.11(c). The State will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).
Explanation:	An appropriate body in the State **must** adopt the plan. This could be, for example, the State Legislature or the Governor, depending on the State's established procedures. States with hazard mitigation teams or councils may choose to use these bodies to adopt the plan. At a minimum, the plan **must** be endorsed by the director of the State agency responsible for preparing and implementing the plan, as well as the heads of other agencies with primary implementation responsibilities. Adoption by the State: • Demonstrates the State's commitment to fulfilling the mitigation objectives outlined in the plan, and • Legitimizes the plan and authorizes the responsible agencies identified in the plan to execute their responsibilities. The section on assurances relates to the State's understanding and accountability in complying with Federal statutes and regulations in effect when it receives grant funding as prescribed in 44 CFR 13.11(c). Additionally, as required in 44 CFR 13.11(d), the State **must** amend its plan to reflect new or revised Federal regulations or statutes, or changes in State law, organization, policy, or State agency operation. The amendment can be added as an annex to the plan and later incorporated into the appropriate section(s) when the plan is formally updated as required in §201.4(d) of the Rule. The resolution of adoption can include a statement assuring FEMA that the State will comply with both of these CFR requirements. The plan **must** include a copy of the resolution of adoption.

1.1 Promulgation Authority

This Hazard Mitigation Plan update was reviewed and adopted by the following promulgation authorities:

_____ Governor Mike Beebe

STATE OF ARKANSAS

EXECUTIVE DEPARTMENT

PROCLAMATION

TO ALL WHOM THESE PRESENTS COME - GREETINGS:

AN EXECUTIVE ORDER PURSUANT TO.

WHEREAS: The State of Arkansas believes mitigation projects. Initiatives, and activities result in the reduction of risk from natural hazards; and

WHEREAS: The State of Arkansas supports mitigation planning and believes that it will result in the judicious selection of cost effective, risk reduction actions; more disaster resistant sustainable communities; building of partnerships among local, state, federal, private, and non-profit share holders; identification of financial and technical resources; and a reduction in loss of life and injury recovery time; and cost associated with natural disasters;

THEREFORE, as directed by Section 322 of the Federal Disaster Mitigation Act of 2000, the State of Arkansas All Hazards Mitigation Plan is formally adopted.

IN TESTIMONY WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Arkansas to be affixed this _____ day of _____ in the Year of our Lord 2010.

_____

GOVERNOR

_____

SECRETARY OF STATE

SAMPLE

1.2 Governor's Executive Order

The Arkansas Hazard Mitigation Plan was approved by Federal Emergency Management Agency (FEMA) under the requirements for the Disaster Mitigation Act of 2000. The governor issued the following Executive Order to support this on-going planning effort.

STATE OF ARKANSAS
EXECUTIVE DEPARTMENT

PROCLAMATION

EO 10-13

TO ALL TO WHOM THESE PRESENTS COME -- GREETINGS:

EXECUTIVE ORDER ADOPTING THE STATE OF ARKANSAS ALL HAZARDS MITIGATION PLAN, PURSUANT TO SECTION 322 OF THE FEDERAL DISASTER MITIGATION ACT OF 2000

WHEREAS: The State of Arkansas believes mitigation projects, initiatives, and activities result in the reduction of risks from natural hazards; and

WHEREAS: The State of Arkansas supports mitigation planning and believes that it will result in the judicious selection of cost-effective, risk-reduction actions; more disaster-resistant sustainable communities; building of partnerships among local, state, federal, private, and nonprofit share holders; identification of financial and technical resources; a reduction in loss of life and injury recovery time; and costs associated with natural disasters;

NOW, THEREFORE, I, MIKE BEEBE, Governor of the State of Arkansas, pursuant to Section 322 of the Federal Disaster Mitigation Act of 2000, do hereby formally adopt the State of Arkansas All Hazards Mitigation Plan, as updated July 23, 2010.

IN TESTIMONY WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Arkansas to be affixed this 13th day of September, in the year of our Lord 2010.

MIKE BEEBE, GOVERNOR

CHARLIE DANIELS, SECRETARY OF STATE

1.3 Assurances

The State of Arkansas will comply with all applicable federal statutes and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c). The State of Arkansas Hazard Mitigation Plan will be amended according to the process described in Section 6.1: Updating the Plan, whenever necessary, to reflect changes in state or federal laws and statutes as required in 44 CFR 13.11(d).

The State of Arkansas is committed to hazard mitigation and plans to maintain the Hazard Mitigation Planning Sub-Committee as part of the Arkansas Pre-Disaster Mitigation Advisory Council. This planning team is managed by the Arkansas Department of Emergency Management and is an important part of the state's on-going efforts to comply with federal statutes and regulations.

The State of Arkansas has continued to maintain and update its mitigation plan. The first major plan update incorporated the analysis of man-made and technological hazards into the mitigation plan as well as an update of the natural hazard vulnerability analysis. The state completed this substantial revision to the plan in 2005/2006.

The second major update of the State of Arkansas Mitigation Plan was completed in August of 2007. This current revision (Version 4, as explained on page 52) carries the focus to save lives and reduce property damage. Mitigation encourages long-term reduction of hazard vulnerability.

http://tornadopictures.net/index.php?option=com_ponygallery&Itemid=26&func=detail&id=21

Section 2: Introduction

2.1 Foreword

Mitigation is the cornerstone of emergency management. It is defined as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. The goal of mitigation is to save lives and reduce property damage. Mitigation encourages long-term reduction of hazard vulnerability.

In the past, federal legislation has provided funding for disaster relief and recovery, but little emphasis was placed on hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest legislation to encourage this planning process. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous set of mitigation planning provisions (Section 409) and replacing it with a new set of requirements (Section 322). This new section emphasizes the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. The new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, this act establishes a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). It also requires that states have an approved hazard mitigation plan in order to receive Stafford Act assistance, excluding assistance provided pursuant to emergency provisions.

This plan meets requirements for a Standard State Plan under Interim Final Rule 44 CFR 201.4, published in the Federal Register by FEMA on February 28, 2002. Meeting the requirements of the regulations cited above keeps the State of Arkansas qualified to obtain all disaster assistance, including hazard mitigation grants available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended on January of 2008.

The State of Arkansas Department of Emergency Management (ADEM) has encouraged the continual update process for its Hazard Mitigation Plan. Mitigation planning is an on-going process throughout the State of Arkansas. The Hazard Mitigation Plan has evolved through the years as well. This copy serves as the required three-year plan revision. This copy is officially labeled as the Arkansas All-Hazard Mitigation Plan (Version 4).

This plan (Version 4) meets all Standard State Requirements *SS201.4:* as well as Plan Update Requirements listed in *SS201.3(b)(5)* and *SS201.4(d).*

2.2 Purpose and Authority

The purpose of the State of Arkansas All-Hazard Mitigation Plan (Version 4) is to provide guidance for hazard mitigation activities in the State of Arkansas. The Arkansas Department of Emergency Management has the responsibility to coordinate all state and local activities relating to hazard evaluation and mitigation, and to prepare and submit to FEMA, a Standard State Mitigation Plan following the criteria established in 44 CFR 201.4 and Section 322 of the Disaster Mitigation Act of 2000 (Public Law 106-390). The Disaster Mitigation Act of 2000 became law on October 30, 2000, and amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the "Stafford Act") (Public Law 93-288, as amended). Regulations for this activity can be found in Title 44 of the Code of Federal Regulations Part 206, Subpart M.

Section 322 requires states to develop mitigation plans that:

- Identify the natural hazards, risks, and vulnerabilities of areas in the state.
- Support development of local mitigation plans.
- Provide for technical assistance to local and tribal governments for mitigation planning.
- Identify and prioritize mitigation actions that the state will support, as resources become available.

The State of Arkansas is committed to the continuing efforts required for effective hazard mitigation and, consequently, the overall purpose of this plan goes beyond the scope of the federal requirements for DMA 2000. The Arkansas Department of Emergency Management has been tasked by the governor to implement a mitigation strategy that will effectively reduce damages and effects on the population and the economy of the state. ADEM has adopted the Standards of the National Fire Protection Association (NFPA 1600) and the Emergency Management Accreditation Program (EMAP) as the benchmarks for continuing mitigation efforts. This plan was updated and revised in 2005/2006 with the purpose of exceeding the DMA 200 crosswalk requirements by including man-made and technological hazards. This first plan revision will be referred to as the State of Arkansas All-Hazard Mitigation Plan (Version 2). The authority for this enhanced planning effort was granted by the governor and state resources committed to support this program.

There were a number of purposes for this planning effort (Version 2):

- Profile man-made and technological hazards that exist in the state.
- Continue to analyze the vulnerabilities and potential impacts.
- Develop an integrated mitigation strategy at the state and local levels.
- Meet nationally recognized standards for successful emergency management programs.

The State of Arkansas has completed another major update to the All-Hazards Mitigation Plan. This update follows criteria published by FEMA in January 1, 2008 and is listed in the DMA 2000 federal requirements §201.4(d) and §201.5(c)(2). These requirements mandate that Standard and Enhanced State Plans be updated and resubmitted every three years to FEMA. The Arkansas All-Hazards Mitigation Plan (Version 4) has been updated to meet the three-year revision requirement. The authority for this planning effort was granted by the governor and state resources committed to support this program.

There are a number of purposes for this latest continued planning effort:

- Review and analyze each section of the plan and update sections when appropriate.
- Update Arkansas state-owned and operated facilities, as well as update vulnerability analysis and damage estimates.
- Complete a detailed Risk Assessment vulnerability update utilizing technical information and data from past hazard events, FEMA approved local hazard mitigation plans, and other agencies. This includes any changes, clarifications, or refinements resulting from any new or updated data and information generated through local mitigation plans.
- Address hazard management capabilities of the state that have changed since approval of Arkansas All Hazards Mitigation Plan (Version 3).
- Incorporate severe repetitive loss information for the state. This will include types and numbers of repetitive loss properties.
- Incorporate updated data from FEMA approved local hazard mitigation plans into the overall planning goals and objectives of the State of Arkansas. When applicable, identify integration efforts that took place since the last update.
- Identify how the state coordinated efforts with federal, state, regional, and local agencies in identifying local mitigation programs and capabilities.
- Meet DMA 2000 requirements for mandatory three-year update of state mitigation plans.

Picture of City of Dumas, Tornado Damage

Section 3: Planning Process

3.1 Documentation of the Planning Process

Documentation of the Planning Process	
IFR REQUIREMENT *201.4(c)(1):*	The plan must include a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated.
Explanation:	A description of the planning process **must** include how the planning team or committee was formed, how input was sought from individuals or other agencies, and how the plan was prepared.
Plan Update:	A description of the planning process is required for the update. The update **must** describe the process used to review and analyze each section of the plan. If the planning team or committee finds that some sections of the plan warrant an update, and others do not, the process the team undertook to make that determination **must** be documented in the plan.

The State of Arkansas All-Hazard Mitigation Plan is the product of thousands of hours of work and the efforts of people from many organizations. The plan builds upon a number of Arkansas Department of Emergency Management (ADEM) mitigation planning initiatives, including State Hazard Mitigation Plans published in 1997, 1999, 2004, 2006, 2007 and this current update scheduled for adoption in 2010.

The staff of the ADEM Mitigation Branch organized the present planning effort. ADEM selected staff from the University of Arkansas at Little Rock to develop the initial phase of this mitigation plan which included natural hazards. In November of 2005, the second phase of plan development (Version 2) focused on adding man-made and technological hazards to the State of Arkansas Mitigation Plan. Bold Planning Solutions (BPS) was selected through a competitive bid process to develop the three-year State Mitigation Plan update (Version 3) as required by FEMA and DMA 2000. In November of 2007, the third phase of the plan development (Version 3) focused on performance of state wide risk assessment, establishing vulnerability, development of mitigation strategies, development for prioritizing local planning projects, identification of current and potential funding sources, and reviewing and analyzing new data to evaluate. Bold Planning Solutions (BPS) was selected through a competitive bid process to develop the three-year State Mitigation Plan update (Version 4). This update will focus on severe repetitive loss data and continued local mitigation plan integration. The state will also maintain the general methodology from the previous successful planning initiatives as required by FEMA and DMA 2000.

The Hazard Mitigation Planning Sub-Committee was formed largely from the existing Arkansas Pre-Disaster Mitigation Advisory Council. The committee was established in December of 2002 with the goal of assisting in the development of this DMA 1000 compliant All-Hazard Mitigation Plan. Current mitigation objectives for the State of Arkansas Mitigation Planning Initiative (Version 4) include:

Performance of statewide risk assessments for the purpose of identifying natural, man-made and technological hazards and their potential for damage and impact.

1. Establishment of vulnerability in terms of jurisdictions most threatened by the identified hazards, and an overview of potential losses based on assessments provided by local governments.
2. Development of a mitigation strategy that provides an identification, evaluation, and prioritization of cost-effective, environmentally sound and technically feasible mitigation actions for reducing the losses associated with each identified hazard.
3. Development of criteria for prioritizing local jurisdictions that would receive planning and project grants under available funding.
4. Address any hazard management capabilities of the state that have changed since approval of the previous plan.
5. Identification of current and potential sources of federal, state, local, and private funding.
6. Technical assistance on sound mitigation techniques and policy.
7. Include an analysis of whether the previously approved plan's method and schedule worked.
8. Provided methods to track initiation status and completion of mitigation activities.
9. Provided mitigation actions that were implemented.
10. Identified specific actions taken to reduce the number of repetitive loss properties and severe repetitive loss properties.
11. Providing a method for monitoring, evaluating, and updating the State Mitigation Plan.
12. Evaluation and improvement of state laws, regulations, policies, and programs related to mitigation activities in the state.
13. Reviewing and analyzing new data to evaluate if it is applicable for incorporation into the state mitigation planning process.

The Planning Team

The Hazard Mitigation Planning Sub-Committee includes individuals with varied backgrounds, expertise, and perspectives who together provide a wide range of interdisciplinary insight. Approximately sixty members of the Hazard Mitigation Planning Sub-Committee include agencies and individuals throughout Arkansas and outside the state involved with:

- Emergency management
- Private industry
- Floodplain management
- Environmental issues
- Historic and archeological preservation
- Geography/natural resources

- Transportation
- Planning and zoning
- Housing/economic development
- Building regulations and codes
- Public information
- Insurance
- Engineering/architecture
- State building services
- Geology/seismology
- State government
- Community planning
- Utilities
- Academia
- Federal agencies
- Local government
- United States Department of Agriculture (USDA)
- Weather service
- Arkansas Graphic Information Systems (GIS) office
- Communications
- Public health
- Livestock and poultry industries
- Chemical facilities
- Arkansas Electrical Cooperatives
- Arkansas Military Departments
- Department of Homeland Security

The table on the following pages lists the members of the updated State of Arkansas Pre-Disaster Mitigation Advisory Council with their contact information. All members of the APDMAC and AGEAC are also members of the Hazard Mitigation Planning Team (also referred to as the Sub-Committee).

July 22, 2010 Updated Planning Team Members

Arkansas Governor's Earthquake Advisory Council and Arkansas Pre-Disaster Mitigation Advisor Council	
Mr. Tom Allen Retired-ADEM Ph: (870) 886-3660 Fax: Email: Membership Started: 1994	**Ms. Myra Jane Biggers** EQ Program Manager & Natural Hazards Planner ADEM-Jonesboro Office Ph: (870) 935-8528 Fax: (870) 935-8537 Email: Myra.biggers@adem.arkansas.gov Membership Started: 2006
Mr. Frank Allison Vice President/Structural Engineer Engineering Consultants, Inc. Ph: (501) 376-3752 Fax: (501) 376-7314 Email: fallison@ecilr.com Membership Started: 1991	**Ms. Kathy Botsford** Director of Pulaski Co. Sanitation/Animal Services Pulaski County Ph: (501) 664-7400 Fax: Email: kbotsford@co.pulaski.ar.us Membership Started: 2001
Dr. Haydar Al-Shukri Director, ACEETT Univ. of AR in Little Rock Ph: (501) 569-8164 Fax: (501) 569-3271 Email: alshukri@seismo.ualr.edu Membership Started: 1998	**Mr. Travis Boyd** Clay Co Coord Clay Co.OEM Ph: (870) 598-5365 Fax: Email: clayoem@centurytel.net Membership Started: 2006
Mrs. Sheila Annable Preparedness Division Director AR Dept. of Emergency Management Ph: (501) 683-6700 Fax: Email: sheila.annable@adem.arkansas.gov Membership Started: 2008	**Mr. Andy Branton** Architect ASP/Fire Marshal's office Ph: (501) 618-8367 Fax: Email: andy.branton@asp.arkansas.gov Membership Started: 2008
Mr. Scott M. Ausbrooks Geohazards & Environmental Geology Supervisor Arkansas Geological Survey Ph: (501) 683-0119 Fax: (501) 663-7360 Email: scott.ausbrooks@arkansas.gov Membership Started: 2003	**Mr. Tony Brooks** Deputy Director AETN Ph: (501) 682-2386 Fax: Email: tbrooks@aetn.org Membership Started: 2002
Ms. Claire Bailey Director Arkansas Department of Information Systems Ph: (501) 682-2701 Fax: (501) 682-4310 Email: claire.bailey@arkansas.gov Membership Started: 2007	**Mr. Matt Burks** Little Rock Emergency Management Administrator City of Little Rock Ph: (501) 569-4130 Fax: Email: mburks@littlerock.org Membership Started: 2006
Ms. Karen Bassett Chief Deputy Director AR Dept. of Environmental Quality Ph: (501) 682-0959 Fax: (501) 682-0798 Email: bassett@adeq.state.ar.us Membership Started: 2009	**Ms. Lou Anne Clements** Craighead County LEPC/CERT Craighead County Ph: (870) 934-0566 Fax: (870) 934-0579 Email: equakelady@suddenlink.net Membership Started: 1988
Mr. Robert W. Betzold AR CAP-USAF State Director U.S Air Force Ph: (501) 376-3721 Fax: (501) 374-6743 Email: caploar@sbcglobal.net Membership Started: 2005	**Dr. Jeffrey Connelly** Professor UALR, Dept. of Earth Sciences Ph: (501) 569-3543 Fax: (501) 569-3271 Email: jbconnelly@ualr.edu Membership Started: 1996

Dr. Brady Cox Assistant Professor, Department of Civil Engineering University of Arkansas Fayetteville Ph: (479) 575-6027 Fax: (479) 575-7168 Email: brcox@uark.edu Membership Started: 2008	**Mr. James Engstrom** Engineer James Engstrom and Associates Ph: (501) 376-7246 Fax: (501) 376-6627 Email: hjengstrom@engstromengineers.com Membership Started: 1994
Mr. Anthony Coy N/E Area Coordinator AR Dept. of Emergency Management Ph: (870) 935-3094 Fax: (870) 935-8537 Email: Anthony.coy@adem.arkansas.gov Membership Started: 2004	**Mr. Tony E. Evans** Staff Maintenance Engineer Arkansas Highway & Transportation Ph: (501) 569-2467 Fax: (501) 569-2014 Email: Tony.Evans@arkansashighways.com Membership Started: 2004
Ms. Janet Davidson Executive Assistant American Red Cross Ph: (870) 763-4481 Fax: Email: jldavidson_2000@yahoo.com Membership Started: 2009	**Mr. Starr J. Fenner** Director Environmental Health and Safety Arkansas State University Ph: (870) 972-3644 Fax: (870) 972-3584 Email: sfenner@astate.edu Membership Started: 2005
Mr. D.A. Davis Safety Supervisor, Environmental Health & Safety Arkansas State University-Jonesboro Ph: (870) 972-2862 Fax: (870) 972-3584 Email: ddavis@astate.edu Membership Started: 2005	**Mr. Vernon Frank** Catastrophe Coordinator State Farm Insurance Ph: (573) 499-2060 Fax: (573) 499-2140 Email: vernon.frank.lods@statefarm.com Membership Started: 2005
Mr. Gerald Delavan, P.G. Geologist Supervisor, RST Division AR Dept. of Environmental Quality Ph: (501) 683-5697 Fax: (501) 682-0611 Email: gld@adeq.state.ar.us Membership Started: 1999	**Capt. Steve Gentry** Emergency Preparedness Liaison Officer NEPLO -Arkansas Ph: (479) 631-6418 Fax: Email: NEPLO_AR@yahoo.com Membership Started: 2010
Mr. Joe Dillard Regional Representative US Representative Berry's Office Ph: (870) 425-3510 Fax: (870) 425-3511 Email: Joe.Dillard@mail.house.gov Membership Started: 2003	**Mr. Terry H. Gray** State Hazard Mitigation Officer AR Dept. of Emergency Management Ph: (501) 683-6724 Fax: (501) 683-7890 Email: Terry.Gray@adem.arkansas.gov Membership Started: 1998
Mrs. Erica Doerr Education Specialist AR Geological Survey Ph: (501) 296-1877 Fax: (501) 663-7360 Email: erica.doerr@arkansas.gov Membership Started: 2008	**Mr. Joe Green** State Farm Catastrophe Coordinator State Farm Insurance Ph: (573) 499-2537 Fax: (573) 499-2140 Email: Joe.green.g9e5@statefarm.com Membership Started: 2005
Mr. Roger Elliot AR State Disaster Director American Red Cross Ph: (501) 748-1010 Fax: (501) 664-7486 Email: elliotr@arkansasredcross.org Membership Started: 1996	**Mr. Richard Griffin** Disaster Management Division Director - Retired ADEM Ph: Fax: Email: Membership Started: 0
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Hon. Gary Howell Clay County Judge Clay Co. Government Ph: (870) 598-2667 Fax: (870) 598-5592 Email: ccjudge@centurytel.net Membership Started: 1998	**Mr. Timothy Lee** Training Specialist UALR, AR. Small Bus. Devel. Center Ph: (501) 683-7700 Fax: (501) 683-7720 Email: tmlee1@ualr.edu Membership Started: 2001
Mrs. Sally Howell Grants Coordinator Clay Co. Government Ph: (870) 598-3204 Fax: (870) 598-5143 Email: ccjudge@centurytel.net Membership Started: 1998	**Mr. David Lendennie** 911/Floodplain Management Mississippi County Ph: (870) 763-5110 Fax: 870-763-0150 Email: missco911@sbcglobal.net Membership Started: 1996
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Dr. Hanan Mahdi Seismologist UALR, GIT Ph: (501) 569-3086 Fax: (501) 569-3271 Email: hhmahdi@ualr.edu Membership Started: 2000	**Ms. Janet Roderick** Director UALR, AR. Small Bus. Devel. Center Ph: (501) 683-7700 Fax: (501) 683-7720 Email: jmroderick@ualr.edu Membership Started: 2001
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Mr. J. Rex Oxner Area Emergency Manager VA Medical Center Ph: (501) 257-1015 Fax: (501) 257-1018 Email: j.oxner@va.gov Membership Started: 2006	**Mr. Gary Stephenson** Government & Community Affairs Liaison State Farm Insurance Ph: (501) 615-6004 Fax: (501) 615-6001 Email: gary.stephenson.a9ef@statefarm.com Membership Started: 2008
Ltc. Robert Penton EQ Planning Coordinator Civil Air Patrol Ph: (501) 753-9249 Fax: Email: pilotrlp@aol.com Membership Started: 1999	**Mr. Scott P. Stovall** Graduate Research Assistant and Herff Fellow Univ. of Memphis Ph: (901) 678-3288 Fax: (907) 678-3026 Email: spstovll@memphis.edu Membership Started: 2008
Mr. Jeffrey F. Puckett IT/911/OEM Clay County Ph: (870) 598-5365 Fax: Email: jeffrey.puckett@centurytel.net Membership Started: 2008	**Ms. Darlene Tanner** 911 Coordinator/Deputy OEM Clay County Ph: Fax: Email: clay911@centurytel.net Membership Started: 2008

Ms. Ramona Taylor Director of Business Development Crittenden Regional Hospital Ph: (870) 735-5527 Fax: (870) 732-7741 Email: ramona_taylor@cmhwm.org Membership Started: 2001	**Mr. Merle Williams** Private Citizen Poinsett Co. (Retired) Ph: (870) 578-5361 Fax: (870) 578-2441 Email: merler@rittermail.com Membership Started: 2003
Mr. Andy Traffanstedt Pulaski County Coordinator Pulaski Co. OEM Ph: (501) 340-6911 Fax: (501) 340-6989 Email: atraffanstedt@co.pulaski.ar.us Membership Started: 2009	**Dr. Wendi J.W. Williams** Geologist/Faculty Univ. of Arkansas Little Rock Ph: (479) 422-3988 Fax: Email: wjwilliams@ualr.edu Membership Started: 2002
Mrs. Veronica Villalobos-Pogue Federal Grants Mitigation Coordinator AR Dept. of Emergency Management Ph: (501) 683-6700 Fax: (501) 683-7890 Email: veronica.pogue@adem.arkansas.gov Membership Started: 2006	**Mr. Fulton Wold** Certified Business Continuity Professional Bold Planning Solutions Ph: (615) 469-5558 Fax: (615) 469-5615 Email: fulton@boldplanning.com Membership Started: 2006
Ms. Bekki White Director & State Geologist Arkansas Geological Survey Ph: (501) 296-1880 Fax: Email: bekki.white@arkansas.gov Membership Started: 2007	
MSG Gregory J. White DOMS Operations NCO Arkansas National Guard Ph: (501) 212-5471 Fax: (501) 212-5442 Email: gregory.j.white@us.army.mil Membership Started: 2009	
Mr. James M. Wilkinson, Jr. Executive Director Central U.S. Earthquake Consortium Ph: (901) 544-3570 Fax: (901) 544-0544 Email: jwilkinson@cusec.org Membership Started: 2003	
Col. Frank Williams AR State Emergency Preparedness Liaison Officer US Army Ph: (501) 771-8713 Fax: Email: frank.r.williams@us.army.mil Membership Started: 2008	
Lt. Col. James "Herb" Williams Homeland Security Coordinator AR Wing, Civil Air Patrol Ph: (501) 376-1729 Fax: (501) 374-6743 Email: arwingdoh@sbcglobal.net Membership Started: 2005	
Lt. Lindsey Williams Lieutenant, Arkansas State Fire Marshal Arkansas State Police Ph: (501 618-8604 Fax: (501) 618-8621 Email: lindsey.williams@asp.arkansas.gov Membership Started: 2005	

Numerous state and federal agencies also participated in the planning process by providing data and expertise. Their contributions are described in Sections 3.2 and 3.3.

Planning Process

The Hazard Mitigation Plan (HMP) Sub-Committee has followed a pre-determined process for the preparation of the 2010 Hazard Mitigation Plan update. The process had four major elements:

- Research and Data Collection: The HMP Sub-Committee gathered all relevant, existing data from various sources including current plans, field collection teams, the internet, state and federal resources, and interviews with team members.
- Data Collation and Plan Writing: After the initial data collection phase, all the documents and notes were fully analyzed and related information was collated. Using all of this information, the initial drafts of the plan were written and submitted to the HMP Sub-Committee for formal consideration, approval, and promulgation.
- Review and Comments: The section drafts were finished and subsequently reviewed by the individual members of the HMP Sub-Committee and, as a group, at team meetings. All comments and ideas were then incorporated into this finalized edition. As review comments were delivered, these requested revisions were considered and added to the plan.
- Finalization, Adoption and Delivery: After incorporating all the revisions based on feedback from the planning team and the public, the final plan was approved by the State of Arkansas.

A more detailed discussion of how the committee reassembled and the steps taken by the committee can be found in the section below titled “Planning Team Meetings”. This section discusses the important steps taken by the committee to assure a successful and collaborating effort for this update.

Planning Team Meetings

The Planning Team Committee was formed in 2002 and continues to meet several times a year. The committee and sub-committees regrouped for the plan in 2004, 2007, and 2010 update process. Since 2007, meetings were held periodically to discuss mitigation needs for the State of Arkansas. Two meetings were held in 2008 and two meetings in 2009 prior to the October 22, 2009 “Kick-off” Meeting for the 2010 Hazard Mitigation Plan update. During the 2008 and 2009 meetings, as stated in the “Planning Process”, the planning committee met on several occasions to discuss the planning needs for the state. Prior to the meetings, each committee member was assigned the task to review chapters of the Arkansas Hazard Mitigation Plan and to provide their agencies input and capabilities for the 2010 plan update.

The hazard mitigation update planning committee meetings consisted of:

- Research and Data Collection
- Data Collation and Plan Writing
- Review and Comments
- Finalization, Adoption, and Delivery

Research and Data Collection: The HMP Sub-Committee gathered all relevant, existing data from various sources including current plans, field collection teams, the internet, state and federal resources, and interviews with team members. This was a “round table” format discussion to review the overall direction of the 2010 update process. The “round table” format allowed everybody the opportunity to comment on information they would like to include in the final adaptation of the plan.

Data Collation and Plan Writing: After the initial data collection phase, all the documents and notes were fully analyzed and related information was collated. Using all of this information, the initial drafts of the plan were written and submitted to the HMP Sub-Committee for formal consideration, approval, and promulgation. This was accomplished by posting the draft plan on the ADEM website and allowing all the committee members to provide input into the planning effort by way of e-mail.

Review and Comments: The section drafts were finished and subsequently reviewed by the individual members of the HMP Sub-Committee. This was accomplished as a group during meetings and individually by the ADEM website where the plan was posted for review. All comments and ideas were then incorporated into this finalized edition. As review comments were delivered, these requested revisions were considered and added to the plan.

Finalization, Adoption, and Delivery: After incorporating all the revisions based on feedback from the planning team and the public, the final plan was approved by the committee. The plan was then sent to FEMA for their review. FEMA will conduct a thorough review of the plan and once all required revisions are addressed, the plan will be approved by FEMA. Once approved by FEMA, the plan can then be adopted by the state.

A question and answer period was held after each presentation for the committee members. Clarification for any questions was addressed or revisited if research was needed. Also, requests were made for each member to gather information on current and updated data from each department and agency. This requested information involved data from other state, federal, and local plans that included the following: mitigation ideas, previous hazard information, state concerns, and regional hazard information. Areas that showed a greater hazard risk to the state were readdressed at the following meetings with more in-depth information.

Thursday, October 22, 2009

10:00 AM – Meeting with Terry Gray, Amanda Merrill, and Josh Rogers with ADEM, Fulton Wold and Ben Brake with Bold Planning Solutions.

"Kick-off" Meeting- Discussed the revision of the State of Arkansas All-Hazard Mitigation Plan. Conversation of data collection needs for the state, roles of the State Mitigation Planning Committee, and schedules of the Planning Team. This meeting is addressed more thoroughly on the previous page.

Wednesday, January 20. 2010*:*

Arkansas Governor's Earthquake Advisory Council and Arkansas Pre-Disaster Mitigation Advisory Council meetings held in Little Rock. The agendas for these meetings and sign-in sheets can be found on the following pages.

For the 2010 plan update, numerous meetings were held with the Planning Team. Documentation of the planning process includes: meeting agendas, meeting summaries, handout packets, follow-up letters, and e-mails. Meetings with individual agencies were conducted as needed to get the required input. The AHMT discussed and reviewed each of the plan's sections for the update. The Team provided input for the hazard risk profiles and assessments, mitigation goals, and mitigation strategies. The State of Arkansas Hazard Mitigation Plan is published on ADEM's website with the opportunity for the public to make comments. A brief summary of the AHMT meetings follow:

Thursday, January 21, 2010

9:00-10:00 AM – Mitigation Department Mitigation Planning Meeting

Attendees:

• Fulton Wold	BPS Inc.	Mitigation Planner
• Amanda Merrill	ADEM	PDMC Coordinator
• Terry Gray	ADEM	Mitigation

This meeting served as a Quarterly Status Meeting for ADEM. Terry Gray and Amanda Merrill provided plan feedback as well as updated repetitive loss documentation.

ARKANSAS GOVERNOR'S EARTHQUAKE ADVISORY COUNCIL MEETING
January 20, 2010
Little Rock, AR
AGENDA
Meeting Minutes
January 20, 2010

Andy Traffanstedt officially welcomed everyone to Pulaski County.

Scott Ausbrooks, AR GEAC Chairman, thanked everyone for attending. He expressed appreciation to Arkansas Electric Cooperative Corporation for the use of their facility and Steve Sharp for helping make the arrangements. He called for introductions, approval of the minutes, and Chairman's Reports. The membership voted unanimously to keep current officers. New nominees for membership: Becky Harrington, Arkansas Insurance Department; Capt. Steve Gentry, U.S. Navy; and David Johnston, AGS Earthquake Geologist. All were accepted unanimously.

Jay Winters, Deputy Director of ADEM, discussed planning for the National Level Exercise in 2011. He reviewed exercises leading up to NLE 2011as well as the state's plan to participate. He spoke about NEHRP funds received by Arkansas and goal areas established for their use.

Wendy Phillips, FEMA, Hurricane/Earthquake Program Specialist, being new to the group introduced herself. She expressed her appreciation for council members' activities. She spoke of events in Haiti and relief efforts. The importance of building codes in mitigating loss of life and property was emphasized.

Jim Wilkinson, CUSEC Executive Director, talked about how the earthquake in Haiti has renewed interest in the New Madrid Seismic Zone. He also gave an update on NEHRP, Bicentennial planned activities, and continued planning for NLE 2011. There was a moment of remembrance for Dr. Norman Hester and all of his accomplishments.

Brian Blake, CUSEC Earthquake Program Manager, gave a recap of the National EQ Program Managers Meeting held in Boston in November, 2009. He provided an overview of workshops and training CUSEC had co-sponsored and also town hall meetings that had been held. He informed the group the GIS Working Group Meeting would be held the last week in February.

Scott Ausbrooks, AR Geological Survey, provided an update on the recent education, information and outreach activities they had been involved in. He recapped the 2009 earthquake activity in Arkansas. Reports of earthquakes felt have increased. Scott emphasized how new monitoring stations enhance the state capabilities in monitoring activity. David Johnston, AR Geological Survey, gave a brief presentation on the permanent seismometer stations.

Dr. Haydar Al-Shukri, UALR ACEETT, presented a report on research being done in Marianna. Indications are the fault zone is larger than initial work revealed. Additionally, the reason for the concentration of damage in Haiti was also discussed. He reported on work being coordinated with Arkansas Geological Survey on the location of more seismic stations.

Dr. Steve Horton, CERI Research Scientist, presented an update on the Arkansas Seismic Network. Increased monitoring in Arkansas beyond the northeast area has provided the ability to lower the magnitude detection threshold as well as better location of the event.

Lt. Lindsey Williams, AR State Police, State Fire Marshal, spoke on state building codes, recent revisions of statutes, and further updating needed.

Dr. Steve Horton, reviewed earthquake related products and tools available on the USGS website.

Veronica Villalobos-Pogue, ADEM Earthquake Program Manager, highlighted key activities over the last six months (handout was provided).

ARKANSAS PRE-DISASTER MITIGATION ADVISORY COUNCIL MEETING
January 20, 2010
Little Rock, AR

Honorable Gary Howell, Clay County Judge, brought the APDMAC meeting to order.

Amanda Merrill, ADEM Pre-Disaster Mitigation Program Manager, discussed PDM Grant funding. She confirmed the only Arkansas project this year is in Russellville. She displayed a map showing the status of hazard mitigation plans for each county.

Fulton Wold, Bold Planning Solutions, gave an update on state hazard mitigation planning. He presented an estimated timeline outlining deliverables and actions proposed to achieve those deliverables. Asked planning team to review plan and add any comments or concerns if need.

Open Discussion

It was the decided to form the following working groups:

- Building Codes
- Legislation
- Awareness/Preparedness
- Education and Outreach

Veronica Villalobos-Pogue offered examples of useful products these groups could provide.

Adjourned

GEAC/APDMAC Member Sign-In Sheet January 20, 2010 Little Rock, AR

Name	Company	Title	RSVP	SIGNATURE
Mr. Tom Allen	Retired-ADEM		☐YES ☑NO	
Mr. Frank Allison	Engineering Consultants, Inc.	Vice President/Structural Engineer	☑YES ☐NO	
Dr. Haydar Al-Shukri	Univ. of AR in Little Rock	Director, ACEETT	☑YES ☐NO	
Mrs. Sheila Annable	AR Dept. of Emergency Management	Preparedness Division Director	☑YES ☐NO	
Mr. Scott M. Ausbrooks	Arkansas Geological Survey	Geohazards & Environmental Geology Supervisor	☑YES ☐NO	
Ms. Claire Bailey	Arkansas Department of Information Systems	Director	☑YES ☐NO	
Ms. Karen Bassett	AR Dept. of Environmental Quality	Chief Deputy Director	☐YES ☑NO	GERALD DELAUAN for KAREN BASSETT
Ms. Julie Benafield Bowman			☐YES ☐NO	
Mr. Robert W. Betzold	U.S Air Force	AR CAP-USAF State Director	☑YES ☐NO	

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Name	Company	Title	RSVP	SIGNATURE
Ms. Myra J. Biggers	ADEM-Jonesboro Office	Natural Hazards Planner	☑YES ☐NO	
Ms. Kathy Botsford	Pulaski County	Director of Pulaski Co. Sanitation/Animal Services	☐YES ☑NO	
Mr. Travis Boyd	Clay Co.OEM	Clay Co Coord	☑YES ☐NO	
Mr. Andy Branton	ASP/Fire Marshal's office	Architect	☑YES ☐NO	
Mr. Tony Brooks	AETN	Deputy Director	☑YES ☐NO	
Mr. Matt Burks	City of Little Rock	Little Rock Emergency Management Administrator	~~☑YES~~ ☒NO	(see Comments) Sent Representative
Ms. Lou Anne Clements	Craighead County	Craighead County LEPC/CERT	☑YES ☐NO	
Dr. Jeffrey Connelly	UALR, Dept. of Earth Sciences	Professor	☑YES ☐NO	
Dr. Brady Cox	University of Arkansas Fayetteville	Assistant Professor, Department of Civil	☐YES ☑NO	
Mr. Anthony Coy	AR Dept. of Emergency Management	N/E Area Coordinator	☑YES ☐NO	
BRIAN BLAKE	CUSEC		✓	

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Name	Company	Title	RSVP	SIGNATURE
Ms. Janet Davidson	American Red Cross	Executive Assistant	☐YES ☑NO	
Mr. D.A. Davis	Arkansas State University-Jonesboro	Safety Supervisor, Environmental Health &	☑YES ☐NO	
Mr. Gerald Delavan, P.G.	AR Dept. of Environmental Quality	Geologist Supervisor, RST Division	☑YES ☐NO	
Mr. Joe Dillard	US Representative Berry's Office	Regional Representative	☐YES ☐NO	
Mrs. Erica Doerr	AR Geological Survey	Education Specialist	☑YES ☐NO	
Mr. Roger Elliot	American Red Cross	AR State Disaster Director	☑YES ☐NO	
Dr. Ashraf S. Elsayed	Arkansas State University	Assistant Professor, College of Engineering	☐YES ☐NO	
Mr. James Engstrom	James Engstrom and Associates	Engineer	☑YES ☐NO	
Mr. Tony E. Evans	Arkansas Highway & Transportation Department	Staff Maintenance Engineer	☑YES ☐NO	
Mr. Starr J. Fenner	Arkansas State University	Director Environmental Health and Safety	☑YES ☐NO	

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Name	Company	Title	RSVP	SIGNATURE
Mr. Vernon Frank	State Farm Insurance	Catastrophe Coordinator	☑YES ☐NO	
Mr. Terry H. Gray	AR Dept. of Emergency Management	State Hazard Mitigation Officer	☑YES ☐NO	
Mr. Joe Green	State Farm Insurance	State Farm Catastrophe Coordinator	☑YES ☐NO	
Mr. Richard Griffin	ADEM	Disaster Management Division Director	☑YES ☐NO	
Mr. Marion Haynes	Arkansas Archeological Survey, Blytheville	Archeological Assistant	☐YES ☐NO	
Col. Thommie Herndon	AR Wing Civil Air Patrol	Assist. Homeland Security Coordinator	☑YES ☐NO	
Hon. Gary Howell	Clay Co. Government	Clay County Judge	☑YES ☐NO	
Mrs. Sarah Howell	Clay Co. Government	Grants Coordinator	☑YES ☐NO	
Mr. Todd Hunter	ASU-Searcy	Workforce Training	☑YES ☐NO	
Col. John I. Kaminar	Defense Coordinating Element VI, Joint and	State Emergency Preparedness Liaison Officer	☑YES ☐NO	

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Name	Company	Title	RSVP	SIGNATURE
Mr. Chris King	USDA Natural Resources Conservation Service	Geologist	☑ YES ☐ NO	
Mr. Frank Kraft	Poinsett Co OEM	Poinsett Co. Coordinator	☑ YES ☐ NO	
Mr. William R. Lacy	Arkansas Insurance Department	Director, Property & Casualty Division	☑ YES ☐ NO	
Mr. Timothy Lee	UALR, AR. Small Bus. Devel. Center	Training Specialist	☑ YES ☐ NO	
Mr. David Lendennie	Mississippi County	911/Floodplain Management	☑ YES ☐ NO	
Mr. Robert Lewis	Northeast AR Red Cross	Disaster Chairman	☐ YES ☑ NO	
Mr. Bob G. Lorimer	State Farm Fire & Casualty Ins. Co.	Claim Section Manager	☑ YES ☐ NO	
Ms. Susan Love	IEM, Inc.	Response & Recovery A-Team, Senior Planner	☐ YES ☑ NO	
Mr. Edwin Lyons	Arkansas Department of Human Services	Director Of Emergency Operations	☑ YES ☐ NO	
Ms. Rita Madison	Arkansas Ready Mix Conc. Assoc.	Executive Director	☐ YES ☐ NO	

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Name	Company	Title	RSVP	SIGNATURE
Dr. Hanan Mahdi	UALR, GIT	Seismologist	☑ YES ☐ NO	
Mr. Gary McElligott	Code Camey and Associates, Inc.	Emergency Operations Manager	☐ YES ☑ NO	
Mr. John David McFarland		Consulting Geologist	☐ YES ☑ NO	
Mr. David Moore	Craighead County OEM	OEM Coordinator Craighead County	☑ YES ☐ NO	
Hon. Charles Nix	Poinsett County	Poinsett Co. Judge	☐ YES ☐ NO	
Mr. J. Rex Oxner	VA Medical Center	Area Emergency Manager	☑ YES ☐ NO	
Ltc. Robert Penton	Civil Air Patrol	EQ Planning Coordinator	☑ YES ☐ NO	
Mr. Jeffrey F. Puckett	Clay County	IT/911/OEM	☑ YES ☐ NO	
Mr. Joseph Richmond	Mississippi Co. Government	Emergency Management Coordinator	☐ YES ☑ NO	
Ms. Janet Roderick	UALR, AR. Small Bus. Devel. Center	Director	☐ YES ☑ NO	

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Name	Company	Title	RSVP	SIGNATURE
Mr. Ronny Rogers	Crittenden County OEM	Crittenden County Coordinator	☐ YES ☑ NO	
Mr. Steve Sharp	AR Electric Cooperative	Principal Engineer Fuels & Civil	☑ YES ☐ NO	
Mr. Jay Sims	UALR, Earth Science Dept.	Instructor	☑ YES ☐ NO	
Dr. Chuck D. Stein	Arkansas Dept.of Education	Assistant Director, Engineer P.E.	☐ YES ☑ NO	
Mr. Gary Stephenson	State Farm Insurance	Government & Community Affairs Liaison	☑ YES ☐ NO	
Mr. Scott P. Stovall	Univ. of Memphis	Graduate Research Assistant and Herff Fellow	☐ YES ☑ NO	
Ms. Darlene Tanner	Clay County	911 Coordinator/Deputy OEM	☑ YES ☐ NO	
Ms. Ramona Taylor	Crittenden Regional Hospital	Director of Business Development	☐ YES ☑ NO	
Mr. Andy Traffanstedt	Pulaski Co. OEM	Pulaski County Coordinator	☑ YES ☐ NO	
Mrs. Veronica Villalobos-Pogue	AR Dept. of Emergency Management	Earthquake Program Manager	☑ YES ☐ NO	

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Name	Company	Title	RSVP	SIGNATURE
Mr. Mark Whitaker			☐ YES ☐ NO	
Ms. Bekki White	Arkansas Geological Survey	Director & State Geologist	☑ YES ☐ NO	
MSG Gregory J. White	Arkansas National Guard	DOMS Operations NCO	☑ YES ☐ NO	
Mr. James M. Wilkinson, Jr.	Central U.S. Earthquake Consortium (CUSEC)	Executive Director	☑ YES ☐ NO	
Col. Frank Williams	US Army	AR State Emergency Preparedness Liaison Officer	☐ YES ☐ NO	
Lt. Col. James "Herb" Williams	AR Wing, Civil Air Patrol	Homeland Security Coordinator	☑ YES ☐ NO	
Lt. Lindsey Williams	Arkansas State Police	Lieutenant, Arkansas State Fire Marshal	☑ YES ☐ NO	
Mr. Merle Williams	Poinsett Co. (Retired)	Private Citizen	☐ YES ☑ NO	
Dr. Wendi Williams, Phd	Univ. of Arkansas Little Rock	Geologist/Faculty	☑ YES ☐ NO	
Mr. Fulton Wold	Bold Planning Solutions	Certified Business Continuity Professional	☑ YES ☐ NO	

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GEAC/APDMAC Guest Sign In Sheet

January 20, 2010 *Little Rock, AR* 16 *Guest Count*

Name			Company	Job Title	RSVP	SIGNATURE
Mr.	John	Ashby	AR State Bank Dept.	Financial Analyst and Emergency Response Officer	☐ Yes ☐ No	
Ms.	Katherine	AufderHeide	Congressman Marion Berry's Office	Community Development Liaison	☑ Yes ☐ No	Katherine AufderHeide
Mr.	Brian	Blake	Central U.S. Earthquake Consortium (CUSEC)	Earthquake Program Manager	☑ Yes ☐ No	
Mr.	J.T.	Cantrell	Pulaski Co. OEM	Deputy Director	☑ Yes ☐ No	
Mr.	Betty Ruth	Davis	U.S. Senator Blanche Lincoln's Office	Community Affairs Specialist	☑ Yes ☐ No	Betty Ruth Davis
Capt.	Steve	Gentry	US Navy (SC)	USN Emergency Preparedness Liaison Officer	☑ Yes ☐ No	
Mr.	Gary	Grimes	Governor's Office	Policy Advisor for EM/HS/LE	☐ Yes ☐ No	
Ms.	Becky	Harrington	Arkansas Insurance Department	Earthquake Analyst	☑ Yes ☐ No	Becky Harrington
Ms.	Emily	Hartman	Arkansas Dept.of Education	Area Planning Manager	☑ Yes ☐ No	Emily L Hartman
— Nathan Spicer			LREm			N.D.S.

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Name			Company	Job Title	RSVP	SIGNATURE
Dr.	Steve	Horton	Center for Earthquake Research and Information	Research Scientist	☑ Yes ☐ No	Stephen Horton
Mr.	David	Johnston	AR Geological Survey	Earthquake Geologist	☑ Yes ☐ No	
Mr.	Ed	Leachman	AR Tech University	Interim Head, Dept of Emer. Admin.and Mgt.	☑ Yes ☐ No	
Mr.	David	Maxwell	ADEM	Director	☑ Yes ☐ No	
Dr.	Natasha	McCallister	US Geological Survey	Geologist II	☑ Yes ☐ No	~~Amanda~~
Ms.	Amanda	Merrill	ADEM	PDM Program Manager	☑ Yes ☐ No	Amanda Merrill
Col.	Richard "Joe"	Moore	AR National Guard	Director of Military Support	☐ Yes ☐ No	
Mr.	Gary	Patterson	Center for Earthquake Research and Information	Director of Education & Outreach	☐ Yes ☑ No	
Ms.	Wendy	Phillips	DHS/ Region VI	Hurricane-Earthquake Program Specialist	☑ Yes ☐ No	Wendy Phillips
Mr.	Jim	Pitcock	U.S. Senator Mark Pryor's Office		☐ Yes ☐ No	

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Name			Company	Job Title	RSVP	SIGNATURE
Mr.	Josh	Rogers	ADEM	Federal Grant Coordinator	☑ Yes ☐ No	
Maj.	Tracy	Saucy	Arkansas National Guard	International Partnership Specialist	☐ Yes ☑ No	
Mr.	Jay	Winters	ADEM	Deputy Director	☑ Yes ☐ No	

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The following are the minutes for the AGEAC and APDMAC meetings held prior to the 2010 update planning process:

GOVERNOR'S EARTHQUAKE ADVISORY COUNCIL
&
ARKANSAS PRE-DISASTER MITIGATION ADVISORY COUNCIL
January 18, 2008

Danny Ormand, ADEM Deputy Director, opened the meeting by thanking everyone for attending and offered all a tour of the new facility at the conclusion of the meeting.

Dr. Jeff Connelly, Vice-Chairman, called the meeting to order. Dr. Connelly called for introductions, approval of the minutes and election of officers. Dan Cicirello had retired from the Council opening the Chairman's position. Scott Ausbrooks was nominated and unanimously approved as Council Chairman, Dr. Connelly was re-elected as Vice-Chairman and Veronica Villalobos-Pogue was re-elected as Secretary/Treasurer. Floor was opened for nomination of new members. Nominated and approved for membership were Erica Doerr, Sheila Annable, David Moore, Gary Stephenson, Ltc. Tim Johnson and Col. Frank Williams.

Brian Blake, Earthquake Program Coordinator CUSEC, had a short presentation outlining recent partnership activities within the State of Arkansas. Noteworthy items were a Non-Structural Hazard Mitigation Workshop, support of FEMA 154/ ATC 20 training workshops and provided an update on the New Madrid Catastrophic Planning Initiative. Upcoming activities: coordination of the '08 Earthquake Awareness week activities among the CUSEC member states, 2011 Regional Exercise and the '08 National Conference in Seattle.

Dr. Haydar Al-Shukri, UALR-ACEETT Director, gave a presentation updating the council on the research in Marianna, AR. Results indicate large magnitude earthquakes took place within the study area otherwise unrelated to the New Madrid Seismic Zone. Reassessing and mitigating the seismic risk in the area is strongly recommended; emphasized the need for short period seismometers.

Scott Ausbrooks, AR Geological Survey, the State Survey's involvement and contributions to the recent Catastrophic Planning conferences, exercises and workshops. Introduced Erica Doerr as their new Earthquake Geologist; unveiled drafts of the new Seismicity Maps (Arkansas, NMSZ, Enola swarm in Faulkner County). Discussed the 9/07/07 Harrison Earthquake. NEHRP Soil Amplification Mapping a project to revise the Arkansas portion of CUSEC 1:250,000 NEHRP Soil Amplification Map. Upcoming projects: NE AR mapping project and a new AGS Webpage (Geohazards Portion).

Professor Ed Leachman, AR Tech University, discussed the formation of an Arkansas HAZUS User Group "ARHUG". Provided an overview of HAZUS-MH, benefits of the user group, and the need for a training schedule. Encouraged council members to sign up for more information.

Lt. Lindsey Williams, ASP/State Fire Marshal, updated the council members on the proposed 2007 Edition of the Arkansas Fire Prevention Code it is based on the 2006 Edition of the International Fire Code, the International Building Code (IBC), and the International Residential Code. As in the past, Arkansas changes are being proposed to insure that the 2007 Arkansas Fire Prevention Code adequately addresses concerns unique to Arkansas.

David Maxwell, ADEM Director, gave a state update on recent planning activities. Director Maxwell also gave a brief overview of the FEMA Catastrophic Planning workshops that have already been completed and those coming up. Other items of discussion were the two tabletop earthquake exercises held at the new EOC involving the Governor's office and State agencies; transition to Emergency Support Functions and the revitalization of the Sister County Program.

Veronica Villalobos-Pogue, ADEM Earthquake Program Coordinator, gave an overview of the AR Earthquake Program (hand out was provided) and its activities since the last meeting. Highlighted were the ATC 20/FEMA 154 training workshops; the upcoming 2008 EQ Awareness week activities and the '08 National Earthquake Conference. She introduced Renee Preslar, Public Education Coordinator, who gave an in depth overview of all the planned activities for Earthquake Awareness week and welcomed suggestions. Veronica also went over the newsletter provided by FEMA Region VI as they were unable to send representation to the meeting.

Meeting Adjourned for Lunch

Judge Howell, Clay Co., opened the PDMC meeting and welcomed all. Nominated new members (see GEAC, those elected for GEAC were also elected for PDM). Minutes were reviewed and approved.

Terry Gray, State Hazard Mitigation Officer, discussed the Revised State All Hazard Mitigation Plan which had recently been approved by FEMA. He also introduced Steven Bannick as the new ADEM PDM Program Coordinator.

Steven Bannick, ADEM PDM Program Coordinator, gave an overview of the AR PDM Program and its activities since the last meeting. Provided a brief update on the status of the 2008 PDM-C applications under FEMA review.

Meeting Adjourned

Special meeting of the school subcommittee, members in attendance were:

Dr. Wendi Williams – Chairwoman
Veronica Villalobos-Pogue
Todd Hunter
Col. Frank Williams
Scott Ausbrooks
Erica Doerr

AGEAC/APDMAC
Meeting Minutes
January 22, 2009

Honorable Buddy Villines, Pulaski County Judge, welcomed everyone to Pulaski County.

Scott Ausbrooks, AR GEAC Chairman, opened the meeting by thanking everyone for attending and called the meeting to order.

David Maxwell, ADEM Director, spoke briefly on the federal disasters that occurred in Arkansas last year. He noted that sheltering was an issue, as two hurricanes occurred back to back, and on continuing efforts to find additional shelter resources. He discussed the recent increase in seismic activity and reminded the group that Governor Mike Beebe released $300,000.00 from the General Improvement Fund to start a State Seismic network which would be beneficial to planning efforts. He mentioned that earthquake awareness was gaining more attention. Other agencies are working together to better promote preparedness for the possibility of an earthquake, as an example, the meeting taking place today.

Scott Ausbrooks, GEAC Council Chairman, called for introductions, approval of the minutes and the Chairman's Report. Travis Boyd motioned to accept, Anthony Coy seconded, with unanimous approval. Election of Officers, Veronica Villalobos-Pogue GEAC Secretary/Treasurer, motioned that Scott Ausbrooks and Jeff Connelly remain as Chairman and Vice Chairman, unanimous approval. Membership nominations were then made, Karen Bassett from ADEQ, Bob Lorimer with State Farm, Judge Charles Nix with Poinsett County, Susan Love from IEM, Chris King with USDA, and Dr. Ashraf Elsayed with ASU Jonesboro-motion to accept, it was seconded by Timothy Lee, unanimous approval.

Jim Wilkinson, Executive Director CUSEC, had a presentation outlining the planning activities for the 2011 Bicentennial. Some of these included: Governor Proclamation, media events, museum exhibits, New Madrid earthquake trail that will run through each of the eight states and Regional workshops to be used to increase awareness. Items of importance are NEMA writing a Mitigation White Paper and the resurrecting of NEHRP funds specific to the State Earthquake Programs. He mentioned National level exercise (NLE '11) is set for May 2011 and asked Paul Hogue to speak to the group on this activity.

Paul Hogue, Executive Training Officer CUSEC, planning for the 2011 National level exercise. He gave the group the background to the exercise, how instrumental the exercise officer's working group was, the objectives, and about lack of funding is becoming an issue. This will be a five day event, with three phases that include initial response, extended response and short term recovery. This will help all those participating to be using same timeline and scenarios; there is also discussion about a long term recovery exercise to follow.

Erica Doerr, AR Geological Survey (AGS), updated on their recent outreach activities. The AGS presented Earthquake 101 talks to schools, educators, senior centers, ham radio operators and the Society of Mining Engineers. Additional outreach activities included the Emergency Preparedness fair, earthquake brochures, earthquake post cards and a new website, which features maps and activities for kids. She also provided a recap of the seismic activity that was recently experienced in the Magnet Cove area along with an introduction to the temporary seismic monitoring stations that were installed to further study the area.

Dr. Steve Horton, CERI Research Scientist, presented an overview of temporary monitoring stations that were installed in the Magnet Cove area as a result of the recent seismic activity at the request of the AGS and ADEM. He described the process involved in the deployment and installation of the equipment, the equipment being used and possible deliverables from the information being gathered. The primary purpose is to provide more accurate seismic monitoring, research and to keep the public informed. Once the data has been compiled, it will be analyzed and made available.

David Ross PE, AHTD Staff Geotechnical Engineer, provided information on basic bridge design. He discussed the additional requirements involved when seismic retrofit is considered versus the advantages of building a new bridge with seismic considerations in the design. He stated that it would cost more to retrofit an old bridge than to build a new one.

Veronica Villalobos-Pogue, ADEM Earthquake Program Manager, mentioned the ongoing efforts to complete thirty four county New Madrid Seismic Zone workshops. She provided several handouts, one outlined the Earthquake Program activities since the last meeting, another handout provided information on Earthquake Awareness Week (Feb. 2-6, 2009). FEMA Region VI was unable to attend however a handout was provided with web sites to checkout all different areas of training and information on the earthquake hazard as well as HAZUS-MH.

Meeting Adjourned for Lunch

Judge Howell, Clay County, opened the PDMC meeting, welcomed all. Nominated new members (see GEAC, those elected for GEAC were also elected for PDM). Minutes were reviewed and approved.

Scott Ausbrooks, AR Geological Survey, provided information that six high band stations for earthquake monitoring are to be installed. Three components of this monitoring are notification, scientific research, and public education. Northwest corner of the state has had most seismic activity. The monitors are to be placed throughout the state to provide maximum coverage, as there are fifty-two parks in Arkansas, these locations would be ideal. They are state run, they are secure, long term continuity, electricity, and public outreach (i.e. displays, brochures, web sites, and video).

Richard Howe PE., Structural/Seismic Risk Consultant, provided a presentation on seismic retrofit projects. He discussed the challenges he faced in trying to prepare this information most specifically the need for Seismic mitigation risk project summaries Several states have physical retrofit projects, but FEMA grant programs for seismic risk mitigation are limited. PDM-C funding is earmarked and dwindling. HMGP funding is dependent on declared events and controlled by the state. He also called on the members to share any information on past projects with him in order to compile a comprehensive library.

William Lacey, Arkansas Insurance Department, presented information on the Earthquake Authority Board. Due to the magnitude of costs for the insurer, those with earthquake insurance have had problems with the following; reduced coverage, increased deductibles, or increased coverage costs due to the rise earthquake occurrences. The Earthquake Authority Board can assist in these matters.

Terry Gray, ADEM, State Hazard Mitigation Officer, gave an overview of the AR PDM Program and its activities from last year. Loss of federal funding is going to cause problems for further mitigation. Mitigation was able to fund individuals with a shelter, safe rooms for school children, NOAA weather radios were available, and mitigation funds for counties. Members were asked to contact their congressman to ask that this funding not be downsized when it comes up for a vote in congress. There is a web based application on ADEM web site for PDM-C. The period is from the middle of June to early Feb.

Meeting Adjourned

AGEAC/APDMAC
Meeting Minutes
July 23, 2009

Honorable Jerry McGuire Officially welcomed everyone to Mississippi County. He mentioned that as of July 1, 2009 the 911 Dispatch was separated from the OEM center as it became overwhelming to manage both. David Lendennie is now the 911 Coordinator and Joseph Richmond is now OEM Coordinator.

Scott Ausbrooks, AR GEAC Chairman, welcomed everyone and thanked them for attending. He called for introductions, approval of the minutes and Chairman's Reports. New nominees for membership: Andy Traffanstedt, Pulaski County Coordinator, MSG. Greg White, AR National Guard, and COL. John Kaminar, U.S. Army EPLO. All were accepted unanimously.

Jay Winters, Deputy Director of ADEM, spoke briefly about planning for the National Level Exercise in 2011 and how the state plans to participate. He informed the members that in March the legislation mandating the Arkansas Earthquake Program was amended- as charged by the General Assembly of the State of Arkansas under Arkansas Code § 12-77-103. The amendment did not take away from the program but did provide detailed guidance on the coordination of earthquake awareness as part of an All-hazard Disaster Preparedness Program.

Jim Wilkinson, CUSEC Executive Director, spoke of the upcoming plans for National Level Exercise 2011. CUSEC Exercise Officers' Working Group (made up of all eight CUSEC states) is providing exercise recommendations to the Board of Directors on scenario, timeline, and exercise objectives. Phase II will deal with looking at areas needing improvement in logistics, transportation, health and medicine, along with long term recovery. It was stressed that everyone needs to be on the same plan and timeline. For information contact: Catastrophic Planning, Sheila Annable, ADEM; National Level Exercise, Emily McMickle, ADEM; Bi-Centennial, Veronica Villalobos-Pogue, ADEM; Central U.S. Earthquake Consortium, Jim Wilkinson, and Brian Blake.

Brian Blake, CUSEC Earthquake Program Manager, discussed the upcoming Bi-Centennial of the NMSZ and a possible conference to be held February 2, 2012 in Memphis. He gave an update on the progress of the CUSEC Geocache siting the addition of two more locations one in Kentucky and one in Illinois. Additional information can be found at http://cusec.org/plans-a-programs/outreach-a-education/28-public-outreach/68-cusec-eocache.html. There were three hundred visits to the website to comment on the caches. He

also discussed a new home owner's workshop, "Get Your Home Ready" the first of which is planned for 6:30-8:30 this evening we will discuss earthquake hazards, preparedness, and do it yourself mitigation projects.

Scott Ausbrooks, AR Geological Survey, provided an update on the recent education, information and outreach activities they had been involved in. They recently added a display board which was funded by State Farm. He recapped the earthquake activity since the first of the year: there have been ten earthquakes, 5 were New Madrid and 5 non-New Madrid. He also showed how this activity can be viewed on the AGS website. Dr. Brady Cox, U of A Fayetteville, provided a presentation on "Soil Liquefaction and Its Engineering Effects" an overview of his personal experiences working with GEER (Geo-Engineering Extreme Events Reconnaissance). He demonstrated how liquefaction occurs and explained the different effects it has on different structure types. He presented slides from Turkey and recent catastrophic earthquakes demonstrating the different effects this has on building infrastructure, bridges, dams and transportation. Dr. Cox currently operates a Vibroseis shaker truck (affectionately named 'Hogzilla') as part of his earthquake and dynamic material characterization research throughout the state as well as travelling to Alaska.

Dr. Ashraf Elsayed, Assistant Professor, ASU, discussed shear velocity profiling project in Craighead County. Project objectives are to determine shear wave velocity profiles in several locations throughout the county using simplified equipment, to evaluate the liquefaction potential and develop recommendations for engineers. Future steps include testing three –five more sites, perform liquefaction analysis at sites where geotechnical data is available and liquefaction hazard mapping of Craighead County using shear wave velocity. Would like to extend survey beyond Craighead County and be a part of ongoing mapping.

Dr. Steve Horton, CERI Research Scientist, presented an update on the Arkansas Seismic Network. The seismograph stations will consist of six state-of-the-art seismic stations, this network when completed is designed to monitor earthquake activity across the state. These systems will integrate with the Seismic Station of Cooperative New Madrid Seismic Network (CNMSN) and the Advanced National Seismic System (ANSS). The general plan is for the stations to go in State Parks, the parks will supply internet and sites for stations. Interim stations are being installed at Wooly Hollow, Powhatton and Lake Catherine State Parks. The process involves placing a vault into the ground with a seismic monitor. An equipment box is outside with a solar panel for power and then information can be sent back to the visitor center via internet for all to see. The interim stations are "live & on line" with CERI which ties into the national network.

Myra Jane Biggers, ADEM Natural Hazards Planner, discussed the planning efforts with the thirty-four counties in the NMSZ planning area. One on one workshop's were held to assist counties in completing their earthquake plans, thirty-two of the thirty- four are completed. She emphasized the importance of the one on one discussion and also some of the challenges encountered in bringing everyone together and de-conflicting everyone's expectations. Veronica Villalobos-Pogue, ADEM Earthquake Program Manager, highlighted key activities over the last six months (handout was provided). ADEM Earthquake Program received a State Farm Insurance grant to assist in education and outreach activities. Feedback from council members is needed to carry forward and make things happen (e.g. workshops, meetings, articles) and 2011 Bi-Centennial ideas/suggestions are also needed. Special Guests included: Russell Hall, Senator Pryor's Office, Chris Heigle, Congressman Berry's Office, and Raymond Frazier, Senator Lincoln's Office.

Adjourn for Lunch

Honorable Gary Howell, Clay County Judge, brought the APDMAC meeting to order and gave kudos to all in the recent disaster response efforts.

Veronica Villalobos-Pogue, ADEM Earthquake Program Manager, motioned for the use of e-mails as meeting notification system. This will help cut costs, is environmentally responsible, and for easier/faster access to members. She also reminded the council that any member who missed two consecutive meetings without notice would be dropped from the roster. Motions were accepted unanimously. A second call for membership was made. David Lendennie asked to add Bob Lewis and Janet Davidson with the Red Cross and Richard Griffin with ADEM; all nominees were accepted and approved, new members are also part of the GEAC.

Sue Evers, FEMA Region VII, spoke to the group about a recent earthquake that occurred in Kansas City, on April 18th that was felt in 23 states. She said that severe shaking of river bottoms was another aspect of earthquakes. Discussion on dam safety (which is not well funded), owner liability and regulation for farm ponds was another concern. There is a controversy about whether levees should be shown on flood plain maps. She also discussed a recent meeting in Missouri sponsored by "Quake Smart for Business" there is a strong need for business safety plans. There is an upcoming HAZUS training: August 17-20 in Topeka, Kansas.

Amanda Merrill, ADEM Pre-Disaster Mitigation Program Manager, confirmed that PDM dollars are not going toward planning. Amanda discussed that 30 million dollars are available to revise plans from the ice storm earlier this year. The first six months are for the counties impacted by the disaster. Some of the criteria for a jurisdiction to apply for PDM grant funds is that they be involved with the National Flood Insurance Program and that they submit a Notice of Intent letter to ADEM.

Terry Gray noted that the PDM dollars are dwindling as they are earmarked for other projects. The amount goes down every year.

Amber Styles-Emberson, AR Dept of Information Systems- ACOOP Program, explained that the program is designed to carry out essential functions during and after a disruptive event. They handle all hazards (human resources, cyber events) including crisis management and continuity of operations. ACOOP is available to all state entities, county and school districts. This includes Pandemic Flu planning which began in 2007; participants include 245 state entities, over 1200 planners and more than 750 locations. Arkansas rates in the top ten percent of states in preparedness. Courses are available to help write a plan, and training can be found on the web site http://www.dis.arkansas.gov/security/coop.html

Marion Haynes, AR Archeological Survey, gave directions to the survey tour and field trip. Those who were interested met out in the parking lot.

Meeting Adjourned

AGEAC/APDMAC
Meeting Minutes
July 25, 2008

David Moore, Craighead County OEM Coordinator, opened the meeting by thanking everyone for attending.

Scott Ausbrooks, GEAC Council Chairman, called the meeting to order. Mr. Ausbrooks called for introductions, approval of the minutes and the Chairman's Report. Scott presented an overview of the earthquake at Mt. Carmel on April 18, 2008 showing pictures of damages and impacts, "Felt" reports and the continuing study of data collected. Floor was opened for nomination of new members. Nominated and approved for membership were Bill Lacy, Jeff Puckett, Darlene Tanner, Andy Branton, Scott Stovall and Dr. Brady Cox.

David Maxwell, ADEM Director, gave a state update on recent planning activities. He recognized the passing of Jenny Hancock and her many contributions to earthquake planning and mitigation as well as her many years of service in emergency management. Director Maxwell discussed the many federal disasters our state has endured, partnership with the AR Geological Survey and their proposal for a seismic monitoring network. Activities and events that ADEM will participate in are a Long-Term Recovery Tabletop exercise, continuing Catastrophic Planning workshops with our counties which should lead up to the 2011 National Level Exercise.

Brian Blake, Earthquake Program Coordinator CUSEC, had a short presentation outlining recent partnership activities within the State of Arkansas. Noteworthy items were the Mt. Carmel earthquake serving as a triggering mechanism for the formation of an Illinois Seismic Advisory Task Force, workshops with state Public Information Officers on coordinated messages, hosting a SHMO workshop and provided an update on the New Madrid Catastrophic Planning Initiative. Upcoming activities: coordination of the '09 Earthquake Awareness week activities among the CUSEC member states, launch of geocache sites, and the redesigned CUSEC website.

FEMA Region VI Earthquake Program was unable to attend.

Erica Doerr, AR Geological Survey, the State Survey's involvement and contributions to the recent Catastrophic Planning conferences, exercises and workshops. She unveiled the new Seismicity Map series, NEHRP Soil Amplification Mapping, the new AGS Webpage. Additional projects the Survey had participated in were the installation of seismic arrays, and an outreach grant from State Farm Insurance. Upcoming projects: Earthquake 101 series in conjunction with Town Hall meetings.

Dr. Haydar Al-Shukri, UALR ACEETT, was to present he was unable to attend and Scott Ausbrooks presented for him. We were given an update on the Paleoseismology research in eastern Arkansas. Results indicate large magnitude earthquakes took place within the study area unrelated to the NMSZ. Another topic was the Enola Seismic Array. The Array consists of 7 stations located around a permitted injection well near the epicentral area of the Enola swarm. Any seismic activity will be monitored by UALR and reports will be submitted to the Arkansas Oil and Gas Commission on a regular basis. The stations will be in place and operational by the end of summer of 2008.

Bill Prior, AR Geological Survey, provided a geologic overview of the Fayetteville Shale gas play. Approx. 2.5 million acres leased within Arkansas in a 2.5 year period, As of July 21, 2008 approx. 901 wells drilled and completed. Major players to date: Southwestern Energy, Chesapeake Energy, Hallwood Petroleum, Maverick Oil & Gas and Shell Expl. & Production. Development Challenges: Gas pipeline infrastructure needs expansion, potential for large volumes of fresh water needed for well completions, and disposal wells needed to dispose of frac water.

Scott Stovall, with the University of Memphis, gave a presentation on "Shear Wave Velocity Profiling & Liquefaction Analysis" the project was done in conjunction with the AR State University in Jonesboro for the AR State Highway & Transportation Department. The project objectives were to determine shear wave velocity profiles at 16 specific bridge sites in NE Arkansas, evaluate liquefaction potential, and provide recommendations. Field testing used two non-invasive techniques: Multichannel Spectral Analysis of Surface Waves (MSASW) and Refraction Microtremor (REMi). The study combined both methods for the construction of a composite dispersion curve to be used in the determination of site specific soil velocities. Initial conclusions: bridge sites are expected to experience liquefaction during an AASHTO-based design earthquake event, and liquefaction potential will be in the range of "moderate" to "major" (mostly major). Initial recommendations: perform liquefaction analysis once the field Standard Penetration Testing (SPT) and laboratory data are available, evaluate SF against liquefaction & dynamic settlement, calculate Liquefaction Potential Index (LPI) based on SPT, based on LPI perform non-invasive testing to determine the shear wave velocity and/or site-specific seismic study. For additional project information contact Ashraf Elsayed, Ph.D., P.E. at Arkansas State University Jonesboro. (SF = (CRR7.5/CSR) * MSF)

Lt. Lindsey Williams, ASP/State Fire Marshal, updated the council members on the proposed 2007 Edition of the Arkansas Fire Prevention Code it is based on the 2006 Edition of the International Fire Code, the International Building Code (IBC), and the International Residential Code. As in the past, Arkansas changes are proposed to insure that the 2007 Arkansas Fire Prevention Code adequately addresses concerns unique to Arkansas. Changes to the Arkansas Building Code as of August 1, 2008. The relaxing of seismic requirements that has occurred only applies to certain type occupancies and only if it has been adopted by local ordinance in the locality of the project.

Dr. Brady Cox, University of Arkansas Fayetteville, was introduced and gave a short presentation on geotechnical failures observed in recent earthquakes overseas. Geo-Engineering Earthquake Reconnaissance Turning Disaster into Knowledge deploys teams of researchers and practitioners to study the geo-engineering affects of large earthquakes around the world. Notable events shown on his slides were the Pisco, Peru and the Iwate-Miyage, Japan earthquakes. Bringing it home: large earthquakes induce widespread and varied destruction, secondary effects can be significant (disruption to infrastructure), full recovery from a large earthquake can literally take years, each large earthquake seems to have a signature, the signature of a large NMSZ earthquake will likely be widespread soil liquefaction and deep soil amplification of low-frequency seismic waves.

Veronica Villalobos-Pogue, ADEM Earthquake Program Coordinator, gave an overview of the AR Earthquake Program (hand out was provided) and its activities since the last meeting. Highlighted were the ATC 20/FEMA 154 training workshops; the 2008 EQ Awareness week activities, the '08 National Earthquake Conference and a recent opportunity to visit Guatemala and learn about their earthquake programs and planning initiatives. Upcoming events: continuing the series of ATC 20/FEMA 154 training workshops for 2008-2009,

welcomed suggestions and participants for 2009 Earthquake Awareness week and the State's possible participation in the 2011 National Level Exercise based on a NMSZ event.

Meeting Adjourned for Lunch

Judge Howell, Clay Co., opened the PDMC meeting, welcomed all and the Chairman's Report. He provided an overview of all the disasters experienced in his area and all of the assistance provided by ADEM and FEMA representatives. Nominated new members (see GEAC, those elected for GEAC were also elected for PDM). Minutes were reviewed and approved.

David Rivas, FEMA Region VI HMA, provided a presentation on a Unified Hazard Mitigation Assistance Program (hand out was provided). He went over the various programs/grants covered along with some examples of critical infrastructure projects being funded.

Richard Howe, Structural/Seismic Risk Consultant, provided a presentation on "Seismic Risk Assessment and Risk Mitigation Decision-Making". General concepts: identifying and quantifying seismic risk, establishing and assessing seismic risk mitigation options in the broad context of Business Continuity Planning for private sector or Continuity of Operations Planning for public sector and the importance of Master Planning. In summary Risk assessment and risk mitigation performed in context of BIA/COOP and master planning provides a documented, rational basis for effective decision-making purposes relative to Seismic Risk Mitigation.

Jay Clevenger, Liberty Bank of Arkansas, provided the group with an overview of the Arkansas Bankers Coalition for Disasters and Emergencies (ABCDE). The Coalitions mission is to ensure that financial services are available to the citizens of Arkansas in the event of a disaster or emergency, while ensuring the safety of bank staff through partnerships between federal, state, and local entities. An example of the coordination amongst banks-Tornado of February 5, 2008 in Highland, with Liberty Bank and Pulaski Bank providing financial services to those in the affected area.

Bill Lacy, AR Insurance Department, presented an overview of the Arkansas State Disaster Insurance Coalition. The Coalition plan strives to provide a timely and comprehensive response from the insurance industry in the aftermath of a disaster impacting Arkansas while not impeding the work of emergency personnel and law enforcement officials. This was put to the test by the many disasters that plagued our State. The AID worked with the top fifteen (15) Arkansas property and casualty insurers requesting damage assessment information and compiling a comprehensive report on the damages by county and storm system.

Steven Bannick, ADEM PDM Program Coordinator, gave an overview of the AR PDM Program and its activities since the last meeting. Provided a brief update on the status of the 2008 PDM-C applications under FEMA review.

Meeting Adjourned

Agency Correspondence…Public Declaration

In addition to sub-committee meetings, planning team members communicated via the ADEM web page and via email. Below are some examples of official correspondence within the HMP Sub-Committee and the mitigation community at large during the most recent plan update initiative.

Correspondence ADEM and AR Department Directors

STATE OF ARKANSAS

DEPARTMENT OF EMERGENCY MANAGEMENT

To: State of Arkansas Department Directors

From: Director of ADEM

Re: Revision of the State Hazard Mitigation Plan

The State of Arkansas Department of Emergency Management is working on a major revision of the current All Hazards Mitigation Plan. The purpose of this project is:

1. Identify and gather data on State owned and operated properties (Locations, values, elevations, etc.)

2. Use this data to refine the State Risk Assessment and perform an Impact Analysis for each identified hazard. Provide improved HAZUS runs for the thirteen Earthquake counties in Northeast Arkansas.

3. Review the past, current, and future mitigation strategies and projects for each identified hazard and compile this into an overall, prioritized mitigation strategy.

4. Improve the Earthquake Annex with the addition of the new data.

Bold Planning Solutions has been contracted for this project. Mr. Fulton Wold is the project manager. Your department may be contracted by ADEM staff or Mr. Wold. I am requesting that you respond by providing any information they may need. Any data deemed sensitive will not be published and will be protected as required by law. If you have any questions, please contract Terry Gray the State Hazard Mitigation Officer at 501-683-6724.

Thank you for your assistance.

SAMPLE

_____

Director of Arkansas Department of Emergency Management

Agency Correspondence Internet Correspondence

Web Page Announcement from FEMA
***Address**: http://www.fema.gov/plan/prevent/hazus/hz_news.shtm#4*

Bold Planning Solutions: A Private Sector Initiative Success Story

The goal of FEMA's Private Sector Initiative is to recruit and train GIS professionals from businesses large and small who can then provide HAZUS-MH training and technical assistance to a wide range of customers.

One of the success stories of the PSI initiative is Florida-based Bold Planning Solutions. Immediately after the company became a PSI vendor in 2006, two significant HAZUS projects were launched:

1. GIS Inventory Enhancement: Collier County, Florida.
2. Use of HAZUS to develop the Arkansas Hazard Mitigation Plan.

The Collier County project involves the incorporation of HAZUS "Level II" data into the countywide GIS inventory. In close collaboration with the county's GIS department and Property Appraiser's office, Bold Planning Solutions replaced HAZUS-MH default inventory data with updated data (including demographic, essential facilities, General Building Stock). By incorporating the most up-to-date local GIS information into HAZUS-MH, Collier County is now able to produce more detailed modeling results which better reflect the effects of a disaster event on this rapidly developing jurisdiction.

Earthquakes are the focus of the Arkansas project, which includes on-site verification of building inventory data for 1,300 "high value" state facilities. Bold Planning Solutions used the enhanced inventory for a comprehensive risk assessment and revision of the State of Arkansas Natural Hazard Mitigation Plan, with emphasis on earthquakes.

For more information about the Collier County and State of Arkansas HAZUS-MH projects, please contact Chad Bowers of Bold Planning Solutions at (941) 497-3110 or email info@BoldPlanning.com.

Web Page Announcement for January 20th, 2010 Planning Team Meeting

STATE OF ARKANSAS
DEPARTMENT OF EMERGENCY MANAGEMENT

BUILDING #9501
CAMP JOSEPH T. ROBINSON
NORTH LITTLE ROCK, ARKANSAS 72199-9600
(501) 683-6700
FAX (501) 683-7890
www.adem.arkansas.gov

MIKE BEEBE
GOVERNOR

DAVID MAXWELL
DIRECTOR

January 21, 2010

Mr. Fulton Wold
President
Bold Planning Solutions
179 Belle Forest Circle, Suite 203
Nashville, TN 37221

Re: Arkansas State Hazard Mitigation Plan Revision Public Meeting Announcement
HMGP-DR-1751

Dear Mr. Wold:

On January 20, 2010, as part of the Governor's Pre-Disaster Mitigation Advisory Council and meeting, members of the public were invited to attend and comment. The public invitation was posted on the Arkansas Department of Emergency Management Agency's website from January 6-20, 2010. Please find enclosed a copy of the webpage displaying the public notice. No comments were received at the meeting,

If you should have any questions, please contact me.

Sincerely,

Terry Gray
State Hazard Mitigation Officer
Mitigation Branch Manager

Enclosures

TG:am

ARKANSAS
Department of Emergency Management
PORTAL

Exercise | Planning | Grants | HazMat | Mitigation | SAR | SHSGP | Training | Library | Reporting

HMGP | FMA | RFC | SRL | PDM-C | ARHMGP | LINKS | APPLICATION DOCUMENTS

Mitigation Branch

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters.

Nothing can stop disasters from occurring, but Mitigation is a way for communities to lessen the effects of disasters by reinforcing existing structures or building new ones stronger and better than before.

In Arkansas, various Mitigation programs have brought millions of dollars to communities to prevent loss of lives and property.

Pictures
Approved Hazard Mitigation Plans
March 2008 Shelter Initiative
Grant Programs Fact Sheet

Arkansas Department of Emergency Management
Camp Joseph T. Robinson
Building #9501
North Little Rock, AR 72199
(501) 683-6700
Fax (501) 683-7890

To contact us:

Terry Gray
State Hazard Mitigation Officer
Amanda Merrill
PDM Coordinator
Josh Rogers
Federal Grants Coordinator

Bonnie Arnold
State Mitigation Grant Coordinator

Marmaduke, AR. April 8, 2006 -- The remnants of a classroom are exposed to the elements as a result of a tornado that struck this northeast Arkansas community on April 2, 2006 and tore the roof off a section of the school. This community of 1100 residents had damages to nearly 90 percent of its residential and business structures. FEMA/Win Henderson

Public Announcement

The Arkansas Department of Emergency Management will hold the first planning meeting to revise the Arkansas State Hazard Mitigation Plan at the upcoming Governor's Earthquake Advisory Council conference at the Arkansas Electric Cooperative Corp., 1 Cooperative Way in Little Rock on January 20, 2010 at 1:00 pm. Public attendance and comment are welcome.

Participation from the Arkansas Geographic Information Office

The Arkansas Geographic Information Office played a vital role in the overall planning initiative for the Arkansas All-Hazards Mitigation Plan three-year update. Learon Dalby served as the Geographic Information Office Liaison and is a member of the Arkansas Pre-Disaster Mitigation Advisory Council. Correspondence with Mr. Dalby and the Geographic Information Office included the following:

- December 8, 2006: Attended mitigation plan revision “kick-off” meeting. Agreed to provide all available requested GIS data for analysis studies.
- January 1, 2007: Provided planning team with access to GEOSTOR data portal.
- February 8, 2007: Reviewed and accepted GIS data from field collection team.
- March 27, 2007: Verified latest census data for loss estimations in mitigation plan update (Version 3).
- April 3, 2007: Provided planning team with State of Arkansas school campus estimated building cost data.
- March 9, 2010: Provided planning team with requested GIS information pertaining to flooding.

Mr. Dalby and the Arkansas Geographic Information Office’s participation in the planning process are greatly appreciated. Loss estimates and vulnerability analysis figures can only be updated as new data is provided.

Participation from the Arkansas Information Technology Office

The Arkansas Information Technology Office worked closely with the planning team. Mrs. Mary Henthorn provided Arkansas state-owned and operated critical facility data for use in the GIS field collection project. Estimated building cost valuations were also reviewed and collated by Mrs. Henthorn. 400 facilities deemed "critical" were provided through various agencies continuity of operation plans.

Participation from the Arkansas State Police Department

The Arkansas State Police Department provided important information to the mitigation planning team. Lieutenant Lindsey Williams provided detailed data on Arkansas fire prevention code. This fire prevention code consists of three volumes:

1. Volume 1, Fire Code — *Based on International Fire Code*
2. Volume 2, Building Code — *Based on International Building Code*
3. Volume 3, Residential Code — *Based on International Residential Code*

Lieutenant Lindsey Williams is an active member of the Arkansas Pre-Disaster Mitigation Advisory Council. He is also the department head of the Arkansas State Fire Marshal's Office. He provides the mitigation planning team information on updates to building codes throughout the state. He also uses data from mitigation planning goals and objectives to help drive proposed fire prevention code changes in Arkansas.

Additional Planning Process Opportunities

In addition to the planning sub-committee, plan input from the general public and other interested parties occurred during public forums in April and July of 2007. Public notices were posted on the ADEM website along with notices in the local paper to invite public and private planning participation opportunities as well as mitigation plan review.

The Arkansas Mitigation Planning Team encourages a hands-on approach from state-wide private, public, and non-profit entities in its State of Arkansas All-Hazard Plan revision initiatives. Three tools currently used to solicit input include:

1. ADEM Website
2. Pre-Disaster Mitigation Advisory Council Meetings
3. Local Paper announcements of Mitigation Advisory Council Meetings

ADEM WEBSITE INFORMATION

The ADEM website is a valuable tool in the public process. ADEM uses the website to broadcast important press releases, educational literature, as well as significant events.

The public is welcomed to access the ADEM website at http://www.adem.arkansas.gov

The ADEM website gives the general public an in-depth overview of ADEM. This comprehensive website is vital in addressing the need to disseminate Emergency Management information to the public. Arkansas citizens can also download important documents such as assistance requests and event reporting templates. Recent ADEM press releases are posted to the website on a weekly basis. This gives the public the opportunity to review disaster information and agency progress over time. The ADEM website posts all public meeting invitations. The latest version on the Arkansas All-Hazard Mitigation Plan (Version 4) is available for download on the website for public review and comment twenty-four hours a day.

PRE-DISASTER MITIGATION ADVISORY COUNCIL MEETING INFORMATION

The ADEM Pre-Disaster Mitigation Advisory Council was formed in 2004. This Council currently lists eighty-one active members. The Advisory Council meets bi-annually to discuss and review Arkansas Mitigation Strategies. Participation includes non-profits, as well as public and private sector members. The meeting is usually attended by the Arkansas State Director of Emergency Management. This position is currently held by Mr. Terry Gray. Also, an outline of the ADEM Mitigation Department funding options is given. HMGP and PDM are two topics covered by the Mitigation Department representative. Current versions of the Arkansas All-Hazard Mitigation Plan are referenced along with all recent planning process initiatives. Public participation and feedback is encouraged throughout this process.

3.2 Coordination Among Agencies

Coordination Among Agencies	
IFR REQUIREMENT *201.4(b):*	The [State] mitigation planning process **should** include coordination with other State agencies, appropriate Federal agencies, interested groups, and ….
Explanation:	In order to encourage States to develop plans that will be used as guides for statewide mitigation activities, and for citizens and the private sector to support such activities, the Rule recommends States demonstrate coordination with all levels of government, and representatives from the private and non-profit sectors. The plans *should* describe how the State interacted with Federal, State, regional, and local agencies, as well as other interested parties such as business, industry, and professional associations, non-profit groups, and community representatives in the development of the plan. Of particular importance is the participation by agencies and groups that can contribute resources to prepare the plan and by agencies that will likely implement mitigation actions. By including these agencies in the planning process, the State can build partnerships that will facilitate the implementation phase of the plan. Merely contacting agencies to solicit input or sending a draft plan for an agency to review does not constitute active participation. Participants *should* play an active role throughout the planning process and, whenever possible, be involved from the beginning. The State *should* identify additional participants as opportunities arise (e.g., after a disaster). Examples of how coordination may be demonstrated: • Description of outreach efforts to engage interested parties. • Description of the types and frequency of meetings of task forces and committees, inter-disciplinary/inter-agency mitigation planning teams, or with interested agencies and private sector organizations. • Discussion of the nature of the Memoranda of Understanding (MOU) or other work agreements. Description of how interested parties who could not participate on a regular basis were kept informed and how they provided comments.
Plan Update	The updated plan *should* describe how the State interacted with all levels of government as indicated above. It *should* also describe how coordination among agencies changed since approval of the previous plan.

The Hazard Mitigation Planning Sub-Committee coordinated the development of the mitigation plan with all state departments, appropriate federal organizations, and local government. The sub-committee also solicited participation from appropriate industry associations, volunteer agencies, and other private and non-profit sector representatives. Over 100 agencies, associations, and/or representatives were contacted to participate in this planning effort. Approximately 40 agencies, associations, and representatives responded.

In order to increase cooperation at the state level, the governor's office issued an executive order that was signed on August 4th, 2004 (see Section 1.2) ordering state offices, agencies, departments, and commissions to integrate mitigation measures in future planning initiatives

and to coordinate these efforts with ADEM and the State Mitigation Plan. It is expected that this executive order will result in increased and more productive future coordination with state entities. In addition to the executive order, a letter from the director of ADEM to all state agency directors was sent in November of 2005 announcing the second phase of the mitigation plan development and requested cooperation and involvement of their members.

Several agencies have committed significant time and resources to assist in the development of a mitigation strategy. The agencies contributing resources and implementing mitigation measures during this mitigation planning process, along with their designated responsibilities, are listed in the table below:

The following table lists the agencies involved in the 2010 plan update and their contributions to the 2010 plan update process.

Table 3.2-1: Agencies Contributions for 2010 update process

Agency	Designated Responsibility
Arkansas Geological Commission	To provide resources and information concerning geological hazards such as landslides, earthquakes, and subsidence.
Arkansas Forestry Commission	To provide resources and information concerning wildfire hazards within the state.
Arkansas Highway and Transportation Department	To provide data on state transportation infrastructure and landslide hazards throughout the state.
Arkansas Insurance Department	To provide data on all state-owned and state-leased buildings in Arkansas.
Arkansas Governor's Earthquake Advisory Council (GEAC or AGEAC)	To provide information on seismic safety for the state, retrofitting projects for schools and hospitals, school safe rooms, information on rebates for adding safe rooms to private homes, and how to have a disaster resistant community. The council created the Hazard Mitigation Planning Sub-Committee, the formation of the Disaster Resistant Home Coalition, and the formation of the Pre-Disaster Mitigation Advisory Council. Also, members of the GEAC are also valuable members of the APDMAC and the State Hazard Mitigation Planning Team for this plan.
Arkansas Geographic Information Office (AGIO)	To provide statewide GIS data and technical support. To work collaboratively with ADEM and the Arkansas Building Authority (ABA) implementing a process whereby strategic state assets, such as buildings, can be accurately mapped and maintained within the electronic databases maintained by the ABA.
Arkansas Building Authority (ABA)	To provide statewide building data. To work collaboratively with ADEM and the Arkansas Geographic Information Office implementing a process whereby state buildings can be accurately mapped and maintained within the electronic databases maintained by the ABA.
Arkansas Natural Resources Commission	To provide information on flood hazards, flood insurance, and dam-failure hazards statewide.

National Weather Service, Little Rock Office	To provide resources and data concerning atmospheric hazards that may affect the state including tornadoes, severe winter weather, drought, and flooding.
Arkansas Department of Emergency Management/Extension of Homeland Security	To provide resources, data, and information on hazardous materials, terrorism event initiatives, and mitigation projects statewide.
Arkansas Department of Health and Human Services	To provide information and resources related to any types of biological hazards including emergency plans for mass casualty events from other natural or man-made hazards. Their participation includes bioterrorism planning, disease surveillance, and containment response. The division is also the lead agency for information related to the Arkansas One Nuclear Facility.
Arkansas Livestock and Poultry Commission	To provide resources and data concerning hazards related to the animal populations in the state. The focus is on the bird populations in relation to the current Avian Flu alerts and also on cattle with respect to Mad Cow and Foot and Mouth Disease.
Arkansas Archeological Survey	To provide information and resources related to the historical and cultural sites and objects throughout the state. The focus is on protecting these unique sites and objects from destruction by hazards and from subsequent looting after events. This organization is the lead agency working in conjunction with the Department of Arkansas Heritage and the State Parks and Tourism Department.
US Army – Pine Bluff Arsenal	To provide resources, data, and information on hazardous material hazards, terrorism event initiatives, and mitigation projects statewide related to this CSEP facility.
Center for Disease Control	To provide resources, data, and information on national public health initiatives including Avian Flu, Anthrax, West Nile Virus, Influenza, and other outbreak concerns.
Department of Homeland Security	To provide resources, data, and information on homeland security issues and to coordinate with FEMA regarding natural disasters and to provide feedback on HAZUS program advances.
US Department of Agriculture	To provide resources, data, and information regarding animal and plant health and surveillance. This department and specifically the Animal and Plant Health Inspection Service (APHIS) program are responsible for the federal strategy related to Swine Flu, Avian Flu, Mad Cow and Foot and Mouth disease.
Arkansas State Police (Fire Marshals Office)	To provide the mitigation planning team updates to the Arkansas Fire Prevention Code.
Arkansas Information Technology Office	To provide critical facility information and review GIS data collected for HAZUS analysis.

Local Coordination

As part of this overall planning effort, the HMP Sub-Committee worked in conjunction with local emergency management agencies. Local Mitigation Plans are required of each county and related jurisdiction and ADEM has provided technical expertise, tools, and funding to these jurisdictions for the development of these plans under the DMA 2000. Local planning efforts were considered during this statewide planning process and this coordination resulted in the inclusion of local loss estimates and local mitigation strategies. Over five local Arkansas Offices of Emergency Management County Directors serve on the State of Arkansas Pre-Disaster Mitigation Advisory Council. These local directors review current Arkansas Mitigation objectives as well as provide a local insight for “best practices” across the state. During the current revision of the Arkansas All-Hazard Mitigation Plan (Version 4), local FEMA approved mitigation plans were compared and collated to form overall goals and objectives for the state.

Local DMA 2000 compliant plans include the following jurisdictions in the State of Arkansas:

- Arkansas County
- Ashley County
- Benton County
- Bradley County
- Calhoun County
- Chicot County
- Clark County
- Clay County
- Cleburne County
- Cleveland County
- Columbia County
- Conway County
- Craighead County
- Crawford County
- Crittenden County
- Cross County
- Dallas County
- Desha County
- Drew County
- Faulkner County
- City of Foreman
- Franklin County
- Fulton County
- Garland County
- Grant County
- Hempstead County
- Hot Spring County
- Howard County
- Independence County
- Jackson County
- Jefferson County

- Johnson County
- Lafayette County
- Lawrence County
- Lincoln County
- Little Rock
- Logan County
- Lonoke County
- Marmaduke School District
- City of Mena
- Monroe County
- Montgomery County
- Miller County
- Mississippi County
- City of Mountain View
- North Little Rock
- Ouachita County
- Perry County
- Phillips County - pending adoption
- Pope County
- Poinsett County
- Pike County
- Prairie County
- Pulaski County
- Saline County
- Scott County
- Sebastian County
- Sevier County
- Sharp County
- St. Francis County
- Union County
- Washington County
- White County
- Woodruff County

As more local mitigation plans become FEMA approved throughout the State of Arkansas, they will also be compared and collated into future plan revisions.

Summary of Federal and State Coordination Improvements since initial FEMA approved State of Arkansas Mitigation Plan

The first version of the State of Arkansas Mitigation Plan to be approved by FEMA was completed in 2004. This plan is referred to as (Version 1). Since the inception and approval of the plan (Version 1), the Arkansas Mitigation Planning Team has made significant strides in not only updating the data in the plan, but also strengthening the context. Since October of 2004, the Arkansas Mitigation Planning Team has completed two additional planning initiatives. The plan was updated in 2006 (Version 2) to follow EMAP criteria and encourage broader agency participation. The plan was updated again in 2008 (Version 3) and the current revision (Version 4) in 2010. The plan's current update process was initiated to meet

FEMA's three-year revision requirement listed in DMA 2000. The EMAP revision (Version 2) included the following Federal and State Agency coordination improvements since the original Natural Hazards Only Mitigation Plan.

1. *Higher agency participation number:* State agencies' representatives participated in a web-based questionnaire that determined agency-based risk assessment. The data in this questionnaire was collated and added to the mitigation strategies section of the Arkansas All-Hazards Mitigation Plan (Version 2). The Governors cabinet reviewed and participated in the emergency management planning process. National Guard members were very helpful in the information gathering phase of Version 2 and Version 3.
2. *Diverse agency participation:* State agencies such as CSEPP and Radiological Departments were referenced in-depth as they are experts in man-made hazard vulnerability across the State of Arkansas. Public Health officials joined in the planning process. Public and private sector participation is evident in the planning team listing.
3. *EMAP assessment team participation:* Peers from leading Emergency Management Associations reviewed in detail data from the original FEMA approved State of Arkansas Natural Hazard Mitigation Plan. All recommended revisions were completed by the planning team to form Version 2.
4. *DHS direct participation:* The Department of Homeland Security participated in the process of adding man-made and technological hazards into the mitigation plan. All DHS participation is documented throughout the updated plan. DHS guidelines were followed at each step of the planning process. Since ADEM has merged to become a part of the Department of Homeland Security, this participation will grow stronger over time.

The 2007 State of Arkansas All-Hazards Mitigation Plan revision (Version 3) included additional federal and state agency coordination improvements since the original Natural Hazards Only Mitigation Plan (Version 1) as well as the All-Hazards Mitigation Plan (Version 2). They are listed below.

1. *Continued Advisory Council Review:* The Arkansas Pre-Disaster Mitigation Advisory Council continues to review and steer state priorities in accordance with current mitigation plan goals and objectives. The Advisory Council was briefed and updated on all plan maintenance items. Feedback was encouraged.
2. *Local Plan Integration:* The Arkansas All-Hazard Mitigation Plan (Version 3) incorporates data from county and city mitigation plans into a collate vulnerability assessment.
3. *State Agency Review:* Each lead Arkansas State agency that participated in the previous two planning initiatives were contacted to review and update pertinent data.
4. *Federal DHS Participation:* The federal branch of the Homeland Security Department added vital input for HAZUS analysis.
5. *GIS Agency Participation:* Field teams were dispersed throughout each county in Arkansas to collect state-owned and operated facility data. This data is vital for accurate risk assessment calculations. Continuity of Operations Plans were reviewed by the Arkansas Technology Office to verify critical facilities were assessed in the GIS collection initiative. The Arkansas Geographic Information Office also played a vital role in data review.

The All Hazards Mitigation Plan 2010 Update (Version 4) includes the following coordination improvements since the 2007 plan revision:

1. *Continued Advisory Council Review:* The Arkansas Pre-Disaster Mitigation Advisory Council continues to review and steer state priorities in accordance with current state mitigation plan goals and objectives. The Advisory Council was briefed and updated on all plan maintenance items. Feedback was encouraged.
2. *Local Plan Integration:* The Arkansas All-Hazard Mitigation Plan (Version 4) incorporates data from county and city mitigation plans into a collated vulnerability assessment. ADEM was contacted to obtain all of the Local Mitigation Plans for integration purposes.
3. *Repetitive Loss Data:* Incorporate severe repetitive loss information for the state. This includes types and numbers of repetitive loss properties.
4. *Updated Flood Maps:* Through contact with the Arkansas Natural Resource Commission, the planning team was able to present maps of the map modification progress across the state.

3.3 Integration with Other Planning Efforts

Integration With Other Planning Efforts	
IFR REQUIREMENT *201.4(b):*	The Standard State Plan should be integrated to the extent possible with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives.
Explanation:	Coordination can result in identifying opportunities to integrate planning efforts and mitigation actions. FEMA has found that mitigation plan implementation is most effective when States integrate mitigation planning efforts with those of other State planning programs and initiatives. States might demonstrate that they have made efforts at integration by: • Reviewing existing plans and reports to identify opportunities to integrate mitigation actions. • Having mitigation planners/specialists serve on other State program and planning teams. • Consolidating the planning requirements for all State mitigation programs (e.g., HMGP, FMA, CRS, local comprehensive plans, and land use plans). • Identifying overall goals or priorities common to other State planning efforts. • Requesting that legislation be passed or issuing an Executive Order mandating integration of mitigation actions into other planning initiatives. • Outlining the State's approach and providing a timeline for integrating actions. Describing actual ongoing efforts where mitigation actions have been integrated into planning mechanisms (e.g., comprehensive plans, capital improvement plans, and emergency operation plans) and implementation tools (e.g., building codes, floodplain ordinances, and land use regulations).

The Hazard Mitigation Planning Sub-Committee contacted all state agencies and other relevant agencies and organizations. They reviewed all known agencies' plans to identify programs and policies that currently promote or could potentially further mitigation initiatives around the state. This State Mitigation Plan considers and is congruent with all of the identified plans, programs, and policies listed on the following pages.

Source: FEMA

Arkansas Pre-Disaster Mitigation Advisory Council (APDMAC): The Arkansas Pre-Disaster Mitigation Advisory Council (APDMAC) provides the same services to the Pre-Disaster Mitigation Program as the Governor's Earthquake Advisory Council provides to the Earthquake Program except it addresses all hazards. The council members include all of the Governor's Earthquake Advisory Council. It was originally formed to support the Project Impact Program in 1999. We had four Project Impact communities in Arkansas: Clay County, Arkadelphia, Tuckerman, and West Memphis. Each of these communities had its own Project Impact Coordinator and they were added to the council. Pulaski County was to be the next Project Impact community but the program was eliminated and Pre-Disaster Mitigation replaced it. The Pulaski County Emergency Management Coordinator, Kathy Botsford, was voted on as a member.

Arkansas Citizens' Advisory Commission (Pine Bluff Arsenal): The Arkansas Citizens' Advisory Commission provides a vital link between the Pine Bluff community and the Army by providing a forum for exchanging information about chemical weapons disposal. It exists to represent community interests. The Arkansas Citizens' Advisory Commission meets with a representative of the Secretary of the Army at monthly public meetings to discuss the Chemical Stockpile Disposal Project, its impact on Arkansas and the Pine Bluff community, and the interests of the public.

The Citizens' Advisory Commission consists of eleven members—nine are members of the community at large and two are state officials. Governor Huckabee, at his discretion, appointed each member of the Citizens' Advisory Commission to serve an unlimited term. Although the Arkansas Citizens' Advisory Commission receives limited federal funding from the Department of Defense, it operates independently from Army influence.

Emergency Management Five-Year Strategic Plan: ADEM has developed a strategic plan to guide the department over the next five years as a blueprint for improving services and capabilities. This plan relates to goals, objectives, and action items for preparedness, response, recovery, and mitigation. This plan is constantly monitored and updated to meet the changing federal initiatives and any current high priority disaster-related issues.

Arkansas Emergency Operations Plan: ADEM has developed a comprehensive Emergency Operations Plan (EOP) that is the state's primary document for response and recovery. This document details all of the supporting departments and agencies and their designated responsibilities in meeting emergency support functions during an actual event. This plan is a cornerstone of the state's preparedness effort and has been used as a primary document throughout the mitigation planning process.

Arkansas Disaster Resistant Home Coalition: The Arkansas Disaster Resistant Home Coalition was formed in 2002. The Coalition is made up of federal, state and local government officials along with private sector entities. Its purpose is to encourage homebuilders and homebuyers to build and purchase only all-hazard disaster resistant homes in Arkansas.

Arkansas Natural Resources Commission (ANRC) Floodplain Management Program: The purpose of the Floodplain Management Program is to promote the public health, safety, and general welfare of the state and to minimize public and private losses due to flood conditions. The authority for this program is Act 629 of 1969. This act, as amended, authorizes cities, towns, counties, and the Arkansas Soil and Water Conservation Commission (ASWCC), where necessary, to enact and enforce land use measures which will prevent and alleviate flood hazards and losses in flood-prone areas of the state, in addition to other purposes. This act was essential to allow communities to participate in the National Flood Insurance Program (NFIP) established in 1968. Areas of responsibility for the Floodplain Management Program include state coordination for the NFIP, administration of the Community Assistance Program's State Services Support Element Grant provided by the NFIP, and providing general information and assistance apart from the NFIP. Duties of the Floodplain Management Section include: 1) Visiting communities participating in the NFIP to provide general and technical assistance; 2) Conducting training and educational workshops; 3) Providing information to the public regarding the NFIP and floodplain management; and 4) Providing assistance for mitigation during the recovery phase of a disaster operation.

Arkansas Natural Resources Commission Dam Safety Program: The purpose of the Dam Safety Program is to provide for the comprehensive regulation and supervision of dams for the protection of the health, safety, and welfare of the citizens of Arkansas. The program assures proper planning, design, construction, maintenance, monitoring, and supervision of dams, including such preventive measures necessary to provide an adequate margin of safety. The authority for this program is Subchapter 2 of Chapter 22 of Title 15 of the Arkansas Code of 1987, as amended, which authorizes the Arkansas Natural Resources Commission to develop and enforce rules and regulations governing the design and operation of dams in the state. The duties of the Dam Safety Section include: 1) Reviewing applications for permits to assure that proper safety standards are met; 2) Issuing permits to construct and operate a dam in the state; 3) Inspecting dams under state jurisdiction; 4) Providing information and education to dam owners and the public; 5) Overseeing the development and implementation of emergency action plans for high hazard dams; 6) Responding to dam emergencies; 7) Maintaining a database and files on dams in the state; and 8) Collecting annual permit fees.

Arkansas Forestry Commission's Arkansas FireWise Program: The goal of the FireWise program is to spread FireWise information throughout Arkansas, helping Arkansans help themselves become more FireWise and fire-safe in the wild land/urban interface areas. FireWise is a cooperative effort among federal, state, and private agencies and organizations to promote fire safety in the wild land/urban interface. The primary FireWise tenet is that it is unnecessary to lose homes or other buildings to wildfires if those homes or buildings are built and maintained according to simple FireWise principles. Currently 106 communities in Arkansas participate in the FireWise program.

National Weather Service StormReady Program: StormReady is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather from tornadoes to tsunamis. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations. To be officially StormReady, a community must: 1) Establish a 24 warning point and emergency operations center; 2) Have more than one way to receive severe weather warnings and forecasts and to alert the public; 3) Create a system that monitors weather conditions locally; 4) Promote the importance of public readiness through community seminars; and 5) Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises. Currently six communities in Arkansas participate in the StormReady program.

Arkansas Earthquake Program: The Arkansas Department of Emergency Management, under the authority granted by Act 247 of 1989, works to ensure the safety and well-being of citizens from the risks associated with earthquakes within or near the State of Arkansas. The Earthquake Program carries out this mandate in a number of program areas. The law places emphasis on earthquake mitigation, preparedness, response and recovery related functions, requiring the full cooperation of all other state and local government agencies, departments, and personnel. The program is required to coordinate comparable functions of the federal government, including its various departments and agencies with other states and localities, and with private agencies of every type.

County Emergency Management Programs: Each county in the state has an Area Coordinator responsible for the overall Emergency Management program. One of the high priorities for each of these coordinators is the development of their local mitigation plan for compliance with the DMA 2000. Part of the overall statewide mitigation strategy and plan development process is the incorporation of this local information; specifically the local loss estimates and local mitigation projects are to be integrated into this State Mitigation Plan.

FEMA's National Mitigation Strategy: In response to the unacceptable loss of life and property from recent disasters, and the prospect of even greater catastrophic loss in the future, the National Mitigation Strategy has been developed to provide a conceptual framework to reduce these losses. The strategy is intended to engender a fundamental change in the general public's perception about hazard risk and mitigation of that risk, and to demonstrate that mitigation is often the most cost-effective and environmentally sound approach to reducing losses. The overall long-term goal of the strategy is to substantially increase public awareness of natural hazard risk and to significantly reduce the risk of loss of life, injuries, economic costs, and the disruption of families and communities caused by natural hazards. The foundation of the strategy is the development of partnerships that empower all Americans to fulfill their responsibility for ensuring safer communities. This

strategy must be implemented in partnership with state and local governments and private sector constituents, including, and most especially, the general public.

U.S. Geological Survey National Landslide Mitigation Strategy: This plan outlines key elements of a comprehensive and effective national strategy for reducing losses from landslides nationwide, including activities at the national, state, and local levels, in both the public and private sectors. The strategy envisions a society that is fully aware of landslide hazards and routinely takes action to reduce both the risks and costs associated with those hazards. The long-term mission of a comprehensive landslide hazard mitigation strategy is to provide and encourage the use of scientific information, maps, methodology, and guidance for emergency management, land-use planning and development and implementation of public and private policy to reduce losses from landslides and other ground failure hazards nationwide. The ten-year goal is to substantially reduce the risks of loss of life, injuries, economic costs and destruction of natural and cultural resources that result from landslides and other ground failure hazards.

Earthquake Vulnerability of Transportation Systems in the Central United State: Transportation systems in the Central US are vulnerable to the effects of a damaging earthquake in the New Madrid seismic zone. In an effort to increase awareness of the earthquake risk in the Central US, and specifically the vulnerability of transportation systems, the U.S. Department of Transportation collaborated with the Central U.S. Earthquake Consortium (CUSEC) to prepare a monograph. Emergency transportation planning is an important element in CUSEC's long-term plan to reduce the earthquake risk in the Central US. In this regard, the Consortium has worked closely with the U.S. Department of Transportation on several projects and training activities to address the vulnerability of transportation systems in the New Madrid earthquake zone, and measures that can be taken to advance mitigation, response and recovery planning. This plan is available on the CUSEC website.

The New Madrid Housing Recovery Initiative Plan: A FEMA/CUSEC/American Red Cross Project: A New Madrid Housing Recovery Working Group was organized under the auspices of the Central U.S. Earthquake Consortium (CUSEC) in 1998 with representation from the four federal regions, state and local governments from the seven member states in the Consortium, and the American Red Cross because of its role as lead agency for Emergency Support Function 6 (Mass Care) in the Federal Response Plan. The task of the working group was to develop a multi-year plan for developing a strategy which could be useful to decision makers and service providers in addressing the basic shelter and housing needs of potentially thousands of disaster victims displaced from their residences as a result of a major earthquake in the Central US. This plan is available on the CUSEC website.

National Flood Insurance Program's (NFIP) Community Rating System (CRS): The NFIP CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities which exceed the minimum NFIP requirements. Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community actions meeting the three goals of the CRS: (1) Reduce flood losses; (2) Facilitate accurate insurance rating; and (3) Promote the awareness of flood insurance. Each community has prepared a flood mitigation plan and has received funding for flood mitigation projects. Details are presented in the flood hazard section.

Arkansas Governor's Earthquake Advisory Council (GEAC or AGEAC): Governor Bill Clinton's Proclamation in December of 1984 formed the Governor's Earthquake Advisory Council (AGEAC). It meets twice a year; the summer meeting, usually in June or July, is held in eastern Arkansas. The winter meeting is held in Little Rock on the anniversary date of the earthquake on Dec. 16, 1811 in Marked Tree, Arkansas. If the 16th falls on a Saturday or Sunday the meeting is scheduled on Friday the 15th or Monday the 17th respectively. The careers and professions of its members reflect the Councils' cross-sectional representation. These members are volunteers.

The Council consists of members who have provided a great deal of leverage to the Arkansas Department of Emergency Management. Most contributions have been of no cost to the agency. The members work to achieve seismic and mitigation program implementation in the state.

The Arkansas Legislature enacted two laws written and fostered by GEAC members: (1) in 1989, Act 247 established a state earthquake program within the Arkansas Office of Emergency Services, requiring the full cooperation of all state and local agencies, and (2) in 1991, Act 1100, as amended by Act 1485 (1999), required earthquake resistant design for all public structures and set penalties for non-compliance. Act 136 (1999), which appropriated $125,000/yr. for the Arkansas Center for Earthquake Education and Technology Transfer at the University of Arkansas at Little Rock, also originated from the GEAC.

In previous years (pre-1990) the council provided time and efforts in making earthquake preparedness/mitigation through presentations to groups and interviews on radio and television. They also provided financing for printed earthquake preparedness materials beyond what FEMA could provide. Today, the group functions largely as a forum for sharing ideas and information, networking of professionals, lobbying for legislative changes, searching for programs and funds, and planning. Current activities include the promotion of seismic safety for the state, retrofit projects in schools and hospitals, school safe rooms, rebates for adding safe rooms to private homes, the promotion of disaster resistant communities, the creation of the Hazard Mitigation Planning Sub-Committee, the formation of the Disaster Resistant Home Coalition, and the formation of the Pre-Disaster Mitigation Advisory Council.

Arkansas Regulatory Partnership Program: The Arkansas Regulatory Partnership Program is a cooperative effort among 19 Arkansas pipeline and gas companies and the Arkansas One-Call Center. Its role is to address the first responder, public official, and excavator audiences as indicated by DOT (1162).

Chemical Stockpile Emergency Preparedness Program (CSEPP): The Chemical Stockpile Emergency Preparedness Program (CSEPP) is a unique partnership between FEMA and the U.S. Army, combining FEMA's long-standing experience in preparing for and dealing with all types of emergencies, and the U.S. Army's role as custodian of the U.S. chemical stockpile. Since 1988, FEMA and the U.S. Army have assisted communities surrounding the eight chemical stockpile sites to enhance their abilities to respond in the unlikely event of a chemical agent emergency. The success of CSEPP initiatives depend on the productive working partnerships among federal, state, and local jurisdictions involved in the program.

Arkansas One-Call: The Arkansas One-Call Center was established in 1978, in central Arkansas, and expanded to be statewide in 1981. It was created to provide an easy way for excavators to notify multiple utilities before digging with just one free phone call. The mission of Arkansas One-Call is to protect the public and prevent damages from accidents involving underground facilities. Arkansas One Call strives to: (1) Provide the best possible notification service at the lowest cost to an underground facility operator in the State of Arkansas; (2) To aggressively promote, through advertising and all other possible means, the practice of "call before you dig" among excavators because advance notice remains the single most productive step which can be taken to prevent damage; (3) To conduct education and training programs for companies, organizations and individuals involved in the excavation business, particularly focusing on those with a record of repeated damage and/or violations of the law; (4) To promote improved communications and coordination among utilities, excavators, governmental agencies, contract locators, and all others involved in the excavation and damage prevention processes; and (5) To promote the use of technology on the One-Call Center and among its constituencies that can help implement these programs more efficiently and effectively.

National Fire Protection Association: The goal of the NFPA is to reduce the burden of fire and other hazards on the quality of life by providing research, training, and education, and advocating consensus on codes and standards worldwide. NFPA membership totals more than 79 thousand individuals globally and more than 80 national trade and professional organizations. Established in 1896, NFPA serves as the world's leading advocate for fire prevention and is an authoritative source on public safety. In fact, the 300 NFPA codes and standards influence every building, process, service, design, and installation in the United States, as well as many of those used in other countries.

GeoStor: Initiated in late 1998 as a two-year research project (Seamless Warehouse of Arkansas Geodata), GeoStor, an internet accessible data warehouse that delivers geographic data, was funded by the Governor’s Telecommunications and Technology Infrastructure Fund. Under the direction of Ms. Susan Cromwell, the Department of Information Services, Office of Information Technology, administered the project and provided guidance and direction throughout the initiative. The objective of this research was to create an internet accessible database or warehouse that could deliver geographic data suitable for use in a range of geographic information systems, to the desktop machines in state agencies, local government offices, and to teachers and students in K-12 educational settings throughout the state.

Emergency Management Accreditation Program: The Emergency Management Accreditation Program (EMAP) is the voluntary assessment and accreditation process for state and local government programs responsible for coordinating prevention, mitigation, preparedness, response and recovery activities for disasters, whether natural or human-caused. Accreditation is based on compliance with collaboratively developed national standards for emergency preparedness, the EMAP Standard. EMAP, as an independent, non-profit organization, fosters excellence and accountability in emergency management and homeland security programs by establishing credible standards applied in a peer review accreditation process.

National Incident Management System (NIMS): The Federal Department of Homeland Security has developed the NIMS system as the integrated standard for emergency planning. The State of Arkansas has officially adopted the NIMS system and is continually

implementing this program within state agencies and with local jurisdictions. The State of Arkansas is integrating all emergency management and homeland security resources to comply with this federal initiative.

Buffer Zone Protection Program: The Buffer Zone Protection Program provides both funding and coordination in bringing federal, state and local levels of government, law enforcement and the private sector together to create buffer zone plans to reduce vulnerabilities in areas surrounding critical infrastructure and key resources. The Buffer Zone Protection Program (BZPP) provides targeted funding through states to local jurisdictions to purchase equipment that will extend the zone of protection beyond the gates of these critical facilities. In 2009, the U.S. Department of Homeland Security announced $48 million in grant funding to protect and secure areas surrounding critical infrastructure and key resource sites such as chemical facilities, dams, and nuclear plants across the country.

Arkansas Hazardous Materials Emergency Response Commission (SERC): The commission's priorities are to supervise and coordinate the activities of the Local Emergency Planning Committees (LEPC) in each of the emergency planning districts making sure: (1) That plans in each district are adequately developed, maintained and exercised to ensure an effective response to accidents and incidents involving hazardous materials; and (2) That the emergency response plans, along with the pertaining information, are accessible for review by the general public.

Transportation Community Awareness Emergency Response (TRANSCAER): TRANSCAER is a voluntary national outreach effort that focuses on assisting communities to prepare for and respond to a possible hazardous material transportation incident. TRANSCAER members consist of volunteer representatives from the chemical manufacturing, transportation, distribution, and emergency response industries, as well as the government. The mission for Arkansas TRANSCAER program is to promote safe transportation and handling of hazardous materials by river, rail and highway, educate our communities to safely handle hazardous materials, and help provide education and training for our emergency responders regarding the safe handling of hazardous materials.

National Strategy for Pandemic Influenza: In November 2005, President Bush outlined this important national strategy and the State of Arkansas has considered this planning effort and incorporated it into the statewide public health emergency planning. This coordination between the federal and the state government is part of an on-going effort to protect the population from a variety of health risks.

Central Arkansas Veterans Healthcare System – Bioterrorism Readiness Plan: As part of the HMP Sub-Committee's efforts to coordinate with other agencies, the team has considered this plan. This plan contains operations information for this organization for responding to potential outbreaks.

Arkansas Animal Disease Emergency Response Plan: This plan was originally developed in 1998 and has been constantly maintained and was most recently updated in 2006. The AADER Committee is primarily composed of members of the Arkansas Livestock and Poultry Commission and the Veterinarian Services. These would be the lead agencies for any events involving, Avian Flu, Mad Cow Disease or Foot and Mouth Disease. This existing planning effort is being incorporated into the state's mitigation strategies for biological hazards.

The Arkansas State Disaster Insurance Coalition Plan: The Arkansas State Disaster Insurance Coalition is a public-private team of individuals and businesses which; through a formal, detailed disaster plan, ensure that citizens of Arkansas will always receive the best possible services when disasters occur in the state. The plan – called the Arkansas State Disaster Insurance Coalition Plan – is a comprehensive contingency plan that facilitates a timely and comprehensive response from the insurance industry in the aftermath of a disaster event impacting the state. This plan was originally developed in 2002 and was recently updated and promulgated in December of 2008. ADEM is a lead partner in this coordinated planning effort.

The Center for Disease Control Emergency Planning: As part of the federal government's bioterrorism planning efforts, the CDC has developed detailed emergency plans for smallpox and other pandemic hazards. These federal plans are implemented through state and local government public health agencies. This coordination is an important part of the state's overall strategy regarding biological hazards. The CDC provides significant grant funding to the state's Department of Health and Human Services for bioterrorism planning and response. The state has also considered the Model State Emergency Health Powers Act that was distributed by the CDC for discussion at the state and local levels.

Arkansas Influenza Pandemic Plan: This plan has been a continuing effort since 1999 with the most recent update completed in January 2008. This plan is maintained by the Department of Health Human Services and has information about response, surveillance, vaccines, and other health issues.

Federal Animal Disease Risk Assessment, Prevention and Control Act of 2001 – Final Report: This report was issued in 2003 and is a primary element of the state's emergency planning for animal pandemics. This coordination is managed by the Arkansas Livestock and Poultry Commission. Animal disease outbreaks, and especially the Avian Flu, are a major concern for Arkansas, so this coordinated effort with the USDA and the APHIS program has a high priority.

Arkansas Fire Prevention Code: This planning process includes the current building codes for the State of Arkansas. Updated by the State Fire Marshals Office, this document references "best practices" for building disaster resistant structures. Documentation included in the Fire Prevention Code is used when establishing the overall state-wide mitigation goals and objectives.

Arkansas COOP Planning Initiative: The State of Arkansas is currently building and updating Continuity of Operations Plans (COOP Plans) for vital state locations and functions. These plans are monitored and collated by the State of Arkansas Information Technology Office. All COOP plans were referenced to provide critical facility data used in risk assessment and vulnerability assessment calculations in the current plan revision (Version 4).

CUSEC Earthquake Awareness Week

Each year in late January and in February, several CUSEC States participate in joint efforts to raise the level of earthquake awareness in the central United States. Activities include things such as Press Conferences, Governor's Proclamations, Town Hall Meetings, Exhibits, Earthquake related training, and much more. In 2009, States holding Earthquake Awareness Activities include Arkansas, Kentucky, Mississippi, Missouri, and Tennessee.

For more detailed information, contact your State Earthquake Program Manager or CUSEC for more information.

New Madrid Catastrophic Planning Initiative

Launched in 2006, the mission of the New Madrid Seismic Zone Catastrophic Planning Project is to increase national readiness for a catastrophic earthquake in the New Madrid Seismic Zone (NMSZ). This multi-year, multi-agency initiative is the largest planning effort ever undertaken in United States History. Specifically, national readiness will be increased by developing a series of annexes or supplements to existing base plans for response and recovery to a series of major earthquakes in the NMSZ and integrating them into a single document with federal, regional, tribal, state, and local components. Additionally, the mission is to identify any issues that can not be resolved based on current capabilities and to propose recommended courses of action for decision makers involved in this project. The project is expected to culminate in 2011 with a series of major command exercises, coinciding with the 200th Anniversary of the 1811-1812 earthquakes. The geology in the central U.S. is particularly vulnerable to earthquake shaking, and potential damage is more widespread than other earthquake-prone areas of the U.S. The series of earthquakes with the greatest magnitude in the area was in 1811-1812 (4 major quakes within 3 months, ranging from approximately 7.0 to 8.0 in magnitude.). Impact to national infrastructure will compound the problem - getting supplies and relief to survivors will be exceptionally challenging. CUSEC, the **Mid-America Earthquake Center** (MAEC), the **United States Geological Survey** (USGS) and **FEMA** have completed preliminary planning scenarios of potential impacts of an earthquake in the NMSZ. The estimated total building loss in the area from one quake alone could exceed $70 Billion. Recently, in September 2008, a **comprehensive report from the MAE Center** was released that details several different catastrophic earthquake scenarios for a major earthquake in the central U.S. The NMSZ Catastrophic Planning Project will serve to accomplish the following three main objectives:

1. Improve response to a catastrophic earthquake and related hazards in the NMSZ
2. Plan for a coordinated response and recovery effort among Federal, State, and local agencies
3. Incorporate lessons from the Hurricane Katrina response, the Southeast Louisiana Catastrophic Hurricane Plan, and previous earthquakes

All Hazard Mitigation Plan
State of Arkansas

Chapter 2 – Hazard Profile

Updated September 2, 2010

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Section 4: Risk Assessment

The risk assessment for the State of Arkansas Hazard Mitigation Plan provides the factual basis for developing a mitigation strategy for the state. This section profiles the natural, man-made, and technological hazards that impact the state, determines which jurisdictions and populations are most vulnerable to each hazard, and estimates potential losses of state facilities for each hazard.

This risk assessment was originally developed as part of the first version of the State Hazard Mitigation Plan in 2004. This risk assessment along with the entire plan was subsequently reviewed and approved by FEMA to meet the state's requirements under DMA 2000. This first version only included natural hazards that impact the State of Arkansas. Arkansas Department of Emergency Management contracted for the revision of this plan in 2005-2006. This revision resulted in Version 2 of the State Hazard Mitigation Plan and focused on the addition of man-made and technological hazards as well as improvements necessary for the Emergency Management Accreditation Program (EMAP).

In 2009, the Arkansas Department of Emergency Management began the process of revising this plan to meet the FEMA requirements for a three-year update and review the criteria of DMA 2000. This risk assessment has been updated and enhanced as part of the overall revision of the plan. The Hazard Mitigation Planning Sub-Committee has thoroughly reviewed all of the identified hazards and their respective profiles. Significant research has been conducted for each hazard and the following list provides the primary sources and methodologies for this update:

- Declared Events: All federal and state declared events were researched and considered for this risk assessment. A number of events occurred between 2005 and 2009 and all of these have been added into this section. Research includes: geographic extent, number of occurrences, and importantly the estimated damages and losses associated with the event.
- National Climatic Data Center: This center maintains an on-going database of all natural hazard events with dates, locations, and estimated damages. This web-based portal was used to further refine the hazard profiles with additional data about events and their locations. This database records all events, not just the major ones that are declared events; therefore, this source significantly helps to update the various profiles.
- FEMA Approved Local Mitigation Plans: Arkansas currently has 62 local mitigation plans that have been reviewed and approved by FEMA. These local plans have been analyzed by the HMP Sub-Committee for inclusion in this hazard profile. Each local profile has been considered and included in the state risk assessment when appropriate.
- HMP Sub-Committee Feedback: The planning team has been intimately involved in this update process. Various members of this team have been contacted throughout this process to provide feedback and data about the individual hazards. This personalized data have been used to further refine this overall risk assessment.
- Internet Research: Throughout this update process, the internet and other research tools have been used. The focus of this research centered on historical events, detailed event descriptions and financial information.

This risk assessment has been completely updated with current information to augment the previous assessments. The HMP Sub-Committee has reviewed this section and the additional information related to Version 4 of this plan. This risk assessment is the most current and detailed hazard analysis for the State of Arkansas at this time. For the 2010 update, the planning team decided that one straight forward methodology for determining the probability of future events would help improve the functionality of the plan. This methodology can be found below. As new events occur or these profiles change, the Sub-Committee will continue to update this assessment in order to better understand the hazards in the state. As this risk assessment is continually updated, this information will be used to further refine the current state mitigation strategies.

The probability of future events ratings for each hazard is quantified as follows:

Probability	
4 - Highly Likely	Event is probable within the calendar year. Event has up to 1 in 1 year chance of occurring (1/1=100%). History of events is greater than 33% likely per year. Event is "Highly Likely" to occur.
3 - Likely	Event is probable within the next three years. Event has up to 1 in 3 years chance of occurring (1/3=33%). History of events is greater than 20% but less than or equal to 33% likely per year. Event is "Likely" to occur.
2 - Possible	Event is probable within the next five years. Event has up to 1 in 5 years chance of occurring (1/5=20%). History of events is greater than 10% but less than or equal to 20% likely per year. Event could "Possibly" occur.
1 - Unlikely	Event is possible within the next 10 years. Event has up to 1 in 10 years chance of occurring (1/10=10%). History of events is less than or equal to 10% likely per year. Event is "Unlikely" but is possible of occurring.

4.1 Identifying Hazards

Identifying Hazards	
IFR REQUIREMENT *201.4(c)(2)(i):*	[The State risk assessment shall include an] overview of the type … of all natural hazards that can affect the State … .
Explanation:	A State hazard mitigation plan will only be effective if it accounts for all sources of risk. The intent of this requirement is to insure that all hazards potentially affecting the State are identified. During the State's planning process (as evaluated in the Planning Process section of this document), it may be determined that some of these hazard types do not pose a significant enough threat to justify further study or the identification of corresponding mitigation actions. However, the mitigation plan ***should*** clearly document that a thorough and comprehensive identification of hazards was performed by the State, including the fact that certain hazards were deemed not to be significant enough to warrant further study, to receive a satisfactory score for this requirement. This section ***should*** include a description of how the State collected the information to identify these hazards, including the sources of information. This process *should* also include incorporating the results of local level mitigation planning efforts to identify hazards as that information becomes available.
Update	The updated plan **must** address any newly identified hazards or hazards that have been determined to pose a more significant threat than was apparent when the previously approved plan was prepared. If improved descriptions of hazards identified in the previous plan are available, they **must** be incorporated into this section.

- The Hazard Mitigation Planning Sub-Committee pursued the following steps to identify any and all hazards that may affect the state as part of the original plan development process:

Discussions and correspondence with experts in the community and state, including the Arkansas Geological Commission, the National Weather Service, the Arkansas Natural Resources Commission, the Arkansas Department of Emergency Management, the Arkansas Department of Health and Human Services, the Arkansas Livestock and Poultry Commission, the Arkansas Forestry Commission, the Governor's Earthquake Advisory Council, the Arkansas Pre-Disaster Mitigation Advisory Committee, the Arkansas Highway and Transportation Department, and University of Arkansas researchers.

- Review of available local mitigation plans.
- Research of internet websites.
- Research of newspapers and other historical records.
- Review of past state and federal disaster designations.

As a result of the research described above, the Hazard Mitigation Planning Sub-Committee determined that the State Mitigation Plan needed to address the risks associated with the following hazards:

- Tornadoes
- Flooding (Riverine, Flash, and Dam Failure)
- Severe Winter Weather
- Earthquakes
- Thunderstorms (including Straight-line Winds)
- Wildfires
- Landslides
- Expansive Soils
- Droughts
- Severe Thunderstorm includes Lightning and Hail Hazards

The HMP Sub-Committee considered the overall hazard list for the state as part of the revision for Version 2 of this plan. The Sub-Committee agreed that a number of man-made and technological hazards needed to be addressed as well. The following hazards were added to the hazard profile section as part of this initial revision:

- Hazardous Materials Events (transported and fixed site)
- Nuclear Events
- Terrorism
- Biological Events

As part of the 2007 revision for the FEMA three-year update, the HMP Sub-Committee once again considered the overall hazard list and discussed the identification of additional hazards for inclusion in this plan. The Sub-Committee researched all existing hazards in Arkansas through the following methods:

- Interviews with subject-matter experts and university staff
- Review of ADEM historical data about hazard events
- NCDC data about natural hazards
- Review of local plans and discussion with local emergency planning staff

Based on all of this research, the Sub-Committee determined that the current list of hazards is adequate and that no new hazards pose a significant risk to the state. The profiles for each hazard have been updated by the Sub-Committee; however, no new event types are being added or profiled.

As part of the 2010 revision for the FEMA three-year update, the HMP Sub-Committee once again considered the overall hazard list and discussed the identification of additional hazards for inclusion in this plan. The Sub-Committee determined that no new hazards would be included.

A list of past presidential disaster declarations was prepared as part of the original planning effort. This table has been subsequently updated for events from 2007-2010 and is shown below in Table 4.1-1.

A list of the identified hazards, including how and why they were identified, is provided in Tables 4.1-2 and 4.1-3.

Table 4.1-1: Natural Hazards Resulted in Presidential Disaster Declarations in Arkansas Since 1972: Historical man-made and technological events can be found in their designated sections.

Designation	Date Declared	Incident Type
FEMA-321-DR	1/27/72	Severe Storms and Flooding
FEMA-375-DR	4/27/73	Severe Storms and Flooding
FEMA-389-DR	5/29/73	Severe Storms and Flooding
FEMA-435-DR	5/31/74	Heavy Rains and Flooding
FEMA-437-DR	6/8/74	Severe Storms and Flooding
FEMA-463-DR	4/1/75	Severe Storms and Tornadoes
FEMA-471-DR	6/7/75	Heavy Rains and Flooding
FEMA-498-DR	4/1/76	Tornadoes
FEMA-564-DR	9/15/78	Severe Storms and Flooding
FEMA-574-DR	4/11/79	Tornado
FEMA-617-DR	4/16/80	Severe Storms and Tornadoes
FEMA-673-DR	12/13/82	Severe Storms, Tornadoes and Flooding
FEMA-688-DR	8/1/83	Severe Storms and Flooding
FEMA-806-DR	12/17/87	Tornadoes
FEMA-807-DR	12/31/87	Severe Storms and Flooding
FEMA-817-DR	12/23/88	Severe Storms and Tornadoes
FEMA-865-DR	5/15/90	Severe Storms and Flooding
FEMA-907-DR	5/30/91	Severe Storms and Flooding
FEMA-950-DR	7/24/92	Severe Thunderstorms
FEMA-1011-DR	2/28/94	Severe Winter Ice Storm
FEMA-1111-DR	4/23/96	Severe Storms and Tornadoes
FEMA-1162-DR	3/2/97	Severe Storms and Tornadoes
FEMA-1176-DR	4/14/97	Flooding, Severe Storms

FEMA-1266-DR	1/23/99	Tornadoes
FEMA-1354-DR	12/29/00	Winter Storm
FEMA-1363-DR	3/13/01	Storms and Flooding
FEMA-1400-DR	1/24/02	Severe Storms and Flooding
FEMA-1450-DR	1/6/03	Ice Storm
FEMA-1472-DR	6/6/03	Severe Storms, Tornadoes and Flooding
FEMA-1516-DR	5/7/04	Severe Storms, Flooding, and Landslides
FEMA-1528-DR	6/30/04	Severe Storm, Flooding
FEMA-1636-DR	4/12/06	Severe Strom, Tornadoes
FEMA-1744-DR	02/07/08	Severe Storms, Tornadoes, and Flooding
FEMA-1751-DR	03/26/08	Severe Storms, Flooding, and Tornadoes
FEMA-1758-DR	05/20/08	Severe Storms, Flooding, and Tornadoes
FEMA-1793-DR	09/18/08	Severe Storms and Flooding Associated With Hurricane Gustav
FEMA-1804-DR	10/22/08	Tropical Storm Ike
FEMA-1819-DR	02/02/09	Severe Winter Storm
FEMA-1834-DR	04/27/09	Severe Storms and Tornadoes
FEMA-1845-DR	06/16/09	Severe Storms, Tornadoes, and Flooding
FEMA-1851-DR	12/03/09	Severe Storms, Tornadoes, and Flooding
FEMA-1872-DR	02/04/10	Severe Storms and Flooding

Along with these declared events, the HMP Sub-Committee has decided to include the following Emergency Declarations to further enhance this risk assessment. A special note is the 2005 event related to Hurricane Katrina.

Year	Date	Disaster Types	Disaster Number
2009	01/28	Severe Winter Storm	3301
2005	09/02	Hurricane Katrina	3215
2000	12/28	Severe Winter Storm	3159
1998	04/24	Severe Storms, Tornadoes and Flooding	3125
1982	04/23	Severe Storms and Tornadoes	3085
1978	04/22	Tornadoes	3062
1978	01/26	Tornadoes	3054
1976	12/03	Drought	3019
1974	09/14	Power Failure	3003

Table 4.1-2: Natural Hazards Identified in Arkansas.

Hazard	How Identified	Why Identified
Tornadoes	• Review of past disaster declarations. • Review of National Climatic Data Center (NCDC) Severe Storms Database. • National Weather Service input and data. • Public input including newspapers and media.	• Arkansas experiences a tornado nearly every year. • Tornadoes have caused extensive damage and loss of life to county residents. • Most recent federally declared disaster event in Arkansas was a severe storm with tornadoes.
Flooding (Riverine, Flash, and Dam-Failure)	• Review of past disaster declarations. • Review of Federal Flood Insurance Rate Maps (FIRM's). • Input from state floodplain manager. • Identification of NFIP repetitive loss properties in the state. • Coordination with the Army Corp of Engineers regarding dams and levees.	• Arkansas is affected by flooding nearly every year. • Floods have caused extensive damage and loss of life in the state in the past. • Arkansas has extensive mileage of waterways through the state, including the Mississippi River along the entire eastern border.
Severe Winter Storms	• Review of past disaster declarations. • Review of NCDC Severe Storms Database. • National Weather Service input and data. • Public input including newspapers and media.	• Arkansas is affected by severe winter storms nearly every year. • Recent severe ice storms caused extensive damage and shut down parts of the state for weeks. • Three federally declared winter storms in the last 15 years.
Straight-line Winds	• Review of NCDC Severe Storms Database. • National Weather Service input and data. • Public input including newspapers and media.	• Arkansas experiences damaging severe straight-line wind events annually. • Some events have caused significant damage to structures and loss of life. • Though often related to tornadoes, straight line winds are a different hazard to be profiled.
Wildfires	• Arkansas Forestry Commission statistics and input. • USDA Forest Service Fire, fuel and WUI mapping. • Input from ADEM about wildfires and the EOC activation. • Public input including newspapers and media.	• Arkansas experiences wildfires every year. • Development in much of the state is occurring at the Wildland-Urban Interface (WUI). • Cyclical drought patterns result in increases of brush and other dry materials. This increases the overall risk for significant fires.
Earthquakes	• Central United States Earthquake Consortium. • United States Geological Survey (USGS) PGA and other hazard maps. • Arkansas Geological Commission data.	• Although earthquakes have not caused significant damage in recent history, repeat or historical earthquakes, such as the 1811-1812 series would be devastating to the state. • Entire state lies within >2% g on USGS PGA map.

	• University of Arkansas at Little Rock research. • Historical reports.	• Potential for catastrophic damages as a result of seismic activity. • Entire northeast sector of the state is vulnerable.
Landslides	• USGS Landslide Hazard maps. • Input from Arkansas Geological Commission. • Local geology and topography. • Input from the Arkansas Highway and Transportation Department (AHTD).	• Parts of Arkansas lie within the high landslide susceptibility zone on National USGS map. • Costly landslides have occurred in the past in the state. • Landslides near highways and roads occur and cause automobile accidents and road clean-up costs.
Expansive Soils	• USGS swelling clays of the conterminous US map. • Input from the Arkansas Geological Commission. • Input from the Arkansas Highway and Transportation Department (AHTD).	• Although not well known to the general public because damage occurs slowly and is rarely spectacular, over half of the state may have expansive soils. • Mitigation measures in road construction often taken by AHTD.
Drought	• National Weather Service data. • National Oceanographic and Atmospheric Association (NOAA) paleoclimatology data. • Agricultural community throughout the state.	• A past emergency declaration in the state for drought. • Drought has a severe economic impact on the state due to the large amounts of agriculture and livestock.
Thunderstorms/Lightning & Hail	• Arkansas Climatological Survey • Democratic Gazette Archives • National Weather Service • Storm Prediction Center	• Arkansas experiences a high number of thunderstorms each year along with damaging lightning and hail.

Table 4.1-3: Man-Made and Technological Hazards Identified in Arkansas.

Hazard	How Identified	Why Identified
Hazardous Materials Release	• Review of past events. • Review of past EPA databases detailing events. • Tier II database, EPA Superfund database. • Public input including newspapers and media.	• Arkansas experiences a hazardous materials event of some magnitude every year. • Hazardous material events have caused extensive damage and loss of life to residents of Arkansas. • Hazardous material events receive high levels of publicity to the state.
Nuclear	• Discussion with the state departments involved in the management of the Arkansas Nuclear One reactor. • Review of past nuclear events worldwide.	• Arkansas has a nuclear facility within the state boundaries. • Nuclear events have caused damage and loss of life worldwide in the past. • Analysis of the past event at Three-Mile Island and the short and long term ramifications.
Terrorism	• Coordination with the policies of the US Department of Homeland Security. • Review of past terrorist disasters. • Continual interaction with the law enforcement agencies throughout	• Arkansas, like all states, is prone to a terrorist attack. • Terrorism, like the events of 9/11, caused extensive damage and loss of life in the past. • With the on-going War on Terror in Iraq

	the state. • Public input.	and Afghanistan, this hazard remains a high-level threat to the country and to the citizens of Arkansas.
Biological	• Coordination with the Department of Health and Human Services – Public Health Preparedness Program. • Review of biological events worldwide. • Information from the CDC. • Public Input.	• Arkansas, like all states is prone to a biological attack. • Naturally occurring diseases affect the population annually. • Arkansas's economy relies heavily on the poultry industry, which is prone to the Avian Flu or other biological events. • Pine Bluff Arsenal is located within Arkansas and contains massive quantities of biological agents used for warfare. • Pandemic flu planning is a high priority for the federal government, the CDC, and the Arkansas Dept of Health and Human Services.

4.2 Profiling Hazard Events

Profiling Hazards	
IFR REQUIREMENT *201.4(c)(2)(i):*	[The risk assessment shall include an] overview of the location of all natural hazards that can affect the State, including information on previous occurrences of hazard events as well as the probability of future hazard events, using maps where appropriate.
Explanation:	The plan **shall** provide an overview of the **location** of all natural hazards that can affect the State. The plan *should* describe the geographic boundaries in the State that would be affected by these hazards. Where appropriate, the hazard analysis *should* also broadly identify on a map the areas of the State affected by each hazard, noting those areas most severely affected by each hazard. A composite map (i.e., a map showing combined information from different thematic map layers) can be provided for hazards that have a recognizable geographic boundary (i.e., hazards that are known to occur in particular areas of the State), such as floods, coastal storms, wildfires, tsunamis, and landslides. For those hazards that are not geographically determined, plans *should* indicate their probable intensity. For example, for areas where tornadoes occur, plans should indicate the recorded intensities of previous events. The plan **shall** also provide a discussion of **past hazard events**. This discussion *should* include: Information on the damages that occurred (e.g., costs of recovery, property damage, and lives lost) to the extent practicable. Level of severity (i.e., flood depth or extent, wind speeds, earthquake intensity). Duration of event. Date of occurrence. Sources of information used or consulted for assembling a history of past occurrences. The plan **shall** also include information on the **probability** of future hazard events. In addition, it *should* describe the analysis or sources used to determine the probability and their magnitudes. The plan *should* also describe conditions (i.e., topography, soil characteristics, meteorological conditions, etc.) in the planning area that mitigate the hazard effects or make the area more vulnerable to hazards.
Update	The plan update **must** continue to include occurrences of hazards profiled in the previous plan, and discuss new occurrences of hazard events. The updated plan **must** incorporate any new studies or technical information related to profiling hazards, such as new National Flood Insurance Program maps or studies, HAZUS studies, or reports from other Federal or State agencies that relate to: • Location of natural hazards; • Past hazard events; • Probability of future hazard events. While maps are not required, any maps included in the updated plan **must** be consistent with the updated information.

4.2.1 Tornado Hazard Profile

This tornado profile was developed in the original plan, amended in the previous update, and modified again in 2010. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to tornadoes.

The State of Arkansas experienced 840 recorded tornadoes in the last 14 years. The information about these events is subsequently used to update this assessment in order to get a more precise understanding of the probability and magnitude of these events.

Tornado Profile

A tornado is a rapidly rotating vortex or funnel of air extending from a cumulonimbus cloud to the ground. It is usually spawned by a thunderstorm and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Often, vortices remain suspended in the atmosphere as funnel clouds. When the lower tip of a vortex touches the ground, it becomes a tornado and a force of destruction.

Tornadoes can cause several kinds of damage to buildings. Tornadoes have been known to lift and move objects weighing more than 300 tons a distance of 30 feet, toss homes more than 300 feet from their foundations, and siphon millions of tons of water from water bodies. However, the less spectacular damage is of much more common. Houses and other obstructions in the path of the wind cause the wind to change direction. This change in wind direction increases pressure on parts of the building. The combination of increased pressures and fluctuating wind speeds creates stress on the building that frequently causes connections between building components (e.g., roof, siding, windows, etc.) to fail. Tornadoes also generate a tremendous amount of flying debris or "missiles," which often become airborne shrapnel that causes additional damage. If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, roofs, and walls.

The Fujita Tornado Scale measures tornado-damage severity. The Fujita Scale assigns a numerical value based on wind speeds and categorizes tornadoes from F0 to F5. Scale values above F5 are not used because wind speeds above 318 mph are unlikely.

Table 4.2.1-1 shows an updated and more detailed description of the Fujita Scale values, wind speeds, and damage descriptions.

Table 4.2.1-1: Fujita Tornado Scale

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

2010 Update – Enhanced Fujita Scale

Implemented in place of the Fujita Scale that was introduced in 1971 by Ted Fujita, the Enhanced Fujita Scale began operational use on February 1, 2007. This scale has the same basic design as the original Fujita Scale, six categories from zero to five representing increasing degrees of damage. It was revised to reflect better examinations of tornado damage surveys and to align wind speeds more closely with associated storm damage. Better standardizing and elucidating what was previously subjective and ambiguous, it also adds more types of structures, vegetation, expands degrees of damage, and better accounts for variables, such as differences in construction quality. The table below illustrates the differences in wind speeds between the previous Fujita Scale and the currently operational Enhanced Fujita Scale.

FUJITA SCALE			**OPERATIONAL EF-SCALE**	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	**0**	**65-85**
1	73-112	79-117	**1**	**86-110**
2	113-157	118-161	**2**	**111-135**
3	158-207	162-209	**3**	**136-165**
4	208-260	210-261	**4**	**166-200**
5	261-318	262-317	**5**	**Over 200**

The path width of a single tornado is generally less than 0.6 mile, although some damage path widths are in excess of one mile. The path length of a single tornado can range from a few hundred yards to over 200 miles. The average tornado in North America moves from southwest to northeast, but tornadoes have been known to move in any direction. The average forward speed of a tornado is 30 mph, but may vary from nearly stationary to greater than 70 mph. The lifespan of a tornado is rarely longer than 30 minutes.

Geographic Area Affected by Tornadoes

Two areas in the state have experienced even higher levels ranging from 11-15 tornadoes in 1,000 square miles. These areas are the extreme northwest corner, including Benton and Washington Counties, and an area on the eastern border with Tennessee and Mississippi, including Monroe, Lee, Phillips, Arkansas, and Desha Counties.

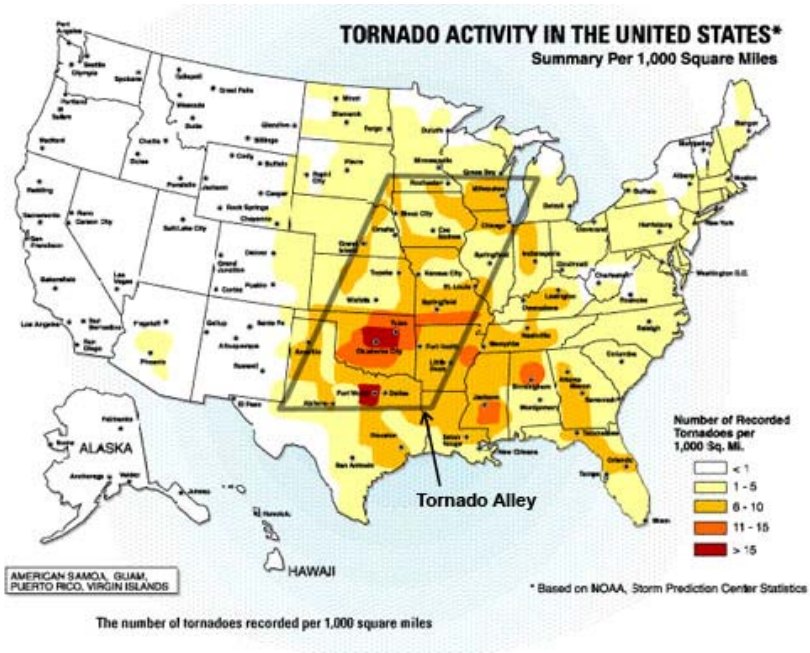
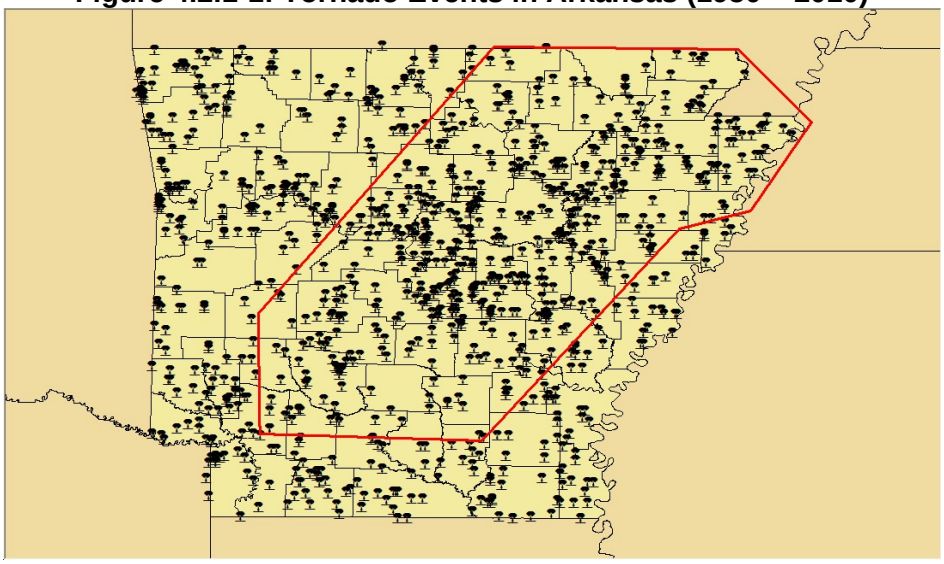


Figure 4.2.1-1: Tornado Events in Arkansas (1950 – 2010)



Source: Geostor

Figure 4.2.1-1 shows a map of tornado occurrences by county in Arkansas. Tornadoes in Arkansas are most common along an elongated zone extending from Clark County northeastward to Mississippi County.

This apparent high-risk zone lies along the northeast-trending mountain front of the Ouachita Mountains, Arkansas Valley, and Ozark Highlands (the Interior Highlands) (see Figure 4.2.1-1). This higher elevation region may force warm moist air from the low-lying Gulf Coastal Plain and Mississippi Alluvial Plain to the southeast upwards, assisting in tornadic initiation, and then guiding the storms along the base of the northeast-trending highlands front.

The HMP Sub-Committee has fully researched the geographic occurrences of tornadoes across the state and has updated this risk assessment as part of this 2010 revision process. Based on all the research and data, it does appear that tornadoes tend to be more prevalent on the diagonal starting in the southwest and going into the northeast corner of the state. However, the entire state is in a high-risk area when compared with the rest of the United States. Therefore, the HMP Sub-Committee has decided that the entire state has a high risk of tornado occurrences.

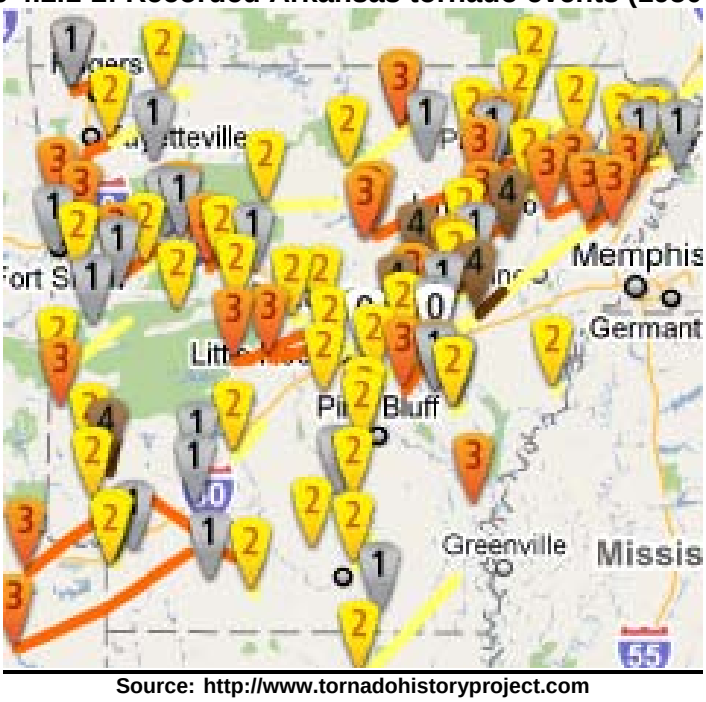
Also, the Sub-Committee has noted that all data recorded for tornadoes is slightly skewed toward urban and populated areas. The HMP Sub-Committee feels that many tornados (especially smaller ones) in very rural areas are not reported, nor recorded; therefore there are probably more tornadoes that have impacted the state and the map above may be lacking a number of events.

Previous Tornado Occurrences

This section has been updated by the HMP Sub-Committee based on new historical research and recent tornado events including the related data.

The map below shows all recorded tornados in the state from 1950 to 2009. The numbers represent the corresponding Fujita Scale ratings.

Figure 4.2.1-2: Recorded Arkansas tornado events (1950-2009)



Source: http://www.tornadohistoryproject.com

From 1999 through 2010, tornadoes in Arkansas killed 41 people, injured 676, and caused approximately $647 million in damage. Notable tornado outbreaks of the recent period include a February 5, 2008 strike in which an EF-4 tornado tore a 123-mile-long path through seven counties in north-central Arkansas, killing 14, injuring at least 175, and damaging or destroying 880 homes and 100 businesses. This path set an Arkansas record for length and is one of the longest verified tracks in U.S. history. The towns of Clinton (Van Buren County) and Atkins (Pope County) were among those suffering severe damage, while a second, shorter tornado devastated the town of Gassville (Baxter County). In January 1999, Arkansas recorded the most tornadoes on any individual January day in any state (56 on January 21, 1999); the most tornadoes in the month of January; and the largest single outbreak ever to strike the state. Other recent large outbreaks occurred on December 18, 2002, May 16, 2003, and November 27, 2005. While hurricanes usually bring only heavy rain to the state, on September 24, 2005, the remnants of Hurricane Rita spawned 17 tornadoes that moved from southeast to northwest—a most unusual state of affairs. The most deadly recent outbreak was that of March 1, 1997, which resulted in 25 Arkansas fatalities. While the average Arkansas tornado is on the ground less than a mile, tornadoes in this outbreak reached path lengths of 75 and 67 miles, with others of over 20 miles. The deadliest outbreak in Arkansas history, however, occurred on March 21, 1952, when 111 people lost their lives. Bald Knob (White County) and Judsonia (White County) were the hardest hit,

suffering over 50 fatalities. Cotton Plant (Woodruff County) also lost 29 people in one of 17 tornadoes that day, 12 of which were deadly.

The state's fatality rates are also far higher than expected for a state with relatively low population density. From 1950 to 2006, the state ranked 14th in both number of tornadoes (1,407) and tornadoes per 1,000 square miles (26.6); it ranked second in the number of fatalities per 100,000 people (13.9), behind the State of Mississippi (19.2). Counts from the Storm Prediction Center may not tell the entire Arkansas tornado story. Many researchers consider this tornado count far lower than the actual number due to Arkansas's rural nature (low population densities) and conditions that make seeing and counting tornadoes difficult (hills, trees, and low cloud decks). If the number of tornadoes counted in more populated areas of the state were extrapolated across the entire area, Arkansas would likely be depicted on maps along with the more well-known Tornado Alley states. However, this method would not take into account local variations in topography that might account for increased or decreased tornado numbers. Interestingly, some of the same conditions that make counting difficult may also explain Arkansas's relatively high fatality counts—geography or obstructions might prevent one seeing, and thus seeking shelter from a tornado. Socioeconomic status may also play a role (especially in the past). Lower incomes result in more manufactured homes or less sturdy housing stock, and lower overall educational level can affect understanding of climate cues or warnings. There are also fewer sturdy shelters, such as basements, in Arkansas. These indicators have steadily been improving in the state over the 56 year period for which tornadoes are assessed here, but they are still counted by researchers as factors that increase vulnerability.

While April suffers the most tornadoes on average (291), late fall and winter tornadoes are not at all uncommon in Arkansas. The state also suffers many night tornadoes, in part due to early sunsets during the winter; this factor could also contribute to the state's fatality rate. Tornadoes in Arkansas occur primarily between the hours of 5:00 and 6:00 p.m. (Figure 4.2.1-6).

Tornado intensity has traditionally been measured according to the Fujita Scale (F-scale), which was based on damage to structures. It ranges from F0 (weak) to F5 (extreme). This method is not a good measure of intensity because a strong tornado may not hit a structure or the variability in structure strength can produce wide variances in damage. This was the only measure used until the recent development of the Enhanced Fujita Scale. As is the case across the country, the average Arkansas tornado since 1950 is very weak (F1.25); there has been only one recorded F5 tornado in the state, on April 10, 1929. Of the 336 fatalities in the state that occurred between 1950 and 2006, 211 took place in F4 tornadoes; of which there were only forty; only two fatalities took place in F0 and F1 tornadoes combined (962 total).

Death tolls since the advent of Weather Service tornado warnings in 1952 have been plummeting nationwide. In Arkansas, rates have declined but remain too high. Each recent tornado, however, has brought about large expenditures for community sirens, and more recently, Arkansas Department of Emergency Management (ADEM) monetary incentives to build tornado-proof safe rooms in homes. ADEM has also been critical in supplying and stressing to the public the need for warning-activated National Oceanic and Atmospheric Administration (NOAA) weather radios, while also vastly increasing

weather radio coverage to rural areas using new transmitters. Significant events across the State of Arkansas include:

The 1929 F5 Sneed Tornado: The only F5 tornado ever documented in Arkansas occurred late on the afternoon of April 10th of 1929 in northern Jackson County. It has come to be known as the Sneed Tornado. The death toll from this tornado was listed as 23 with at least another 59 people injured. Some of the injuries were quite severe including skull fractures. The description below is from research conducted by the National Weather Service, Little Rock office.

A number of other tornadoes struck northeast Arkansas on April 10th, but separating one damage path from another was difficult as storm surveys were not conducted in those days. It is believed, however, that the Sneed Tornado began in Independence County about three miles south of Batesville. The tornado crossed into Jackson County in the Black River bottoms likely in the area north of Centerville. The tornado reached its maximum intensity as it moved through the community of Pleasant Valley and then on through the community of Sneed. Both of these communities located about two and a half to three miles north of Swifton, were virtually destroyed. Historical accounts as well as the report of an eyewitness who is still alive today indicated that the tornado was 1/2 mile wide at this point. The tornado then began to weaken and passed on just to the south and east of Alicia.

A large number of people saw the tornado coming and took shelter in various places. There were several storm cellars in the area and many people headed for these. According to one account, about 25 people gathered in one cellar alone. One of the storm cellars still exists today although it is in a deteriorated condition. Others sought shelter under a road bridge, in a barn, and in a chicken house. A Red Cross survey completed several days after the tornado indicated 75 families, including a total of 450 people, were affected by the tornado. Forty homes were destroyed and another 40 were damaged. Thirty-six barns were destroyed. In addition, a number of farm animals were killed. Pictures taken after the storm bear out the destruction that occurred. Some of the photos show debris scattered around so badly that it was impossible to determine exactly what type of structure had been destroyed.

Other tornadoes that struck on April 10, 1929 included an F4 tornado that struck Guion, and another F4 tornado that traveled from four miles southwest of Wynne through Smith's Chapel and Princedale to north of Parkin. Tornadoes that day also affected areas around Almond, Charlotte, Cord, Diaz, Herpel, Lorado, Monette, Moorefield, and Mt. Pleasant. 100-mph wind gusts, torrential rain and flooding struck portions of the state on March 2, 1997 killing 25 people, in four counties with at least 399 people injured.

- **Area:** Storms, including as many as 14 tornadoes, swept through the state Mar. 1 along a 260-mile path from Hempstead County in the southwest to Greene County in the state's northeastern corner.
- **Damage:** About 1,200 houses statewide were damaged or destroyed. In Arkadelphia, 373 homes, 45 businesses and 16 public buildings were damaged or destroyed.
- **Aid:** Thirteen of 75 counties were declared federal disaster areas, 11 for tornadoes and two for flooding. Most of the flooding receded.

1996 Fort Smith Tornado: Two recent tornado events illustrate the consequences of a tornado strike on populated areas of Arkansas. On the night of April 21, 1996, downtown Fort Smith was devastated by a strong tornado. The tornado touched down in Moffett, Oklahoma and quickly strengthened as it crossed the Arkansas River into Fort Smith (Sebastian County) at an intensity of F2. The tornado moved northeastward through Fort Smith devastating the downtown area and an industrial section of town before entering Crawford and Van Buren Counties. Here, its intensity increased locally to F3 while killing four people and injuring 89. The destruction in Sebastian County included 35 homes destroyed, 120 severely damaged, and 1133 with minor damage. In the commercial district, 88 businesses were damaged or destroyed. Damage totals in Crawford County included 463 homes destroyed, 50 had major damage, 142 had minor damage, 246 apartments were damaged, and 10 businesses were damaged or destroyed. Damage totals from this tornado are estimated in excess of $300 million.

Tornado Damage of Homes from April 26, 1996

Four other tornadoes occurred in Arkansas that night killing two additional people, and large hail caused approximately $9 million in damages in Fayetteville. An F2 tornado is generally not thought of as a particularly damaging tornado. The Fort Smith tornado, however, is an example of a moderate tornado being at the “wrong place,” thus causing massive damage. Although the tornado occurred at the wrong place, it struck at the “right time” (near 11:00 PM). Casualties were substantially lower than they would have likely been had the tornado struck in the afternoon.

1997 Arkadelphia Tornado: On March 1, 1997, almost one year after the Fort Smith tornado, a severe weather situation with tornadoes and very heavy rainfall erupted along a nearly stationary front from Texas to West Virginia. At mid-afternoon, an outbreak of 24 strong to violent tornadoes in Arkansas and adjacent states resulted in 29 deaths, including 25 in Arkansas. Of the 17 tornadoes that affected Arkansas, five of these were F4 intensity. The most deadly F4 tornado began in southwest Clarke County with major damage and loss of six lives in Arkadelphia. Damage path width in this area ranged from 1/4 to over 1/2 mile. This tornado continued along Interstate 30 through Hot Spring County and much of Saline County, and reached F4 intensity as it moved to the Shannon Hills area and finally into Pulaski County. Total path length of this tornado was

80 miles. Sixteen people were killed by this tornado. The National Weather Service, using NEXRAD radar, issued tornado warnings from 10 to 32 minutes before the tornadoes struck, greatly reducing the loss of lives. Damage estimates in the 25 counties that became eligible for federal assistance included 275 homes and 129 mobile homes which were destroyed, and 582 homes and 30 mobile homes which were damaged.

1997 Tornado Damage in South Little Rock

January 21, 1999 Little Rock Tornado: On January 21, 1999 a record 56 tornadoes occurred statewide in Arkansas. One tornado in this system directly affected the capitol city of Little Rock. This F3 tornado moved from eastern Saline County into southwest Pulaski County at approximately 6:33 PM. Trees were downed as the tornado entered Pulaski County, with some roof damage to a business along Interstate 30 about five miles southwest of Little Rock. The tornado continued northeast into eastern sections of the downtown Little Rock area crossing near the intersection of Interstates 30 and 630. In this area, many homes and businesses (at least 235 structures) were heavily damaged or destroyed. It was estimated that about 750 structures sustained at least some damage. This included homes in a historic district built at the turn of the century. Trees were also downed throughout the area. One tree fell onto a car, taking the life of a woman inside. The Governor's Mansion was not spared, with numerous trees down and one tree damaging a fence around the property. A grocery store was also destroyed at the corner of 17th and Main. One man lost his life at this location. Further northeast, the tornado weakened as it crossed Interstate 40 just east of Highway 67/167. However, the tornado blew a tree down onto a mobile home about two miles southeast of Sherwood. A man lost his life as a result. The tornado finally dissipated in Sherwood, after showing a damage path 15 miles long and 700 yards wide. Disaster costs for this tornado outbreak totaled $4.7 million.

February 24, 2007 Dumas, Arkansas: A tornado shredded several businesses and homes in a small Arkansas town, injuring about a dozen people, some of them seriously, however there were no reports of fatalities. Shelters were opened in Dumas and over 75 people slept at these locations. The storm slammed into one of the town's main thoroughfares, destroying most of the businesses along U.S. 65, including a Fred's department store. The National Weather Service reported that parts of cars were hanging in trees in the storm zone. Wind speeds were estimated between 90 and 100 mph. Damage from a possible tornado was also reported in Tichnor, in southern Arkansas County, just northwest of Dumas.

The severe storm system affected three other counties besides Desha, including Bradley, Drew and Union. More than two dozen people were injured in the storms and about 150 homes were damaged or destroyed. The state declared this event an official disaster and approved 56 people for temporary housing. The estimated damages are set at over $720,000.

October 29, 2009 East Camden: The tornado began in a wooded area of the Highland Industrial Park and then tore through the Arkansas Fire Training Academy. At the academy, the Apparatus Building was heavily damaged; walls were blown out of the Smoke Building. A large part of the roof was torn off the Administration and Classroom Building, and vehicles belonging to the students were tossed around and overturned. About 60 staff members and students were in the Administration and Classroom Building, but they were aware of the tornado warning that was in effect and had taken shelter in small, interior rooms. There were no injuries. Trees, power lines, and power poles were blown down. The tornado then continued into the Ouachita County portion of the Highland Industrial Park. NCDC lists a total of 21 tornadoes (segments) for this day. Total damages from the East Camden listing alone estimated at $1.8 million.

March 10, 2010 Center Hill: Emergency management reports indicated one home and two mobile homes were destroyed, three homes received major damage, and 16 homes received minor damage. Two chicken houses had roof damage. One business, which repaired cars and farm equipment, was destroyed. A fire station and church suffered damage. Trees and power lines were knocked down. Two people received minor injuries. Other tornado listings for March 10 include: One report in Grape, one in Sunnydale, Pearson, and Hutson. Cumulative damages from these reports are listed at over $3 million.

Deadliest Tornadoes in Arkansas History: Tornadoes that caused 50 or more fatalities in Arkansas include the Fort Smith tornado of January 12, 1898 (55), the Brinkley tornado of March 8, 1909 (58+), the Hopewell-Warren tornado of January 3, 1949 (55 in AR), and a tornado that traveled from Dierks to Bald Knob on March 21, 1952 (57+), with 50 fatalities in Judsonia alone. Table 4.2.1-2 lists and provides information on the ten deadliest tornadoes in Arkansas. The deadliest year for tornadoes in Arkansas was 1952, when 111 deaths occurred. All of these deaths occurred during the March 21 outbreak when 17 tornadoes moved from southwestern, across central, and into northeastern Arkansas.

Table 4.2.1-2: The Ten Most Deadly Tornadoes in Arkansas

Date	Counties	Deaths	Injuries	Comments
March 8, 1909	Grant, Jefferson, Pulaski, Lonoke, Prairie, Monroe	58+	633	Sheridan to 10 miles NE of Brinkley; 85-mile path length and up to 880 yards width; 49 deaths and 15 injuries at Brinkley.
March 21, 1952	Howard, Saline, Faulkner, White, Jackson, Craighead	57+	346	Dierks to Bald Knob damaged; 250-mile length, 900 yards width; part of 9th most deadly tornado event in U.S.; 28 tornadoes in four states killed 204 (111 in AR) and caused $15 million in damage.
Jan. 3, 1949	Columbia, Union, Ouachita, Calhoun, Bradley, Lincoln, Drew	55 in AR	402 in AR	Originated in Louisiana; in Arkansas 145 miles in length, up to 500 yard wide damage path; damaged Hopewell and Warren.
Jan. 12, 1898	Sebastian	55	44	Fort Smith damaged; several miles long, 200 yard width damage path.
April 10, 1944	Columbia, Cross	42	304	Areas near Magnolia and Parkin damaged; 200-mile length, up to 200 yards wide.
March 21, 1952	Lonoke, Prairie, Woodruff, Cross, Poinsett	40	274	Same tornado event as 3/21/52 tornado above; New England, Hazen, Cotton Plant, Hilleman, and Marked Tree damaged; 105 miles long, 880 yards wide.
April 15, 1921	Miller, Hempstead, Pike	35 in AR	238 in AR	Originated in Texas; from Mineola, TX to Mt. Pisgah Settlement, AR damaged; 26 deaths in TX; 70 miles long in AR, 667 yard wide damage path.
June 1, 1947	Jefferson	35	300	Pine Bluff damaged; 19 miles long, up to 1.5 mile wide damage path.
May 15, 1968	Craighead	34	350	Jonesboro damaged; eight mile path length, up to 200 yard wide damage path.
April 10,1929	Independence, Jackson, Lawrence, Greene	31	62	From Almond to Lorado damaged; 65 miles long, 1200 yards wide; immense tornado destroyed Swifton where 23 died.

Probability of Future Tornado Events

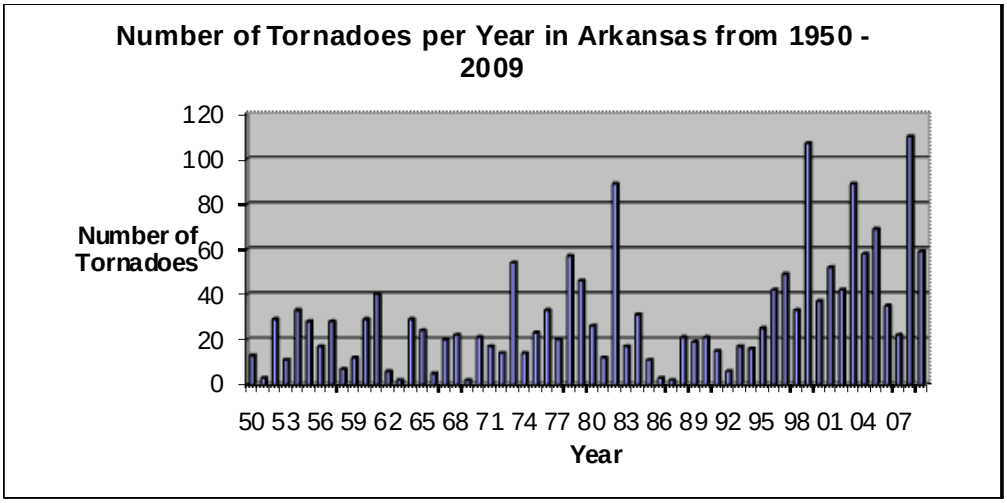
The HMP Sub-Committee has re-assessed the probability of future events as part of the three-year plan review. The profile for this hazard has not changed significantly during this recent period. It remains a virtual certainty that future tornadoes will occur in the state on a regular basis. From 1996 through 2010, the state averaged 60 tornado events per year. Therefore, the probablility that Arkansas will experience a tornado event is **"Highly Likely"**.

Based on NOAA data between 1950 and 1995, Arkansas ranked 16th in average annual number of tornadoes (19.4 annually), 15th in average annual number of tornadoes per 10,000 square miles (3.7 per 10,000 square mile annually), fifth in average annual number of strong to violent (F2-F5) tornadoes (9 annually), and fourth in average annual number of strong to violent (F2-F5) tornadoes per 10,000 square miles (1.7 per 10,000 square miles annually).

From 1996 through 2010, Arkansas has been affected by 840 tornadoes. This more recent tornado data through 2010 indicates that an average of 60 tornadoes occur annually in Arkansas. Figure 4.2.1-3 shows the number of tornadoes in Arkansas each year from 1950 through 2009. The largest number of tornadoes in a single year in Arkansas was 140 in 1999. The smallest number of reported tornadoes in a single year was two in 1969 and 1987. An average of over 30 tornadoes annually can therefore be expected in Arkansas, with an annual variation between two and 107 tornadoes.

As an update to the graph below, the statistics for 1950-2009 are listed.

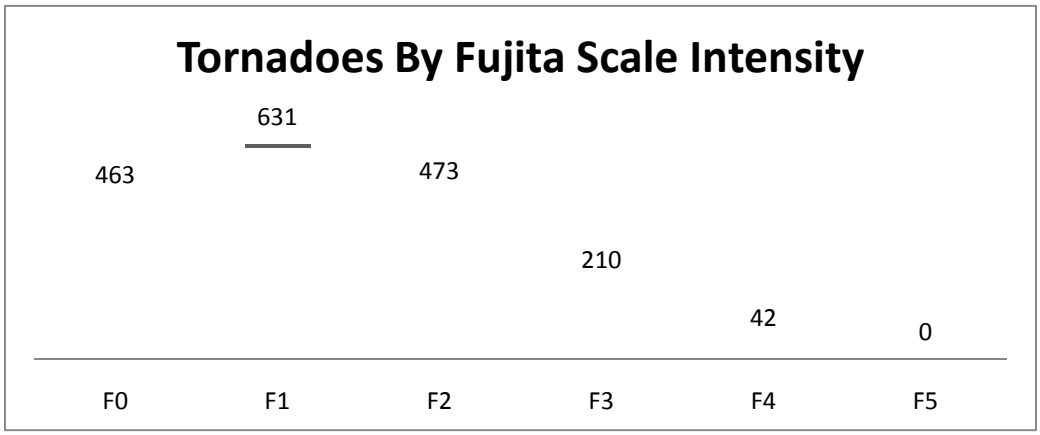
Figure 4.2.1-3: The Number of Tornadoes in Arkansas Each Year



Source: http://encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2377#

Figure 4.2.1-4 shows variations in tornado damage severity for Arkansas tornadoes as measured by the Fujita Scale. F1 tornadoes are the most common (31%). No F5 tornadoes have occurred in Arkansas from 1950 through 2010.

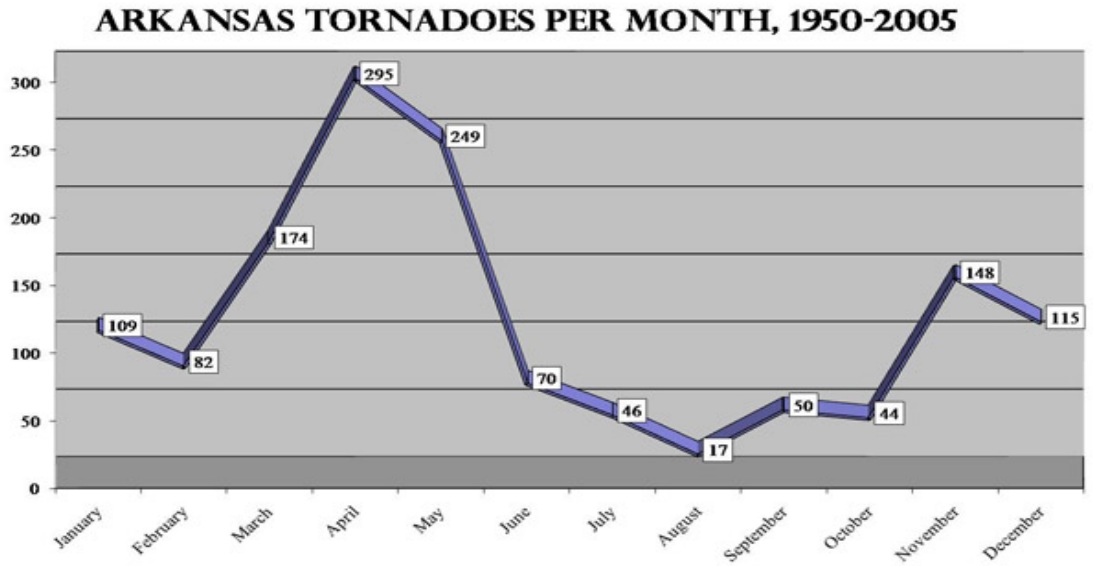
Figure 4.2.1-4: Variation in Fujita Scale Intensity for Arkansas Tornadoes (1950-2010)



Source: NCDC

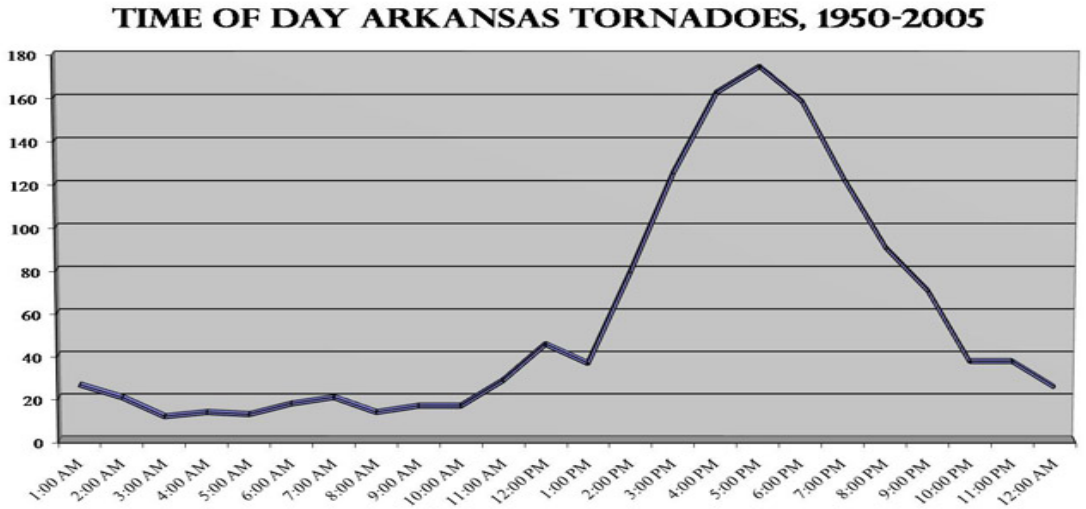
Although tornadoes may occur at any time of the year, peak tornado occurrence in Arkansas is during the spring. Figure 4.2.1-5 shows the number of tornadoes that occurred in Arkansas during each month from 1950 through 2005. Over 57% of all tornadoes occurred during March through May. This is somewhat earlier than the May-June peak tornado occurrence nationally. A secondary tornado maximum occurs in November, December, and January, with the least common month being in August.

Figure 4.2.1-5: Number of Tornadoes in Arkansas by Month (1950-2005)



Source: http://encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2377#

Figure 4.2.1-6: Number of Tornadoes in Arkansas by Time of Day (1950-2005)



Source: http://encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2377#

4.2.2 Severe Winter Weather Hazard Profile

This Winter Storm profile was developed in the original plan, amended in the previous update, and modified again in 2010. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to Severe Winter Weather.

Severe Winter Weather Profile

Severe winter weather, which may include extreme cold, heavy snowfall, ice storms, winter storms, and/or strong winds, affects every state in the continental United States. Areas where such weather is uncommon, such as Arkansas, are typically disrupted more severely by severe winter weather than regions that experience this weather more frequently. In addition, winter storms may spawn other hazards such as flooding, severe thunderstorms, tornadoes, and extreme winds that may hamper recovery efforts.

As a hazardous winter weather phenomena, the National Weather Service (NWS) defines snowfall as a steady fall of snow for several hours or more. Heavy snow is defined as either a snowfall accumulating to four inches in depth in 12 hours or less, or snowfall accumulation to six inches or more in depth in 24 hours or less. In states such as Arkansas, where lesser accumulations can cause significant impacts, lower thresholds may be used. A blizzard means that the following conditions prevail for a period of three hours or longer: 1) Sustained wind or frequent gusts to 35 miles an hour or greater; and 2) Considerable falling and/or blowing snow (i.e., reducing visibility to less than 1/4 mile). Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Heavy sleet is a relatively rare event defined as the accumulation of ice pellets covering the ground to a depth of 0.5 inch or more.

A Frozen Limb Falls on a Live Electric Line

Freezing rain or freezing drizzle occurs when rain or drizzle freezes on surfaces such as the ground, trees, power lines, vehicles, streets, highways, etc. Small accumulations of ice can cause driving and walking difficulties while heavy accumulations produce extremely dangerous and damaging conditions. An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of 0.25 inches or greater.

A combination of severe winter weather types occurring over a wide area is usually called a winter storm. Winter-storm formation requires below freezing temperatures, moisture and lift, to raise the moist air to form the clouds and cause precipitation. Lift is commonly provided by warm air colliding with cold air along a weather front. Various causes exist for winter storms in the United States. Winter storms in mid-western and plains states typically develop over southeast Colorado on the lee side of the Rockies. These storms move easterly or northeasterly and use both the southward plunge of cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce ice, snow and sometimes blizzard conditions. These fronts may push deep into the interior regions, sometimes as far south as Florida.

Road Closures due to the Effects of an Ice Storm

The occurrence of severe winter weather has a substantial impact on communities, utilities, transportation systems, and agriculture, and often results in loss of life due to accidents or hypothermia. Between 1988 and 1991, a total of 372 deaths, an average of 93 each year, were attributed to severe winter storms nationally. The superstorm of 1993, considered among the worst non-tropical weather events in the United States, killed at least 79 people, injured more than 600, and caused more than $2 billion in property damage across parts of 20 states. Although Arkansas was not strongly affected by this winter storm, 14 deaths (most due to exposure) and $100 million dollars in damage (collapsed roofs, downed power lines) occurred in Alabama. Blizzard conditions

with heavy snow, combined with rapidly falling temperatures and very high winds, were reported.

Severe winter weather poses several types of hazards including snowstorms, ice storms, storms with strong winds and extreme cold. Heavy snow from a snowstorm can immobilize a region and paralyze a city, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse buildings and knock down trees and power lines. In rural areas, homes and farms may be isolated for days and unprotected livestock may be lost. The cost of snow removal, repairing damages and loss of business can have large economic impacts on cities and towns. Limited damage data from the NWS over the past 20 years indicate that the average severe winter weather event costs over $13 million dollars. Over 80% of this damage is done by winter storms.

Heavy accumulations of ice from ice storms or heavy snow can bring down trees, electrical wires, telephone poles and lines and communication towers. Communications and power can be disrupted for days while utility companies work to repair the damage. Power and communications disruptions are common consequences of ice storms and heavy snow in Arkansas. The monetary costs of power and communications losses to businesses are significant but difficult to estimate.

Heavy accumulations of ice or snow also commonly result in building collapses or structural damage to buildings. The damage may be caused directly by the excessive weight of the ice/snow accumulation, or by ice-laden trees or branches falling on structures. Homes, businesses, as well as weaker nonresidential structures, commonly sustain structural damage. Poultry houses in Arkansas are particularly at risk. Additional agricultural revenues are lost because of the time it takes to rebuild the poultry houses.

Accumulations of ice and snow may also cause extreme hazards to motorists. Motorists in Arkansas are generally unaccustomed to driving on slick roads resulting in an increase in traffic accidents, some of which may result in fatalities. Travel is hampered by ice or heavy snow because the state lacks sufficient snow removal equipment and road treatments (sand, salt) because of the infrequent occurrence of severe winter weather events. The cost of the numerous traffic accidents, as well as the costs related to business and school closings that occur due to hazardous travel conditions are difficult to estimate.

Extreme cold often accompanies or succeeds severe winter weather. Prolonged exposure to the cold can cause frostbite or hypothermia and become life threatening. Infants and elderly people are most at risk. What constitutes extreme cold and its effects varies across different areas of the United States. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." Pipes may freeze and rupture in homes that are poorly insulated or without heat. A record cold in Arkansas in December of 1989 broke water pipes and damaged water-pumping equipment resulting in a boil water order in parts of the state. There were issues with the propane gas supplies, and electrical and natural gas systems that were pushed to their limits to meet the record demands.

Winter storms are sometimes accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, severe drifting and dangerous wind chill. Strong winds

with these intense storms and cold fronts can knock down trees, utility poles and power lines. These conditions, however, are rare in Arkansas.

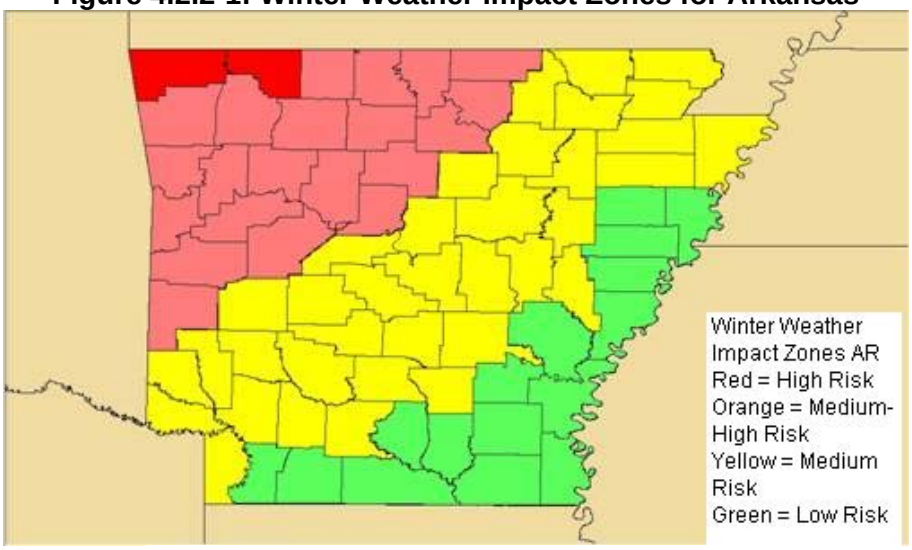
Geographic Area Affected by Severe Winter Weather

The HMP Sub-Committee has reviewed the geographic areas affected by winter weather. Using the NCDC storm database, four related winter event types were considered.

- Severe winter weather can impact the entire State of Arkansas, although not all areas are equally affected. The northwest corner of the state experienced the most severe winter events between 1980 and 2010. All counties in this part of the state experienced 33 or more events over the past 28 years, with Benton and Carroll Counties experiencing the most events at over 40. The southern and eastern part of the state experienced the fewest severe winter events. Counties in these parts of the state were affected by 23 or fewer events.
- Counties in the northwest corner of Arkansas experienced the most heavy snow events between 1980 and 2010 (19 or more), while the southern half of the state experienced the fewest events (8 or fewer).
- Ice storms have been most common in the central part and northwest corner of Arkansas. Counties in these parts of the state suffered 10 or more ice storm events over the past 26 years, while other parts of Arkansas experienced as few as five events over this same time period.
- Winter storm events are most common in the north central and central parts of Arkansas. Counties in these areas were affected by ten or more winter storms between 1978 and 2003, whereas counties in southern Arkansas experienced four or fewer events.

Based on this analysis the counties were categorized into four hazard zones that are detailed on the following map.

Figure 4.2.2-1: Winter Weather Impact Zones for Arkansas



Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score

Sources: Geostor

For the 2010 plan revision, the period from January 1996 through March 2010 was analyzed in order to update the original plan. From 1996 through 2010, there were 310 recorded events with significant snow and ice. These storms have been evenly distributed across the state with practically every county having been affected by at least one recorded event in the last three years.

The HMP Sub-Committee researched the trends related to winter storms and learned that in this three year period, the only event that had damages recorded by the NCDC was on the eastern edge of the state. The Sub-Committee noted that this fact could be a new trend since the previous risk assessments focused on the northwest section of the state. Though almost all counties were impacted by storms, the only county listing damages was Ashley County.

Previous Severe Winter Weather Occurrences

This hazard profile has been updated by reviewing all previous events again and focusing on the events that occurred since the last formal update. Since the beginning of 2007, there have been 158 recorded winter storm events in the state. As noted above, these impacted practically the entire state. Of the 158 events, two were declared to be disaster events by the Arkansas Department of Emergency Management. One was a severe winter weather event and the other included ice, heavy rains, and flooding. These two events are profiled below.

January 1979 Ice Storm: One of the worst ice storms ever to affect Arkansas occurred in January of 1979. Several counties in south central and southeast Arkansas experienced ice accumulations up to three inches. Several cities, including Monticello, McGee and Warren, were completely paralyzed. Several deaths resulted from auto accidents. Up to 80,000 customers were without power, many for up to two weeks. Utility damage estimates at the time were $5 million. The Arkansas Forestry Commission estimated that 3.5 million acres of timber suffered ice damage inflicting a loss in excess of $6.5 million on forest landowners. Total unadjusted damages were in excess of $15 million.

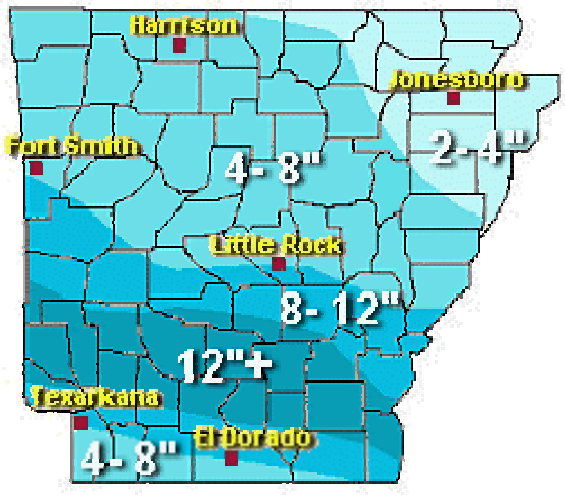
January 1988 Snowstorm: The largest snowstorm of the century to affect Arkansas occurred in January of 1988, when the entire state was blanketed by heavy snow. Snow amounts of up to 16 inches accumulated in Heber Springs and El Dorado, and 13 inches fell in Little Rock. Sleet and freezing rain also fell on the southern 1/3 of the state. Poultry growers were particularly hard hit by this storm. At least 215 poultry houses were crushed ($14.5 million damage to buildings) killing 3.5 million birds ($8.5 million loss). Many other structures, such as awnings, sheds, metal buildings, hangers, marinas and greenhouses collapsed, damaging or destroying their contents. Cattle growers had problems because feed supplies could not be delivered to the animals. Many calves were lost due to stress from the heavy snow and harsh conditions. Significant damage also occurred to power lines and exposed cabling.

February 1994 Ice Storm: An extremely damaging ice storm struck Arkansas and much of the southeastern United States in February 1994. It was unusual in its great aerial extent (10 states affected) and large precipitation amounts. Ice accumulations ranged from one inch to as much as six inches in parts of northern Mississippi - unprecedented ice accumulations in this area for a freezing rain event. Overall, the storm produced over $3 billion in damages and cleanup costs, and at least nine deaths were attributed to the

storm. Well over two million customers were without electricity at some time, and 1/2 million were still without power three days after the storm. Falling trees and limbs damaged many homes, businesses and vehicles. In Arkansas, the southeast part of the state was most severely affected with some areas having almost every power pole downed by the ice. A number of homes and businesses sustained structural damage caused by falling trees. Approximately 120,000 customers were without power at some time during the storm, and up to two weeks were required to restore power to some locations. Some power companies called this the worst ice storm in their history. Severe damage to the forestry industry and specific orchard crops occurred. Damage and cleanup costs in Arkansas were estimated at over $50 million.

January 2000 Winter Storms: Severe winter weather was particularly damaging to Arkansas in 2000. On January 27th and 28th, a major winter storm brought mostly heavy snow to Arkansas. From two to eight inches of snow had accumulated in the northern half of the state and along the southern border. In much of the southern half of the state, eight to 14 inches of snow was common. Clark County recorded the highest average snowfall total in the state at 15 inches, with isolated reports of 20 inches. It was the most widespread, heavy snow to affect Arkansas since 1988. More than 600 chicken houses were damaged or destroyed, mostly in the southwest part of the state, with each house holding up to 20,000 chickens. The vast majority of chickens were killed when the houses collapsed and from hypothermia. Because of the loss of poultry, about two-dozen counties were declared federal agricultural disaster areas. During the height of the storm, Interstate 30 became impassible from Malvern to south of Arkadelphia, and was closed for a number of hours. The National Guard was called out to rescue stranded motorists, and a number of shelters opened for motorists and for the homeless. On January 29th, a State of Emergency was declared, with only necessary travel advised. It was the heaviest snow in 12 years, with for to eight inches or more common. Parts of southern Arkansas received over a foot of snow.

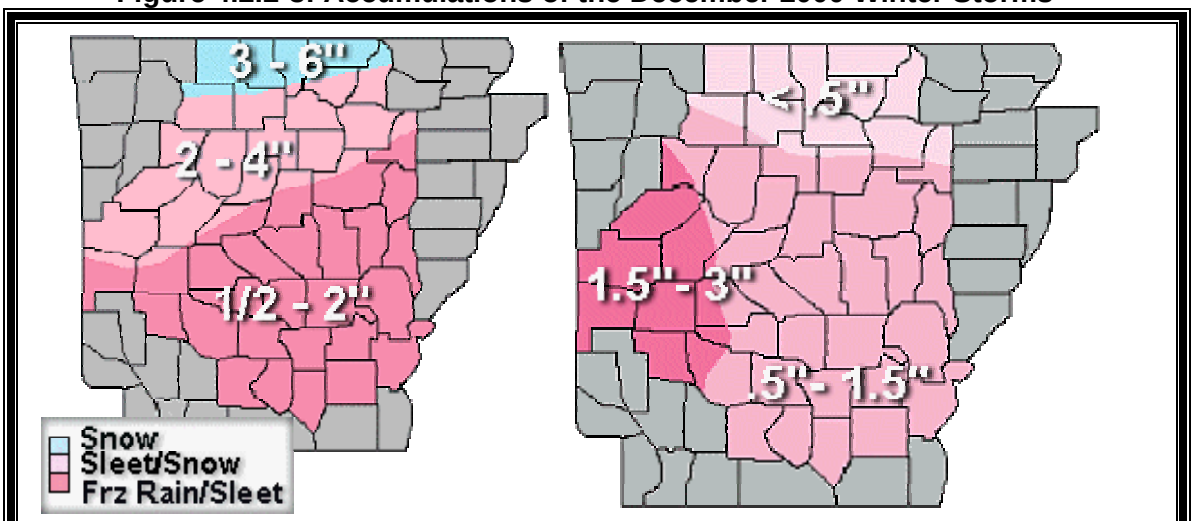
Figure 4.2.2-2: January 2000 Winter Storm Event



Source: National Weather Service

December 2000 Winter Storms: Two major ice storms severely affected Arkansas within a two-week period in December of 2000. A major winter/ice storm developed in Arkansas late on December 12 and lasted through December 13. Three to six inches of snow fell across the northern part of the state before mixing with two to four inches of snow and sleet across much of northern and western Arkansas. In central and southern Arkansas, one-half to one inch of freezing rain accumulated with sleet mixed in at times. Where icing occurred, there were massive power outages with branches and entire trees falling in some areas due to the weight of the ice. Falling trees and limbs resulted in property damage (mainly to roofs and vehicles), personal injury (many head lacerations and other injuries were reported) and blocked roads. Many power poles also fell, and some with transformers started fires. About 300,000 customers lost power during this mid-December event, believed to be the largest power outage in Arkansas history to date. Many people were without power and heat for several days during which time most businesses, schools and government offices were closed. Entergy, the largest electric supplier in Arkansas (645,000 customers), brought in approximately 6,000 linemen and tree trimmers from 10 states (more than ever called upon in company history) to help restore power and remove tree debris from lines.

Figure 4.2.2-3: Accumulations of the December 2000 Winter Storms



Source: National Weather Service

Some additional reported consequences of the power losses included service stations unable to dispense fuel, community water systems unable to treat and distribute water, senior citizens unable to receive medical attention (such as dialysis and oxygen), retirement and nursing homes without electricity, Red Cross shelters without electricity, airport closings because beacons were inoperable, loss of perishables in grocery stores and restaurant, and loss of phone service (including some cellular) and cable service in many areas of the state. There was also concern about accidental fires and/or carbon monoxide incidents by the many persons trying to heat homes using alternative methods. The freezing rain, sleet and cold weather from this event resulted in nine deaths in the state. These included traffic accidents and a house fire that killed a mother and two children.

Following the major winter/ice storm on December 12th and 13th, a second ice storm developed during the morning of December 25th and continued through December 27th. Mostly freezing rain and sleet were noted, with one and a half to three inches of ice in western sections of the state and one-half to two inches of ice elsewhere. Roads were much icier during this second storm due to lower temperatures. Most major state highways were covered with two inches of ice and many roads were nearly impassible from the ice and trees that had fallen due to the weight of the ice. Numerous traffic accidents were attributed to the ice, including several pile-ups on I-55. The National Guard was contacted to help stranded motorists.

The loss of power during the second storm was even greater than the first, as about 320,000 customers lost power statewide, many for several days. The ice damaged or destroyed several main transmission lines connecting power grids to cities. Entergy mobilized more than 5,200 linemen and servicemen and nearly 4,000 tree trimmers from 24 states to restore service.

The lack of electricity affected the ability of some communities to treat and deliver water. Over 120,000 people in 35 communities, including Hot Springs, were without water for some period of time. The National Guard hauled 500-gallon water tanks to cities in need and also delivered generators and other emergency equipment. There were also gasoline shortages as stations were unable to operate pumps. Arkadelphia was one of a few stops between Texarkana and Little Rock with open restaurants and operating gas stations until the stations ran out of gas on the 27th. Little Rock National Airport was closed from the evening of the 25th until midday on the 27th due to ice on the runways stalling some 170 flights. This was the first time since 1975 that the airport had been closed for more than 24 hours. Other consequences of the ice storm included the loss of communication towers in many communities (including Garland County), loss of phone service for 25,000 customers, loss of power at some hospitals and a shortage of supplies, such as oxygen cylinders at nursing homes. Impassible roads kept some fire crews and emergency workers from responding to emergency calls.

The state's livestock and forests were also hard hit by the ice storms. An estimated 31,533 beef cattle, 4,653 dairy cattle, 12,065 swine, 30,000 turkeys and over five million chickens (including chicks) died as a result of the storms. The Arkansas Forestry Commission estimates that private, non-industrial landowners bore $50 million in damage and replacement costs. Large paper companies, such as International Paper and Weyerhauser Co., suffered losses in the millions of dollars as well. Trees and branches felled by the ice in residential areas were also damaged resulting in a massive and costly debris-removal effort. Federal and state government funded most of the cost of this cleanup. Debris removal in Arkadelphia was not completed until the end of April. Other effects of the storm were not felt immediately. The millions of downed trees and branches left by the ice storms may serve as fuel for wildfires, which could be much hotter, denser and more widespread.

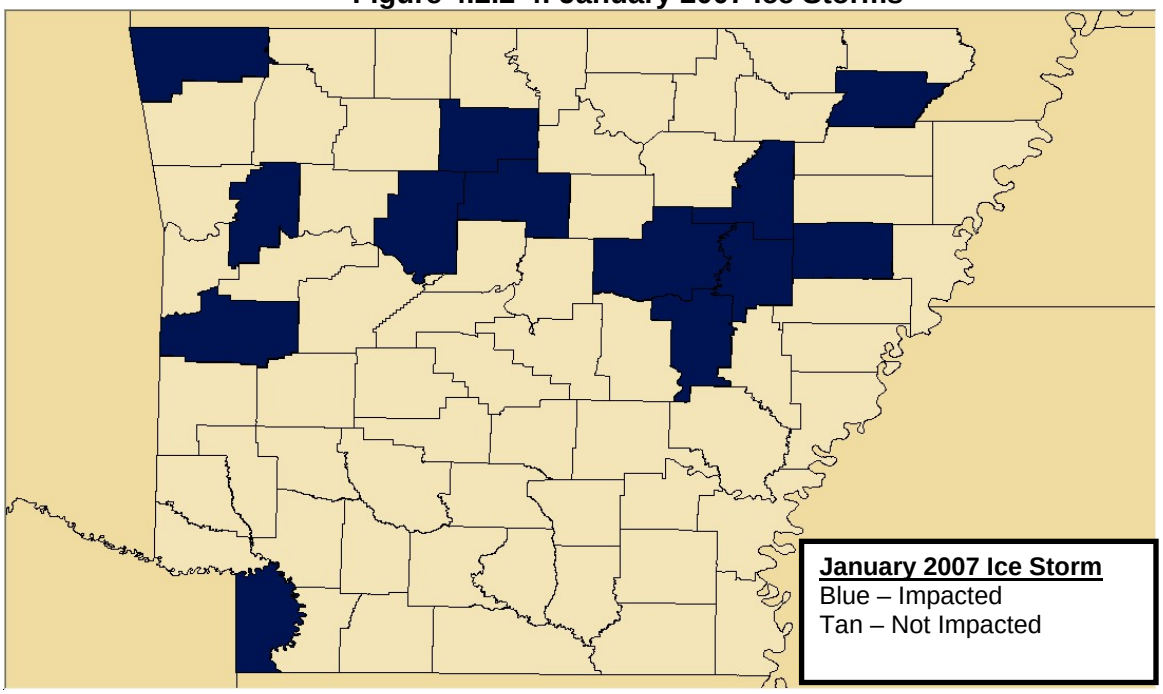
Combined, the two December 2000 ice storms took the lives of at least 20 people in Arkansas. The National Weather Service has stated that these two storms are likely the most widespread and damaging ice storms in recorded state history, which dates back to 1819.

October 18, 2004 – Severe Winter Weather: The counties of Prairie, Pulaski and Saline were impacted by a severe winter weather event. The state declared this a disaster event and initiated the processes for Public Assistance (PA) and Individual Assistance (IA). Thirty-one people were approved for temporary housing and the estimated damages were approximately $200,000.

January 13, 2007 – Ice, Rains and Flooding: This event impacted a number of counties across the state. The ones hit the worst and recognized by the state are listed below and then shown on the following map in blue:

- Benton
- Cross
- Franklin
- Greene
- Jackson
- Miller
- Pope
- Prairie
- Scott
- Searcy
- Van Buren
- Woodruff
- White

Figure 4.2.2-4: January 2007 Ice Storms



January 2009 Ice, Rains and Flooding: A five-day storm resulted in repair costs nearly twice of those after the dual ice storms in late December 2000. This time, more than 40,000 electrical poles snapped or were damaged under the burden of the ice-laden wires or trees. The Electric Cooperatives of Arkansas replaced over 1,500 miles of

electrical wire. The financial toll from the January ice storm in north Arkansas is estimated at $500 million, with most of the cost for restoring electric utilities. The three major utilities that sustained damage from the storm say they will spend close to $460 million for repairs. Much of the cost is from the widespread collapse of power lines and utility poles. Only the nonprofit Electric Cooperatives of Arkansas, which estimated damages at $250 million, stands to receive any state or federal assistance.

February 8, 2010 Winter Storms: As an area of low pressure aloft approached from the west, snow began spreading into western Arkansas very early in the morning. Precipitation spread rapidly eastward as the morning progressed. In northern Arkansas, snow fell. Through the middle of the state, snow fell, mixed with sleet at times. By afternoon, however, much of the precipitation in the middle of the state changed over to rain and sleet. In some areas, the wintry mix changed back to snow in the evening. Farther south, rain predominated, mixed with a little sleet or snow at times. All precipitation diminished in the evening and into the early morning hours of the 9th. Most places in the northern half of Arkansas received at least 3 to 6 inches of snow. In a band about 75 miles wide, centered along a line from Clarksville and Russellville across Greenbrier to between Augusta and Brinkley, snowfall amounts of 6 to 10 inches were common.

Probability of Future Severe Winter Weather Events

Since 1996, Arkansas has experienced 310 severe winter weather events including 31 heavy snow/snowstorm events, 37 ice storm events and 60 winter storms. These numbers indicate that Arkansas can expect an average of almost 15 severe winter weather events each year, including 2.4 heavy snows, 2.3 ice storms each year, and 3.7 winter storm event in an average year. Therefore, the probability of the state experiencing future events is **“Highly Likely”**.

4.2.3 Flood Hazard Profile

This Flood hazard profile was developed in the original plan, amended in the previous update, and modified again in 2010. The Sub-Committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to flooding.

Flooding Profile

Flooding is defined as the accumulation of water within a water body and the overflow of excess water onto the adjacent floodplain, causing land that is normally dry to be inundated. Flooding is a natural process of over-bank flow. Floods may result from many causes. Most floods are caused by heavy rainfall from storms or thunderstorms that generate excessive runoff. A riverine flood is a flood caused by precipitation, runoff or snowmelt over a relatively large watershed causing flooding over wide areas and cresting in over eight hours. A flash flood is a flood caused by heavy precipitation or snowmelt over a limited watershed (typically fewer than 50 square miles), crests in eight hours or less time, and generally occurs in hilly terrain. Riverine floods have relatively low velocity, cover a large area of land, and take longer to recede, whereas flash floods have a higher velocity and may recede quickly. A flash flood can also occur when extreme amounts of precipitation fall on any terrain if the precipitation accumulates more rapidly than the terrain can allow runoff.

Flash Flooding

Flash floods pose more significant safety risks than other riverine floods because of the rapid onset, the high water velocity, the potential for channel scour and the debris load. Debris carried by floods can damage or destroy structures in its path. In addition, more than one flood crest may result from a series of fast moving storms. Sudden destruction of structures and the washout of access routes may result in the loss of life.

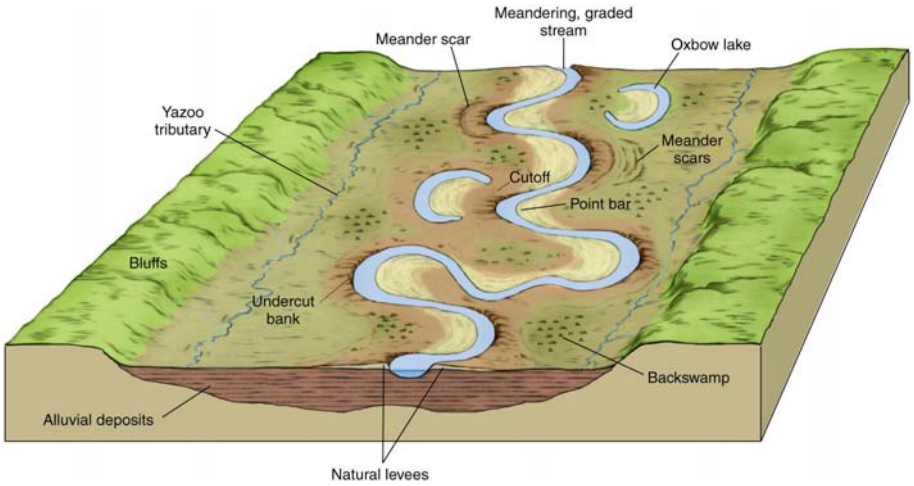
Flood damage is proportional to the volume and the velocity of the water. Floods are extremely dangerous because they cause damage through inundation and soaking as well as the incredible force of moving water. High volumes of water can move heavy

objects and undermine roads and bridges. Floods often occur without local precipitation as a result of precipitation upstream. Although rural flooding is dangerous to fewer people and may be less costly than urban flooding, it can cause great damage to agricultural operations. Flooding can also facilitate other hazards such as landslides, or cause other hazards such as hazardous material events.

Floodplains

A floodplain is the normally dry, flat area of land adjoining the channel of a stream, watercourse or other water body, such as a lake or reservoir that is susceptible to inundation by floodwater and stream-borne sediments. Floodplains can be managed to mitigate against damage from floodwaters. The floodplain is the area of overflow of floodwaters, and zoning regulations commonly prohibit development in this area. The floodway is the channel of a watercourse and those portions of the adjoining floodplain providing the passage of the 100-year flood stage waters. The floodway fringe is the portion of the floodplain where complete development will cause significant rise (typically one foot) in the 100-year floodplain. Flood stage is water elevation at which damage to personal property is significant. Damage from flooding depends on the amount of cultural development. Locally heavy precipitation may produce flooding in areas other than delineated floodplains or along recognized drainage channels. If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems.

Despite the hazards, scenic floodplains commonly are highly populated. Development occurs on floodplains because there are no topographic constraints on construction (no hills), they contain fertile alluvial soil and an abundant water supply, and they provide access to transportation, commerce, energy and wastewater disposal. Floodplains cover a very large area that cannot be left totally undeveloped. This, coupled with ignorance of flood hazards and the extent of the floodplain, typically leads to unsound development on floodplain land.



Floodplains offer many benefits to communities. Floodplains act as natural flood-storage areas, decreasing the destructive force of floodwaters downstream. Biological activity, chemical processes and filtration of floodwaters on floodplains can reduce flood-generated pollution from agricultural and urban runoff and sewage overflow. Floodplain vegetation reduces soil erosion, reduces velocity of floodwaters, traps floodwater

sediment increasing soil fertility and reduces sediment load downstream. High sediment load reduces biological activity and aesthetic and recreational value. Floodplain vegetation also shades streams, reducing water temperature and providing a habitat for organisms promoting biodiversity and productivity. Floodplains preserve and recharge groundwater supplies and provide opportunities for recreation, outdoor education and scientific study. Urban expansion may encourage development in floodplains that would otherwise be reserved for these benefits.

In addition to floodplains, floods occur in low areas where drainage is poor. Impermeable soils and flat terrain are susceptible to flooding when rainfall rates exceed the ability of the soil to carry water away. High groundwater levels may also cause flooding problems even where there is no surface flooding. Basements are susceptible to flooding from high groundwater levels. Seasonally, high groundwater is common in many areas of Arkansas, while in other areas groundwater is high only after long periods of above average precipitation.

Groundwater Levels

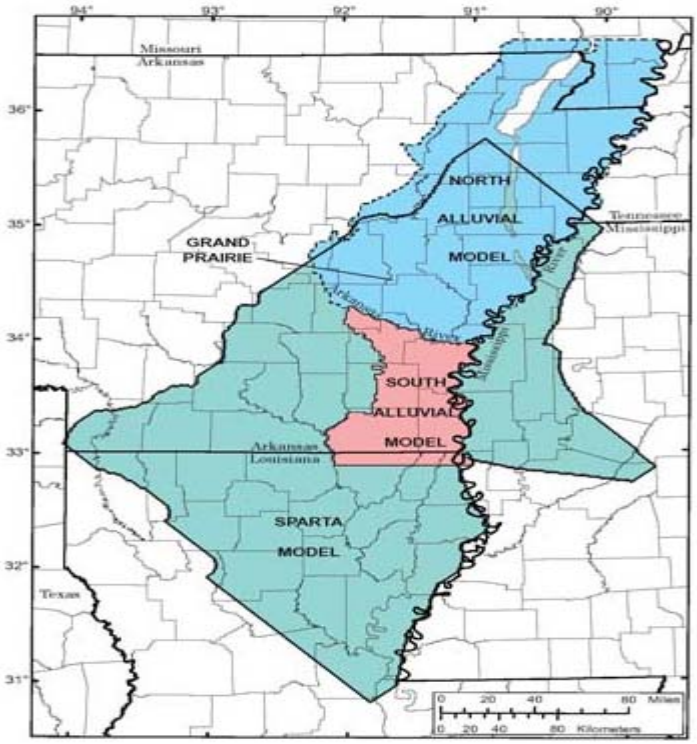
The HMP Sub-Committee continually researches information about flooding and the natural conditions that cause these events. Ground water levels in the state effect a number of items.

- Flooding and flash flooding
- Drought
- Expansive soils

Arkansas is the fourth largest user of ground water in the United States. The Mississippi River Valley alluvial aquifer (alluvial aquifer) is a water-bearing assemblage of gravels and sands that underlies most of eastern Arkansas and several adjacent states. Ground-water withdrawals have caused cones of depressions to develop in the alluvial aquifer water-level surface, some as much as 100 feet deep. Long-term water-level measurements show an average annual decline of one foot per year in some areas.

The Sparta Aquifer is largely a confined aquifer of regional importance that comprises a sequence of unconsolidated sand, silt and clay units. Several large cones of depression have developed in the Sparta Aquifer, causing hydraulic heads to drop below the top of the formation in parts of central and southern Arkansas and several areas in north-central Louisiana.

Figure 4.2.3-1: Location of Sparta Aquifer



Source: GeoStor

- In November 2003, the USGS issued Fact Sheet 103-03 entitled Ground-Water Depletion Across the Nation. In this study, it was stated that continued pumping since the 1920s by many industrial and municipal users from the underlying Sparta Aquifer have caused significant water-level declines in Arkansas, Louisiana, Mississippi and Tennessee. Such declines have caused concerns about the Sparta's sustainability resulting in the aquifer being declared "critical" in Arkansas.
- The Memphis, Tennessee and West Memphis, Arkansas area is one of the largest metropolitan areas in the world that relies exclusively on ground water for municipal supply. These large withdrawals have caused regional water-level declines of up to 70 feet, and have resulted in interstate concerns over continued and increased pumping in the Memphis area.
- In July 2006, the USGS issued another report on the Sparta Aquifer and the area around Union County Arkansas. They have now begun a project to monitor this situation by analyzing the water levels and the water quality.
- In 2009, the USGS issued a report on the Cockfield and Wilcox Aquifers and the areas surrounding them. This report can be found at the USGS website.

Dam Failure

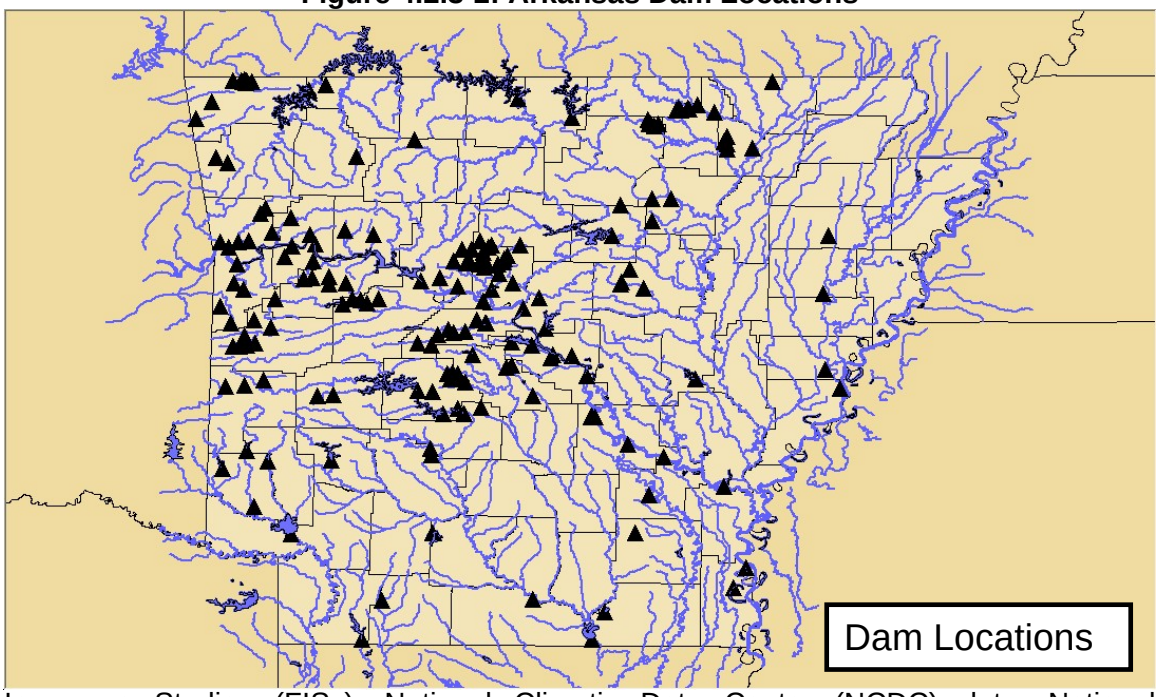
The failure of a dam may also result in a flood event. A dam impounds water in the upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot of water is the volume that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Dam failures are not routine, but the results can be devastating. Two factors influence the potential severity of full or partial dam failure: (1) The amount of water impounded, and (2) The density, type, and value of development downstream. Each dam listed in the National Inventory of Dams is assigned a high, significant or low hazard classification based on potential of loss to life and property should the dam fail. Hazard classification is updated continually based on development and changing demographics upstream and downstream.

A number of outside forces can cause dam failures. Included in these are prolonged periods of rain or flooding, landslides into reservoirs, failure of dams upstream, high winds and earthquakes. The most common cause of dam failure is prolonged rainfall that produces flooding. Failure, due to natural events, such as earthquakes or landslides, is significant because there is little to no advance warning. It is important to note that dam failures can result from natural events, human-induced events or a combination. Improper design and maintenance, inadequate spillway capacity or internal erosion or piping within a dam may also cause failure. People, property and infrastructure downstream of dams are subject to devastating damage in the event of failure.

National statistics show that overtopping of dams due to inadequate spillway design, debris blockage of spillways or settlement of the dam crest, account for 34% of all dam failures. Foundation defects, including settlement and slope instability, account for 30% of all failures. Piping and seepage cause 20% of national dam failures. This includes internal erosion caused by seepage, seepage and erosion along hydraulic structures, leakage through animal burrows and cracks in the dam. The remaining 16% of failures are caused by other means.

The map below shows all the recorded dam locations from the National Inventory of Dams along with the major waterways and lakes within the state. The areas below dams, called tailings, are at risk to sudden and intense flooding in the event of a dam breach. Current lists of all dams are available at the Office of the Arkansas Department of Emergency Management.

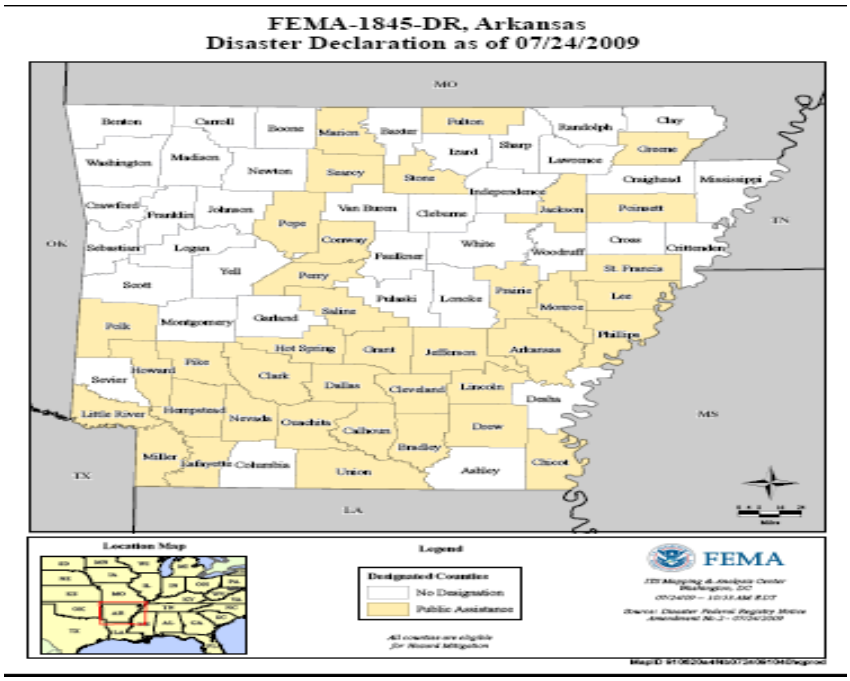
Figure 4.2.3-2: Arkansas Dam Locations

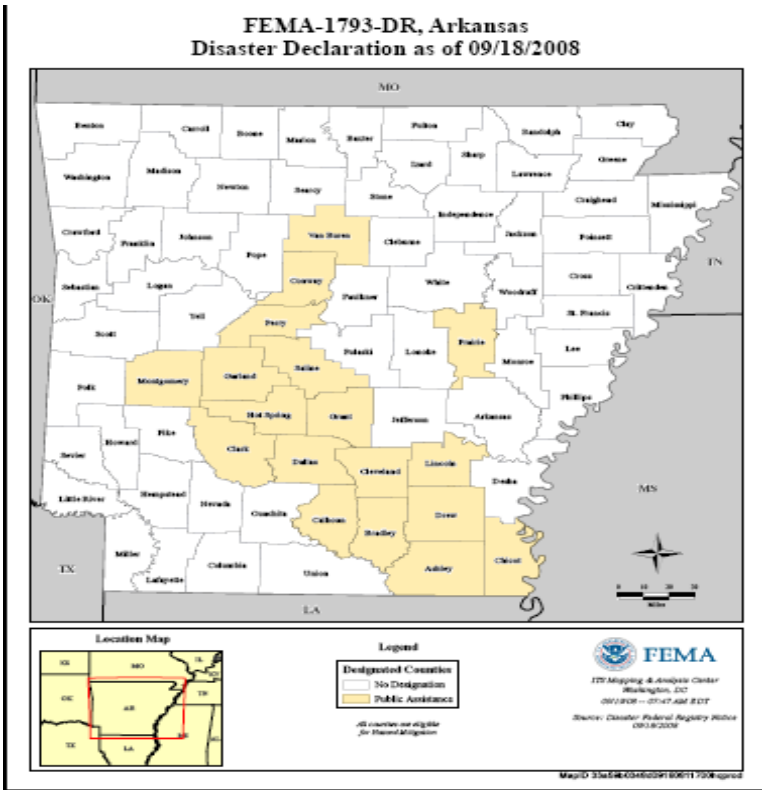


Insurance Studies (FISs), National Climatic Data Center (NCDC) data, National Inventory of Dams data, and locations of past federally declared flood disasters, the Hazard Mitigation Planning Sub-Committee determined that every county in the state can be affected by flooding. As a high-level example of the geographic dispersion of flooding throughout the state, the HMP Sub-Committee reviewed the counties affected by the past federally declared events that involved flooding. Since 1957 when FEMA began this program, practically every county has been part of a declared flooding event.

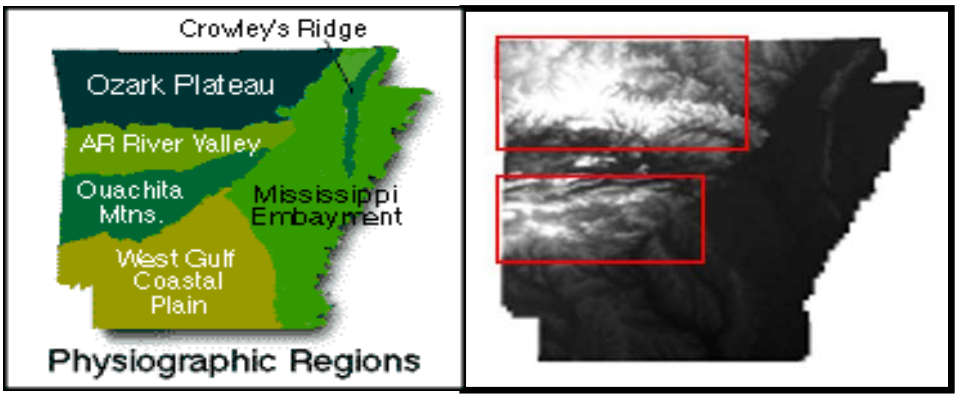
The following two maps show the counties impacted by some of the declared flooding events since the previous update. Based on FEMA records, over 60 of the 75 Arkansas counties have been part of FEMA declared flooding-related events in only the past five years.

Figure 4.2.3-3: FEMA Flooding Disaster Declaration by county



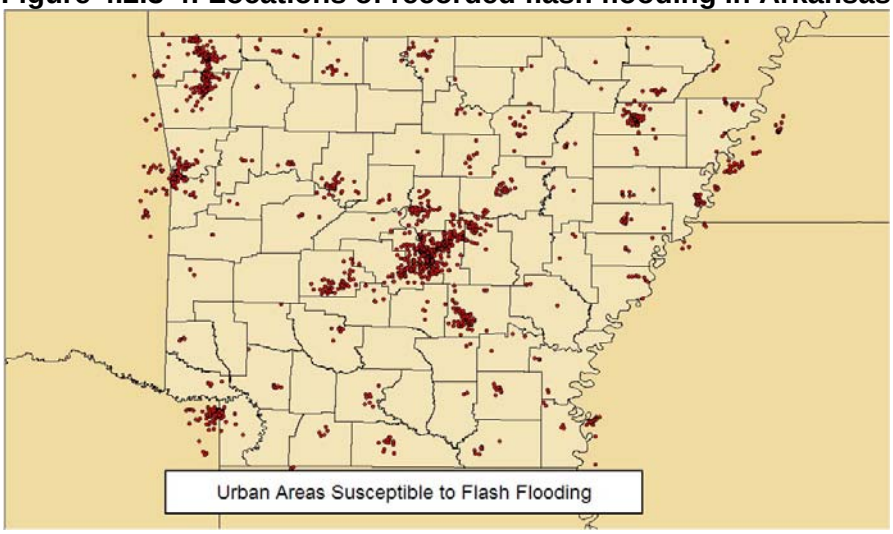


A variety of factors affect the type and severity of flooding throughout the state, including topography, geology, rainfall characteristics and urban development and infrastructure. Flash floods are most common in the western half of the state. The Ozark Plateaus, Ouachita Mountains and the Gulf Coastal Plain Physiographic Provinces that comprise much of this area exhibit high to moderate relief, steep to moderate slopes and bedrock with low permeability, all facilitating rapid runoff and the consequent potential for flash floods. Urban development in this part of the state exacerbates the flash flooding problem. The following two maps show the various topographic areas of the state related to flooding. The lighter areas on the maps show the more elevated areas of the state. The lightest areas show the highest elevations.



The map below shows the locations of all recorded flash flooding events in the state. Due to the levels of development, the urban areas experience a higher amount of flash flooding than the rural parts of the state. The map below is the latest on file at GeoStor.

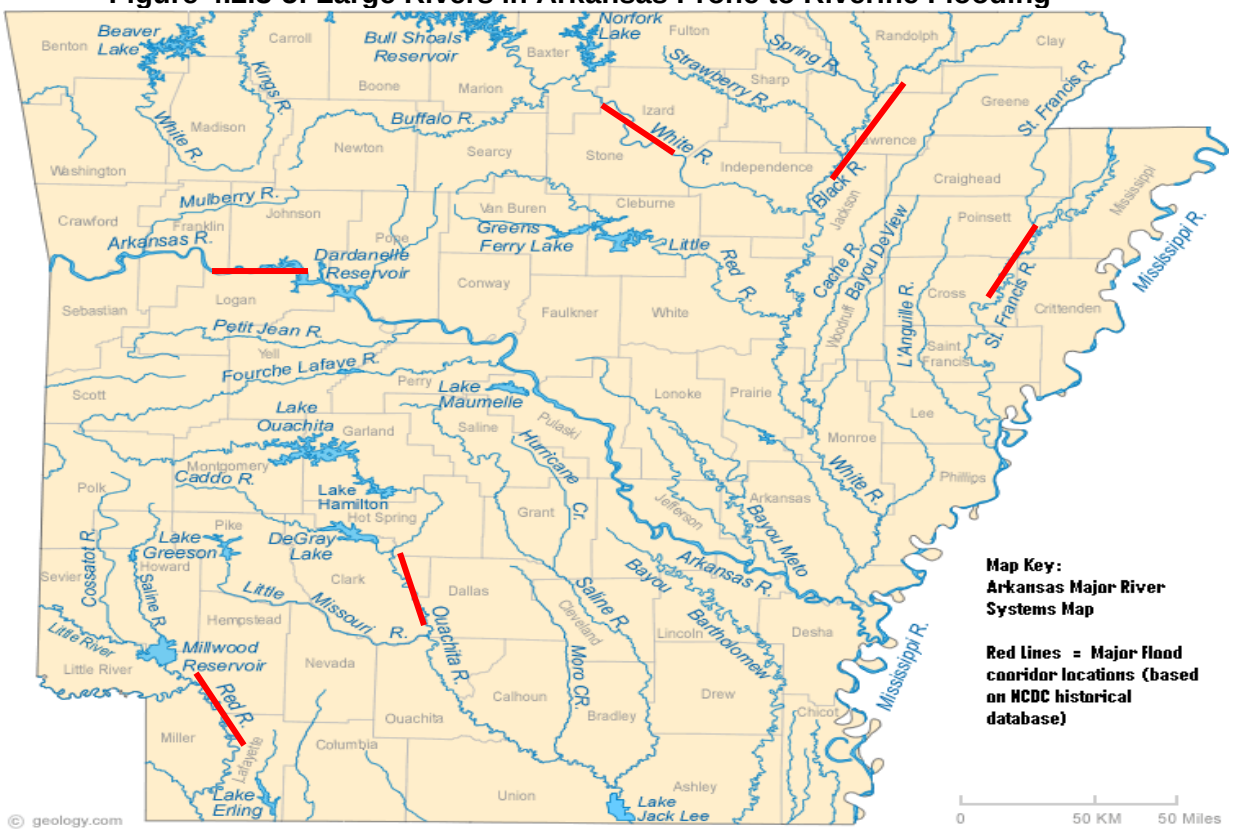
Figure 4.2.3-4: Locations of recorded flash flooding in Arkansas



Source: Geostor

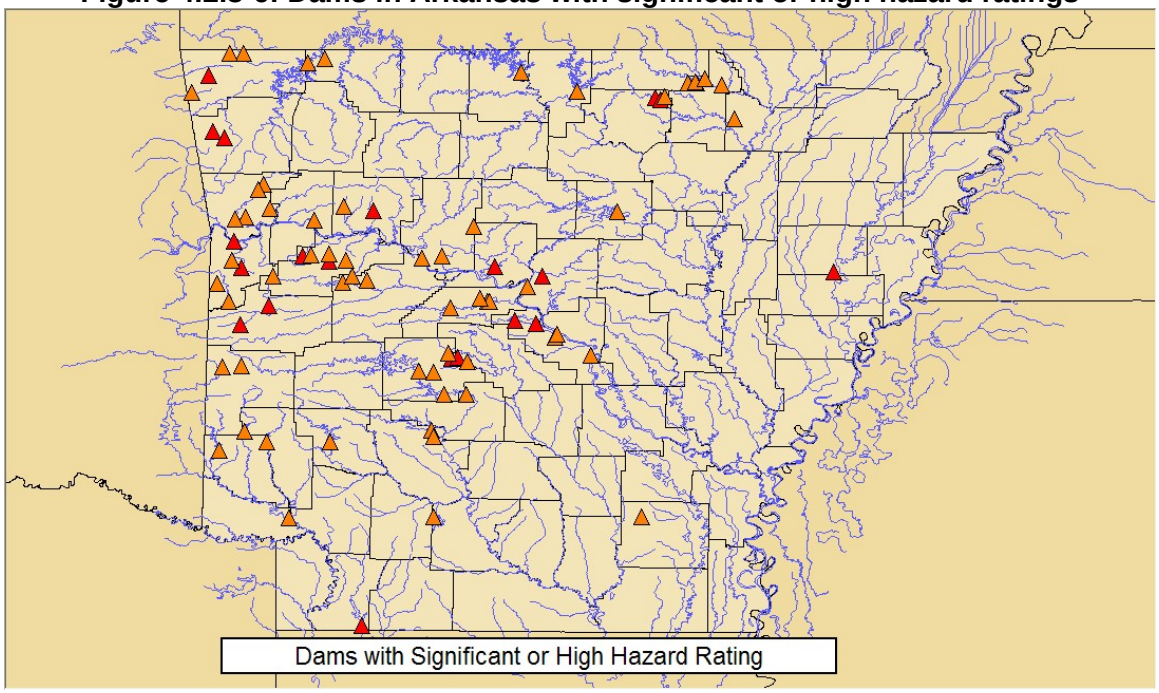
Riverine floods are most common in the Mississippi Embayment of the eastern half of the state and along the Arkansas River in the Arkansas Valley Province in the western part of the state. These areas exhibit low relief and typically have flat, broad floodplains. Larger rivers including the Mississippi, Arkansas, St. Francis, White, Ouachita and Red Rivers, are most prone to riverine flooding.

Figure 4.2.3-5: Large Rivers in Arkansas Prone to Riverine Flooding



Dams in Arkansas are located throughout the state but are most common in the Ouachita Mountains and the Arkansas Valley Physiographic Provinces of central and western Arkansas where the topography is conducive to deep impoundments. Dams are also common on the north-south trending Crowley's Ridge of eastern Arkansas, the only area of significant topographic relief in the Mississippi Alluvial Plain. There are also a large number of dams in southeastern Arkansas, largely in Arkansas County, related to agricultural activity. Figure 4.2.3-6 on the following page displays the dams in Arkansas that have been given a hazard rating by the National Inventory of Dams. Of the 177 dams in the Inventory, 20 are designated as a "Significant" hazard. These are designated in red. There are 60 locations listed as "High" hazard and these are shown in orange. A detailed list of all high and significant hazard dams can be obtained through ADEM.

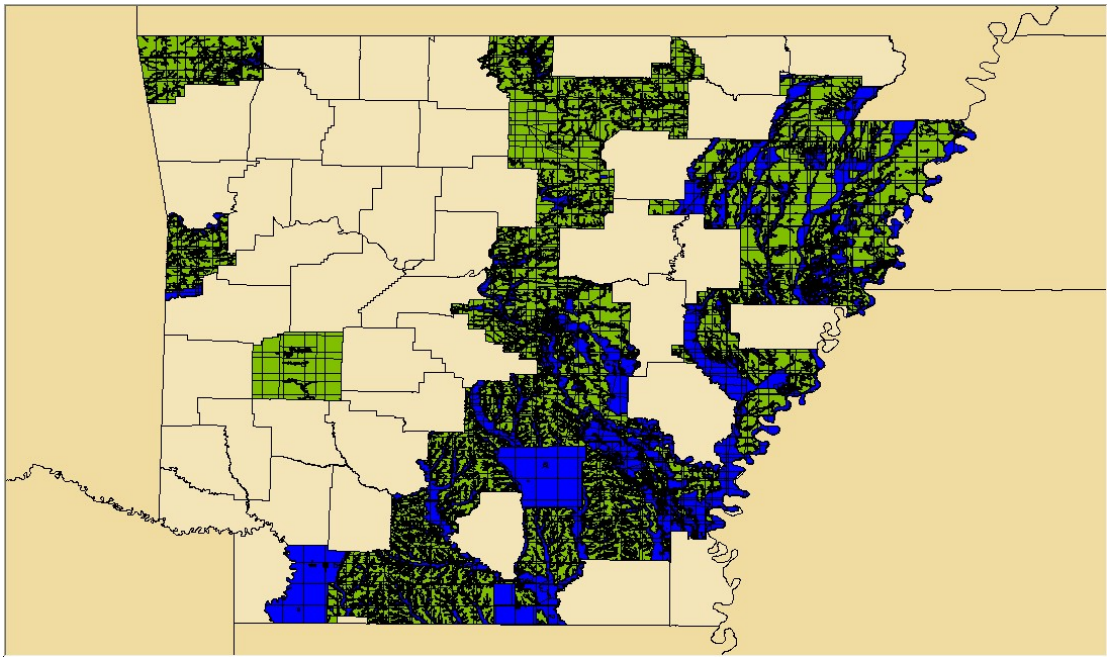
Figure 4.2.3-6: Dams in Arkansas with significant or high hazard ratings



Source: GeoStor

Of the 75 counties in the state, 33 have digital Q3 floodplain data. For these areas, the 100-year and the 500-year floodplain hazard areas can be identified and assessed. On the map below, the areas in blue are within the 100 and the 500-year floodplain boundaries. The map below is the latest on file at GeoStor.

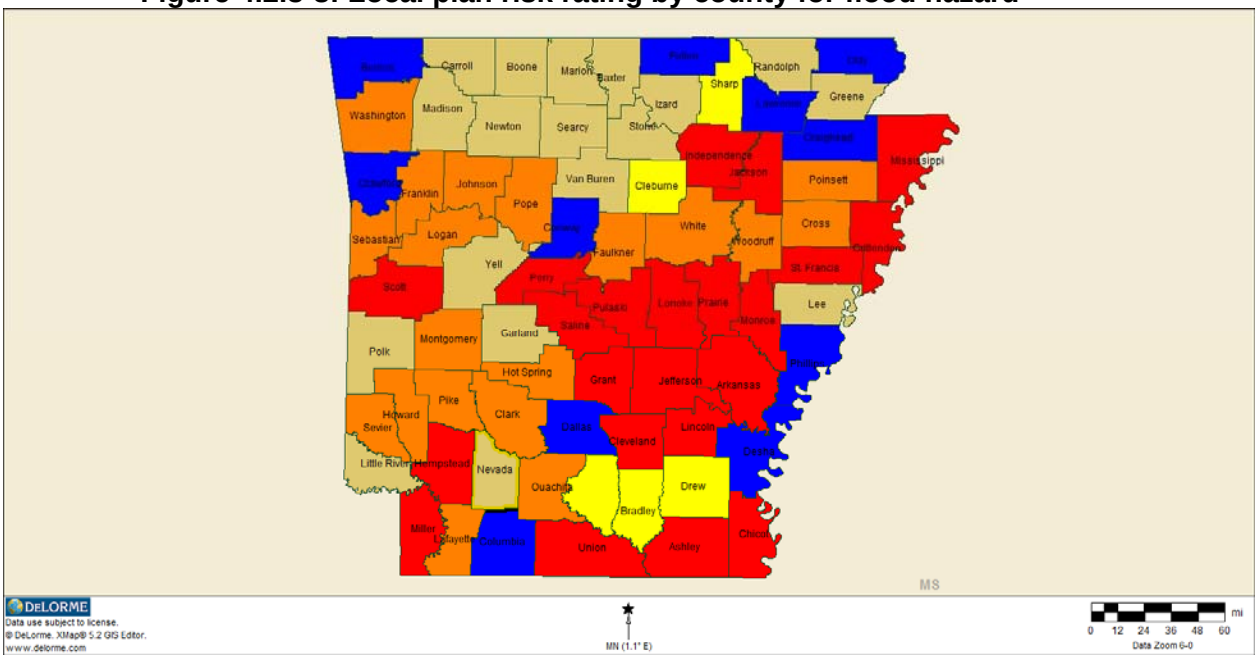
Figure 4.2.3-7: Arkansas counties within the 100 and the 500-year floodplain boundaries



Source: Geostor

As of January 2010, sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map_displays jurisdictional rankings for the flooding hazard. Note that this map does not include City or School District Plans.

Figure 4.2.3-8: Local plan risk rating by county for flood hazard



Source: Bold Planning Solutions

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Flood Hazard totals:

High Risk Jurisdictions	22
Medium-High Risk Jurisctions	19
Medium Risk Jurisdictions	5
No Hazard Score/Listing	11

Previous Flooding Occurrences

The HMP Sub-Committee continually tracks flooding events in order to better understand this overall hazard.

- Since 1957, 33 of the 58 FEMA declared disaster events involved flooding.
- In the last 10 years, 12 of the 19 FEMA declared events involved flooding.
- The NCDC database lists over 2,000 flooding events in the state since 1996.
- The NCDC database lists over 1,000 flood events since January 2003.
- From 2003 through 2010, 31 events were declared by the state. Of these, 17 involved flooding.
- The state averages over 100 flooding events every year with approximately one major event each year.

Repetitive Loss Structures

A high priority in Arkansas and nationwide is the reduction of losses to repetitive loss structures. These structures strain the National Flood Insurance Fund. They increase the NFIP's annual losses, the need for borrowing, and they drain resources needed to prepare for catastrophic events. The NFIP defined repetitive loss property as "any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period since 1978. At least two of the claims must be more than 10-days apart". Provided below is a summary of the repetitive loss structures in Arkansas listed by county.

Table 4.2.3-1: Repetitve Loss Structures in Arkansas by County (April 2010)

County	# of Properties	# Mitigated	# Insured	Claims Paid ($)	# of Losses	# of SRL Properties
Arkansas	3	1	2	47,278.81	7	0
Ashely	4	0	3	104,675.15	10	0
Baxter	16	3	11	1,523,594.15	34	1
Benton	6	0	0	521,684.19	16	1
Boone	1	0	1	6,585.24	2	0
Bradley	12	1	6	448,312.28	29	1
Chicot	12	1	5	398,863.18	33	2
Clark	4	0	4	144,997.15	8	0
Clay	2	0	2	43,782.67	5	0
Cleburme	1	1	1	69,835.26	2	0
Conway	2	0	2	60,646.34	6	1
Craighead	37	4	16	2,100,616.22	99	5
Crawford	3	2	1	437,551.65	7	1
Crittenden	61	37	13	1,886,974.83	188	4
Cross	4	0	1	51,569.96	9	0
Desha	18	3	4	365,484.58	39	0
Drew	1	0	1	190,221.14	6	1
Faulkner	10	0	4	598,864.85	27	1
Franklin	4	0	4	414,779.32	18	1
Fulton	4	1	4	315,151.43	11	1
Garland	17	2	8	963,870.78	43	3
Grant	3	0	2	48,625.31	6	0
Greene	4	0	2	27,623.76	8	0
Howard	2	1	0	41,925.78	5	0
Independence	22	0	8	735,866.25	50	1
Izard	10	0	3	414,551.28	22	1

Jackson	9	1	5	306,141.49	24	1
Jefferson	37	5	10	1,812,216.39	139	6
Lawrence	2	0	1	94,416.79	5	1
Lee	4	2	0	70,148.74	10	0
Lincoln	1	0	0	31,384.21	4	0
Little River	1	0	1	81,503.92	2	0
Lonoke	8	0	2	226,855.92	18	1
Miller	7	2	2	108,452.72	25	1
Mississippi	2	0	1	73,744.40	6	0
Monroe	4	1	1	39,204.56	9	0
Newton	2	0	1	67,265.20	4	1
Ouachita	7	0	6	213,261.64	13	0
Phillips	47	8	5	1,606,302.47	176	8
Poinsett	3	0	1	74,545.53	6	0
Polk	1	0	1	15,422.88	2	0
Pope	5	1	2	268,186.63	14	1
Pulaski	99	15	45	5,672,902.30	283	9
Randolph	5	0	3	340,806.91	10	1
Saline	26	0	11	1,359,078.49	74	5
Sebastian	17	2	6	1,533,396.69	59	2
Sharp	10	0	7	470,233.89	22	0
Union	8	0	6	160,611.78	19	0
Van Buren	1	0	1	19,826.21	2	0
Washington	10	0	5	460,039.84	23	1
White	4	0	3	323,773.89	9	0
Yell	1	0	0	7,998,97	2	0

Severe Repetitive Loss (SRL) Data

An SRL property is defined as a **residential property** that is covered under an NFIP flood insurance policy and:

(a) That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or

(b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both (a) and (b) above, at least two of the referenced claims must have occurred within any 10-year period, and must be greater than 10 days apart.

(Source: http://www.fema.gov)

The following table from ADEM shows the SRL properties within the State of Arkansas as of 04/30/2010

Table 4.2.3-2: Severe Repetitive Loss Overview

Total SRL Properties	***SRL Total Losses***	***$ Losses Total***
63	325	8,554,667.39

Flood of 1927: The Flood of 1927 was the most devastating in Arkansas' history. Almost one-fourth of Arkansas was under water. The Mississippi River was 60 miles wide in some places. Rising floodwaters drove about 143,000 people out of their homes, and hundreds died. The Flood of 1927 was caused by a combination of events. Early snowmelts in Canada caused the upper Mississippi River to swell, while huge rainfalls occurred in the upper mid-west. By April, heavy rain fell over the lower Mississippi Delta. On April 10, four inches of rain fell on some parts of Arkansas. On April 20, a record rainfall of almost nine inches fell on the Little Rock area, with more than seven inches falling in just four hours. The swollen Mississippi River began backing up the Arkansas, White and St. Francis Rivers. All levees on the Arkansas River between Fort Smith and Little Rock failed. Breaks in the levees were responsible for flooding towns and vast farming areas. More than 1,376,000 acres of tilled farmland were flooded. Some plantations suffered so much flood damage that they never recovered.

Official reports suggested that between 91 and 120 people died in Arkansas as a result of the flood, but numbers were not exact due to widespread chaos and inadequate reports of losses. Without the efforts of the Red Cross, many more lives may have been lost due to disease or exposure. By the time floodwaters receded in July, more than 325,000 refugees had been cared for in Red Cross camps. The Red Cross helped provide safe drinking water, food and milk, gave hundreds of thousands of typhoid inoculations, controlled mosquitoes and malaria, disposed of dead animals and gave medical attention to the sick and wounded. They also organized a huge rescue force of boats that searched around the clock for victims huddled on high ground, perched on rooftops or clinging to trees.

The Floods of 1990: One of the most costly years in state history in terms of flooding was 1990, as riverine and flash floods caused upwards of $60,000,000 damage and caused two fatalities. Flash flood events caused by heavy rains from March 3-5, 1990, affected 20 counties in the western half of the state. Schools were closed, businesses and government agencies were closed and/or flooded, automobiles washed off roads, school buses were stranded and hundreds of families were evacuated. Damage estimated by the NWS to washed-out roads and bridges in these counties was $754,000. Total damage estimates were unavailable from the NWS, but damage reported in the Arkansas Democrat Gazette was estimated to be over $10,000,000. In addition, the Ouachita River overflowed its banks from Arkadelphia to Camden in March, causing millions of dollars of damage to agricultural operations.

Flood Waters of 1990 Overtake a Highway

Flash flooding events occurred in 20 counties in the western half of the state on May 3, 1990, caused by four to six inches of rain in a 24-hour period. This flash flood event resulted in an estimated $1,963,000 of damage to public facilities. Riverine flood events in May caused over $41,000,000 of damage to public facilities, private property and agricultural operations. The Red River was over flood stage from May 1 to May 22, 1990, causing $14,000,000 in short-term damage. Of this total, $2,700,000 of damage was caused by debris that was carried by the floodwaters. A total of $6,900,000 of agricultural damage was reported with $1,500,000 of damage to cattle operations alone. Long-term damage is extremely difficult to assess. For example, some fields were left with a three-foot thickness of silt and mud deposits, making it impossible for machinery to get into these fields. All tributaries of the Red River were subject to flood events at some point in this timeframe. The Arkansas River was also at flood stage for much of the month; the U. S. Army Corps of Engineers (USACOE) reported the highest crest on record for the McClellan-Kerr Navigation System. Damage to public facilities was estimated at over $10,000,000, with private property owners suffering over $7,000,000 of losses, and agricultural concerns ravaged by $11,000,000 of damage. Fort Smith suffered $2,000,000 of losses to city property. North Little Rock paid more than $1,500,000 for repair to the municipal sewer plant and the hydroelectric plant on the Arkansas River. More than $10,000,000 in losses were estimated for Jefferson County.

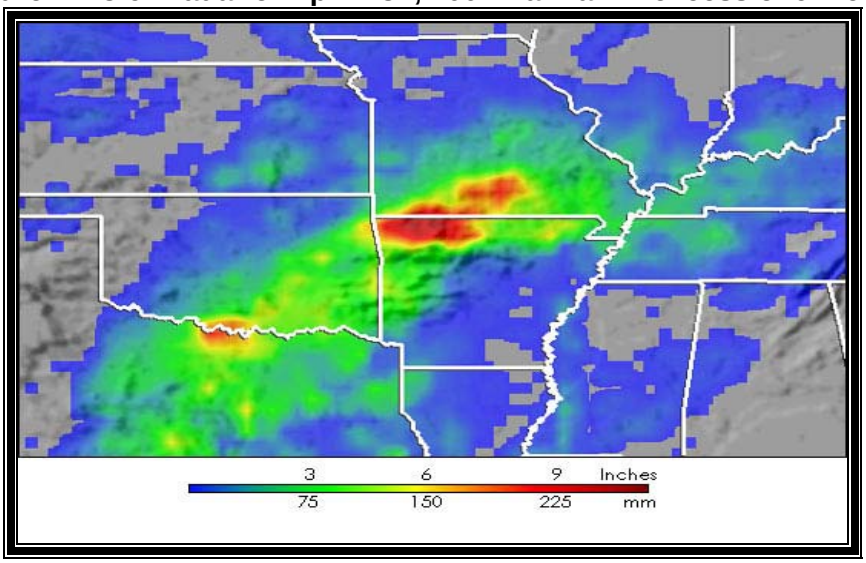
One of the most memorable flash floods in the history of the state also took place in May of 1990, as two separate four to six feet high walls of water moved down Central Avenue in Hot Springs, leaving businesses along Bathhouse Row inundated in up to six feet of floodwater. Cars and drivers floated down the street. Approximately 13 inches of rain fell in Garland County over a nine-hour period. Carpenter Dam Bridge over Lake Catherine was washed away. Water released from Lake Hamilton flooded homes on Lake Catherine. Over 300 homes outside the Hot Springs area had to be evacuated. The NWS reported damages totaling over $100,000,000 in Arkansas due to excessive rain in May. An additional 18 counties in central, northwest and southwest Arkansas suffered between $3,000,000 and $5,000,000 damage from flash floods in June and July of 1990.

April 1997 Flash Flooding: On April 4, 1997, severe storms and heavy rains caused considerable flooding throughout the state which resulted in significant property damage and casualties in a wide area of Arkansas. Eleven inches of rain fell over a 24-hour period in Columbia County in the community of Magnolia. Floodwaters entered houses throughout the community. One foot of water accumulated in the local hospital and numerous bridges were washed out. Damage for this community alone was estimated at $11,000,000. Nearly 1/3 of the counties in Arkansas were declared federal disasters. Federally declared counties included Bradley, Cleburne, Cleveland, Columbia, Craighead, Dallas, Drew, Grant, Greene, Izard, Jackson, Jefferson, Lafayette, Lincoln, Lonoke, Monroe, Montgomery, Ouachita, Poinsett, Sharp, St. Francis, Stone, Union and Van Buren.

March 1997 Riverine Flooding: Widespread riverine flooding in 1997 occurred March 1 through March 2 along the Mississippi River Floodplain in Mississippi, Poinsett and Crittenden Counties. At least 300 residential structures were inundated to a depth of six inches to three feet above the lowest floor. Jefferson and Lincoln Counties in the West Gulf Coastal Plain along the Arkansas River also suffered significant flooding during this time frame. All five of these counties are vulnerable to repetitive flood events. Minor to moderate flooding occurred in 25 federally declared counties during this event. Damage primarily affected roads and bridges.

April 2004 Flooding: Extensive flooding occurred in north-central and northwestern Arkansas in the last two weeks of April 2004. Springtime showers and thunderstorms dumped heavy rains over parts of northwestern Arkansas and south central Missouri over the weekend. Hardest hit was northwestern Arkansas where two children were swept away by floodwaters west of Huntsville, Arkansas. Flooding was caused by heavy rainfall, as much as 15 inches over the two-week period. The Buffalo River was reported to be 25 feet over flood stage. Damage estimates for these floods from the Arkansas Department of Emergency Management were $25,000,000. Figure 4.2.3-9 below shows radar recorded during the flooding event.

Figure 4.2.3-9: Radar of April 28th, 2004 Rainfall in excess of 9 inches



Source: National Weather Service

FEMA-1861-DR Severe Storms, Tornadoes, and Flooding: On November 18, 2009, Governor Mike Beebe requested a major disaster declaration due to severe storms, tornadoes, and flooding during the period of October 29 to November 8, 2009. The Governor requested a declaration for Public Assistance including direct Federal assistance for 37 counties and Hazard Mitigation statewide. During the period of November 9-13, 2009, joint Federal, State, and local Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the State and the affected local governments, and that Federal assistance is necessary.

June 2010 Flooding: Arkansas Gov. Mike Beebe said the Red Cross estimated as many as 300 people had been in the rugged Albert Pike campground area, a part of the U.S. Forest Service, but there was no way to determine the precise number. Emergency management officials had put the death toll Friday at 20 but revised the figure to 16. The 54-unit campground was quickly inundated with water, which was rising as quickly as 8 feet per hour. The water was so violent it overturned RVs and peeled asphalt off the roads.

Dam Failure Occurences

***June 2000 Ponca Dam Failure*:** Flooding on Ponca Creek (about four inches in eight hours) and in the headwaters of the Buffalo River (six inches) caused the small (non-state permitted) earthen Ponca Dam to fail on June 17. This, and the general flooding, caused the Buffalo River to rise eight feet in one hour just below the confluence with Ponca Creek. Fortunately, the river was already closed to floaters and no one was washed away at the Ponca launch. The washout resulted in the earthen fill (which was previously leaking) to wash into the park and Buffalo National River.

July 2004 Decatur Dam Failure: Floodwaters damaged several businesses in Decatur in western Benton County when an earthen dam, too small to be permitted by the state, broke shortly after midnight on July 3, 2004. Five to six inches of rain had fallen in the area earlier in the day. One business, an auto parts store approximately 500 yards from the dam, was damaged by four feet of water. Six service-bay doors were destroyed when the water swept equipment within the shop into them. Equipment from the business was found up to a half-mile away.

Table 4.2.3-3: 2003-2010 Declared Flooding Events: The following lists all of the major events in the state that had a flooding component.

Date	Type	State/ Federal	PA/IA	Number of Counties	Counties	Damage Amount	Approved for Temporary Housing
9/1/03	Severe storms, heavy rains & flooding	State	PA	2	Izard & Sharp	$199,877.14	N/A
4/19/04	Severe storms & flooding	State Federal	PA/IA	18	Baxter, Boone, Carroll, Crawford, Franklin, Independence, Izard, Jackson, Johnson, Madison, Marion, Newton, Randolph, Scott, Searcy, Stone, Washington & Woodruff	$10,040,694.89	53
5/30/04	Severe storms & flooding	State Federal	PA/IA	15	Bradley, Calhoun, Clark, Columbia, Hempstead, Hot Spring, Howard, Lafayette, Little River, Nevada, Ouachita, Pike, Sevier, Union & Woodruff	$5,175,322.67	65
6/16/04	Severe flooding	State	IA	1	Sebastian	$300,000.00	20
6/30/04	Severe storms, flooding & heavy winds	State	IA	7	Benton, Carroll, Crawford, Franklin, Independence, Phillips, & Sebastian	$1,050,000.00	42
7/2/04	Severe storms, heavy rains & flooding	State	PA	1	Carroll	$42,346.26	N/A
7/16/04	Severe flooding	State	IA	1	Ashley	$200,000.00	2
10/27/04	Severe storms, heavy rains & flooding	State	PA	1	Franklin	$101,023.91	N/A
7/16/05	Severe storms & flooding	State	IA	1	Pulaski	$87,117.54	4
8/26/05	Severe storms, heavy rain & flooding	State	PA	1	Cross	$231,352.20	N/A
3/9/06	Severe storms & flooding	State	PA/IA	15	Benton, Carroll, Clay, Cross, Faulkner, Fulton, Garland, Greene, Izard, Jackson, Little River, Pulaski, Randolph, White & Woodruff	$312,672.00	23
3/19/06	Flooding	State	PA	1	Little River	$84,326.57	N/A
4/2/06	Severe storms, tornadoes & flooding	State Federal	PA/IA	9	Conway, Crittenden, Cross, Fulton, Greene, Hot Spring,	$3,746,802.41	62

					Lawrence, Randolph & White		
9/22/06	Severe storms, tornadoes & flooding	State	PA/IA	6	Clay, Fulton, Izard, Lawrence, Randolph & Sharp	$2,089,979.95	41
1/13/07	Heavy rains, ice & flooding	State	PA/IA	13	Benton, Cross, Franklin, Greene, Jackson, Miller, Pope, Prairie, Scott, Searcy, Van Buren, Woodruff & White	$625,123.61	77
2/12/07	Thunderstorms	State	PA	1	Fulton	$28,862.00	N/A
02/07/08	Severe Storm, Tornadoes, and Flooding	Federal	PA/IA	10	Baxter, Conway, Independence, Izard, Pope, Randolph, Sharp, Stone, Union & Van Buren		
03/26/08	Severe Storm, Tornadoes, and Flooding	Federal	PA/IA	38	Arkansas, Baxter, Benton, Boone, Carroll, Cleburne, Crawford, Cross, Desha, Fulton, Greene, Hempstead, Independence, Izard, Jackson, Jefferson, Lawrence, Lee, Logan, Lonoke, Madison, Marion, Miller, Perry, Phillips, Poinsett, Pulaski, Randolph, Saline, Searcy, Sebastian, St. Francis, Stone, White, Woodruff, Yell & Van Buren		
05/20/08	Severe Storm, Flooding, and Tornadoes	Federal	PA/IA	12	Arkansas, Benton, Cleburne, Conway, Crittenden, Grant, Lonoke, Mississippi, Phillips, Pulaski, Saline & Van Buren		
09/18/08	Severe Storm and Flooding Associated with Hurricane Gustav	Federal	PA	18	Ashley, Bradley, Calhoun, Chicot, Clark, Cleveland, Conway, Dallas, Drew, Garland, Grant, Hot Spring, Lincoln,Montgomery, Perry, Prairie, Saline, Van Buren		
06/16/09	Severe Storm, Tornadoes, and Flooding	Federal	PA	38	Arkansas, Bradley, Calhoun, Chicot, Clark, Cleveland, Conway, Dallas, Drew, Fulton, Grant, Greene, Hempstead, Hot Spring, Howard, Jackson, Jefferson,		

					Lafayette, Lee, Lincoln, Little River, Marion, Miller, Monroe, Nevada, Ouachita, Perry, Phillips, Pike, Poinsett, Polk, Pope, Prairie, St. Francis, Saline, Searcy, Stone & Union		
12/03/09	Severe Storm, Tornadoes, and Flooding	Federal	PA	37	Boone, Bradley, Calhoun, Carroll, Cleburne, Cleveland, Columbia, Conway, Cross, Dallas, Franklin, Fulton, Grant, Izard, Jackson, Johnson, Lafayette, Lawrence, Lincoln, Logan, Marion, Monroe, Nevada, Newton, Ouchita, Poinsett, Prairie, Pulaski, Randolph, St.Francis, Scott, Sharp, Stone, Union, Van Buren, White & Woodruff		
02/04/10	Severe Storms and Flooding	Federal	PA	25	Miller, Lafayette, Nevada, Hempstead, Ouchita, Calhoun, Bradley, Drew, Lincoln, Cleveland, Dallas, Clark, Grant, Jefferson, Lonoke, Pulaski, Prairie, Monroe, Woodruff, White, Jackson, Poinsett, Craighead, Greene & Clay		

Probability of Future Flood Events

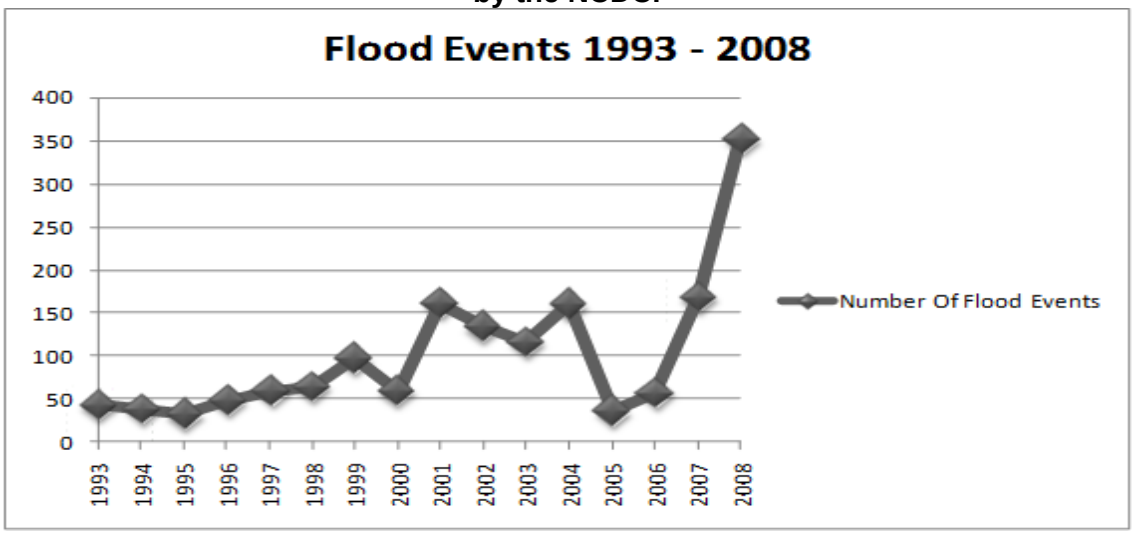
The probability of a flood event is expressed as the percent chance that a specific magnitude flood will occur in a given year. Table 4.2.3-4 summarizes the associated chance of occurrence for the type of floods the state experiences.

Table 4.2.3-4: Probability of flood occurrence

Flood Return Intervals	Chance of Occurrence in Any Given Year
10-Year	10%
50-Year	2%
100-Year	1%
500-Year	0.2%

The National Climactic Data Center (NCDC) severe storms database includes a complete database of flood events in Arkansas since 1993. The state experienced 841 flood events (23 riverine floods and 818 flash floods) over an 11-year period from January 1993 to December 2003. From January 2004 through March 2010, the state experienced an additional 1,223 flood events. Over this entire period from 1993 through 2010, Arkansas has suffered an average of over 120 flood events annually, including approximately nine major riverine flood events and an average of 101 flash flood events per year. In the past 11 years, every county in Arkansas has experienced a flash flood event. On average, 44 of the state's 75 counties are affected annually. Therefore, the probability of future flooding events is rated as **"Highly Likely"** that Arkansas will experience a flooding event**.**

Figure 4.2.3-10: Total number of flood events in Arkansas, 1993-2008 as reported by the NCDC.



Source: NCDC

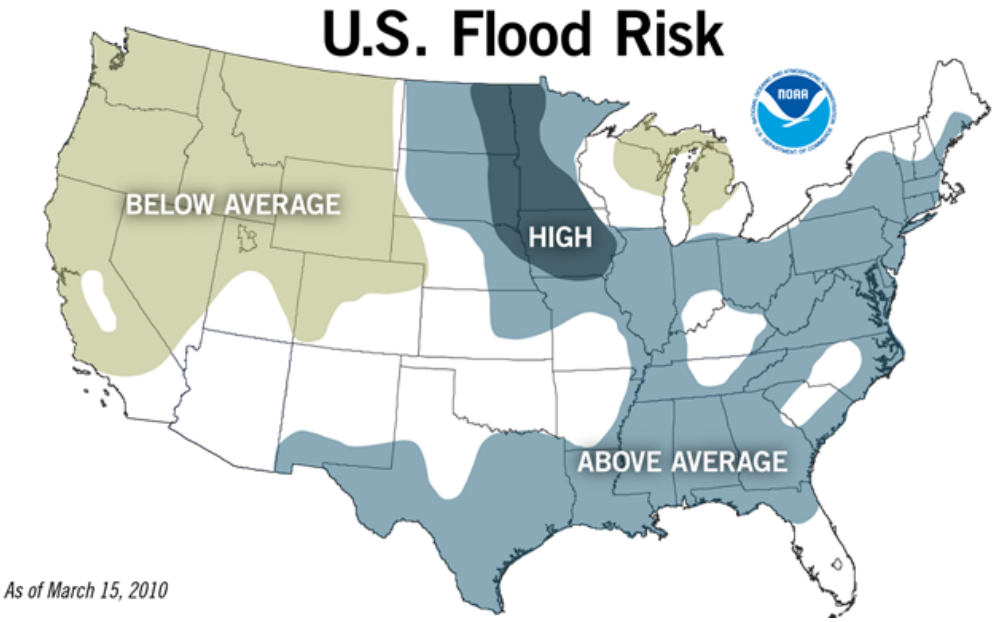
Extremely damaging flood events are indicated by declarations of Federal Disasters for flooding. Since 1957, the State of Arkansas has suffered 33 Presidential Disaster Declarations that involved flooding. This represents an average of less than one (0.5) declared flood disaster annually (or one federally declared flood disaster event every 1.7 years).

With the data collected in the Local Plan Integration section of Chapter 3, there are 22 plans that rate flooding as a “High” risk and 19 that rate flooding as a “Medium-High” risk for their counties. This equals to more than 50% of the counties in Arkansas that show flooding as a “High” or “Medium-High” risk in their jurisdiction.

According to data from the Arkansas Natural Resources Commission Dam Safety Program, no failure of a permitted dam has occurred in Arkansas. Permitted dams are those that exceed 25 feet in height and impound at least 50 acre-feet of water. Smaller, non-permitted dams have failed or been overtopped on occasion in Arkansas, although records of these events are not kept. These non-permitted dams are generally low hazard dams that lack engineering design but have not caused significant damage in the past. Based on this limited data, failure of permitted dams is not likely to be more frequent than once every 50 years. Failure of smaller non-permitted dams appears not to be more frequent than once every few years.

The HMP Sub-Committee considers flooding to be an on-going certainty with a “**Highly Likely**” probability of occurrence in the future. However, the Sub-Committee also notes that the current flood risk as calculated by NOAA is “Average” with the eastern and southern parts of the state showing “Above Average” risk for flooding.The map below details this current analysis as of March 2010.

Figure 4.2.3-11: U.S. Flood Risk 2010



Source: http://www.noaanews.noaa.gov/stories2010/images/usfloodrisk_spring2010.png

4.2.4 Earthquake Hazard Profile

This Earthquake hazard profile was developed in the original plan, amended in the previous update, and modified again in 2010. The Sub-Committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to earthquakes. The State of Arkansas is aware of the potential magnitude of a seismic event along the New Madrid Fault in the Northeast corner of the state. This hazard has received significant priority from the Governor's Office and from ADEM recently and therefore the HMP Sub-Committee has given special attention to earthquakes resulting in a new Earthquake Vulnerability Analysis to this plan. This separate document is an on-going development project coordinated with the Central US Earthquake Consortium (CUSEC) and using updated GIS data, FEMA's loss estimation tool, HAZUS-MH.

Earthquake Profile

An earthquake is the shaking or vibration of the earth caused by the sudden release of energy, usually as a result of rupture and movement of rocks along a fault. The rupture and slippage processes generate seismic waves that radiate from the fault surface in all directions. If the energy of the seismic waves is strong enough, people and structures along the earth's surface will be affected. The *focus* of an earthquake is the point within the earth where the initial rupture of the rock occurs in the earth and where the seismic waves are first released. The *epicenter* of an earthquake is the point on the ground surface directly above the focus.

Most earthquakes such as those occurring in California, Alaska and Japan occur along the boundaries between rigid tectonic plates that are in slow but constant motion near the surface of the earth. Much less commonly, earthquake zones develop within the rigid plate itself resulting in "interplate" seismicity. Such interplate earthquakes arise from a more localized system associated with structural complexities from earlier geological conditions or from variations in the strength of the lithosphere. The New Madrid Seismic Zone (NMSZ), an area of high seismic activity within the central United States (including northeastern Arkansas), is the most important example of interplate seismicity in North America.

Inspecting a crack in the ground left by an Earthquake

The Size of Earthquakes: Two scales usually express the size of an earthquake. One scale measures the cause, which is known as the *magnitude* of the earthquake. A second scale measures the effects and is known as the *intensity* of the earthquake. Magnitude is a measure of the energy released from the source beneath the earth's surface where a fault has suddenly ruptured. The magnitude scale is objective, measured by instruments at various distances and directions from the epicenter of an earthquake. A single magnitude value can be calculated for any given earthquake from seismograph readings at stations near and far from the source, even though the amplitudes of the measured waves usually diminish with distance. Magnitude scales are expressed in Arabic numbers to one decimal place. Because the magnitude classification is based on a logarithmic scale, a magnitude eight earthquake is not twice as big as a magnitude four earthquake, but rather, 10,000 times larger. The amplitude of ground motion for any scale unit (*e.g.,* 5.0) is 10 times larger than its previous unit (4.0). In terms of energy, each unit on the magnitude scale represents approximately 32 times more energy released at the source than the next lower unit. Hence, a magnitude 6.5 earthquake is actually 32 times larger than a magnitude 5.5. At present, at least four different magnitude scales are commonly used to classify earthquakes.

Earthquake *Intensity* is a measure of the severity of the ground shaking as reflected in the degree of damage to man-made structures, the amount of disturbance to the surface of the ground and the reaction of animals to the shaking. Intensity is measured in the United States by the Modified Mercalli Scale (Table 4.2.4-1). This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead it is an arbitrary ranking based on observed effects. Although earthquakes have only one magnitude, they have variable intensities that generally decrease with increasing distance away from the source. However, other factors such as local geology, shallow ground water and building type may affect the intensities of earthquakes at a site. For example, greater intensities are associated with poorly consolidated alluvial soils, high ground water levels and poor construction practices, such as un-reinforced masonry structures.

Table 4.2.4-1: Abbreviated Description of the Twelve Levels of Modified Mercalli Intensity: The average peak acceleration is given (in parenthesis) for each scale value.

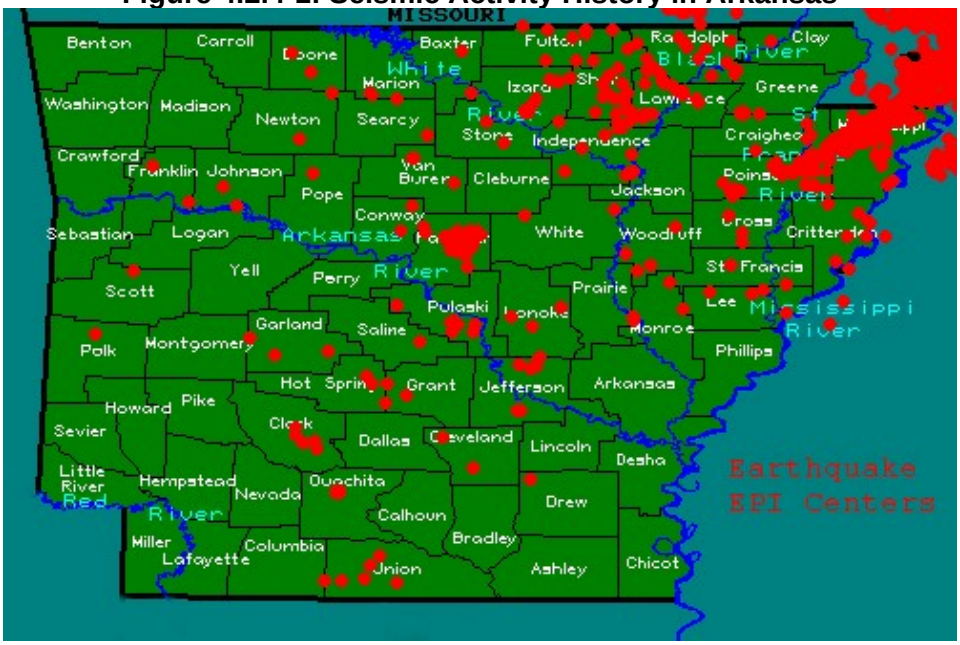
Mercalli Intensity	Damage Description
I	Not felt except by a very few under especially favorable conditions. (Negligible)
II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. (Negligible)
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated. (Negligible)
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed, walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. (0.015g-0.02g)
V	Felt by nearly everyone; many awakened. Some dishes, windows broken, cracked plaster in a few places, unstable objects overturned. Disturbances of trees, poles, and other objects sometimes noticed. Pendulum clocks may stop. (0.03g-0.04g)
VI	Felt by all, many frightened. Some heavy furniture moved, a few instances of fallen plaster and damaged chimneys. Damage slight. (0.06g-0.07g)
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, considerable damage in poorly built or badly designed structures, some chimneys broken. Noticed by persons driving cars. (0.10g-0.15g)
VIII	Damage slight in specially designed structures, considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed. (025g-0.30g)
IX	Damage considerable in specially designed structures, well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (0.50g-0.55g)
X	Some well-built wooden structures destroyed, most masonry and frame structures destroyed with foundations, ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks. (More then 0.60g)
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and landslips in soft ground. Rails bent greatly.
XII	Damage total. Waves seen on ground. Lines of sight and level are distorted. Objects thrown into the air.

Geographic Area Affected by Earthquakes

A map of historical and instrumentally located earthquakes that have occurred in Arkansas from 1811 through 2003 is presented in Figure 4.2.4-1. Note the uneven distribution of earthquakes and that not all counties have experienced a felt or recorded earthquake during this time period. This earthquake distribution can be misleading because, unlike other hazards, the event does not have to occur in a jurisdiction for that jurisdiction to be affected by it (large earthquakes can cause damage 100s of kilometers from the epicenter). Additionally, earthquakes in Arkansas are infrequent, having recurrence intervals on the order of hundreds of years or more. This relatively short earthquake record is therefore incomplete, and the entire state must be considered vulnerable to the effects of earthquakes. It is clear, however, that northeast Arkansas has the most earthquake activity in the state.

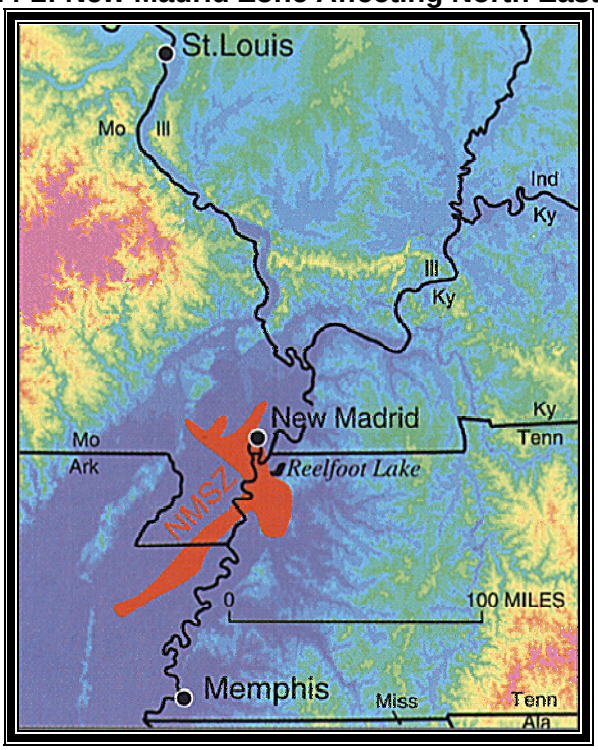
The cluster of earthquakes in northeast Arkansas in Mississippi, Craighead and Poinsett Counties is the southern end of the New Madrid Seismic Zone (NMSZ), the most seismically active region in the United States east of the Rocky Mountains.

Figure 4.2.4-1: Seismic Activity History in Arkansas



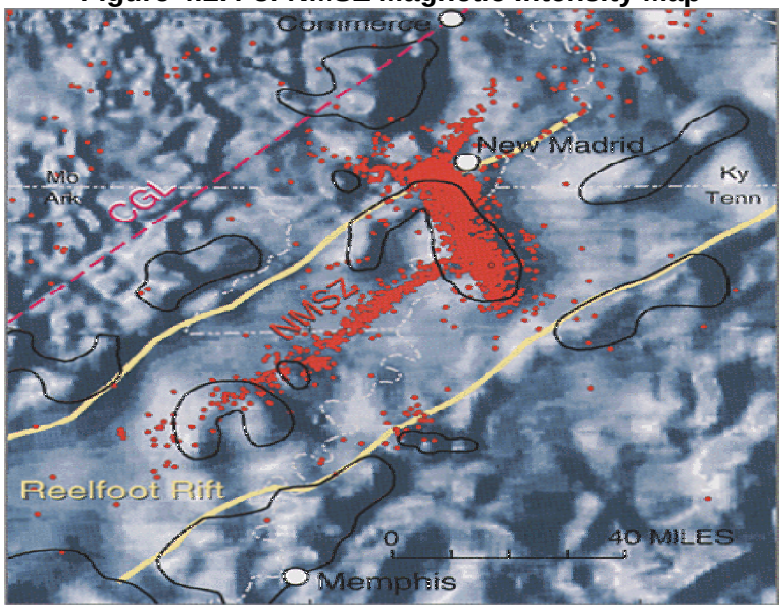
Source: USGS

Figure 4.2.4-2: New Madrid Zone Affecting North East Arkansas



Source: USGS

Figure 4.2.4-3: NMSZ Magnetic Intensity Map



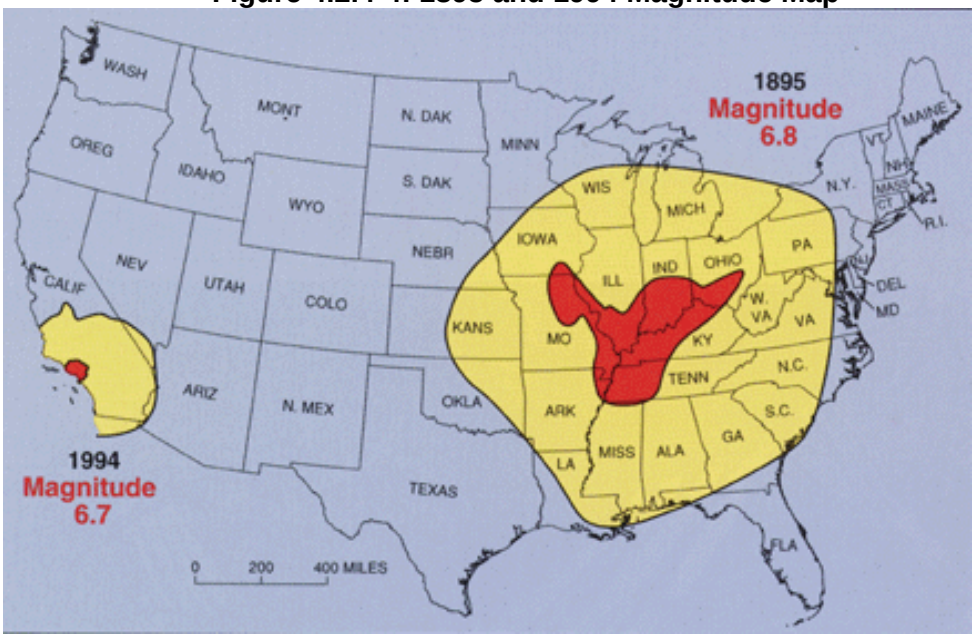
Source: USGS

Figure 4.2.4-3 is the shaded-relief magnetic map of the region surrounding the New Madrid Seismic Zone (NMSZ). This shows areas of high magnetic intensity as "hills" and those of low intensity as "valleys." The deeply buried Reelfoot Rift is expressed as a smoother appearing area between the yellow lines and the Commerce Geophysical Lineament (CGL), paralleling the rift, is traced. Red dots show the locations of the many earthquakes recorded in the NMSZ since 1974, and major igneous bodies, which show up as prominent "hills," are outlined in black.

In addition to earthquake location and recurrence, earthquake hazards also depend on how amplitudes of seismic waves die out as they move away from the earthquake source to the affected site. Research by the United State Geological Survey (USGS) and others has demonstrated that seismic wave energy decreases much more slowly in the central and eastern United States than in the west. For the same size earthquake, this leads to greater shaking and higher hazard over larger areas in the central and eastern United States.

Although earthquakes in the central and eastern United States are less frequent than in the western United States, they affect much larger areas. This is shown on the map below by two areas affected by earthquakes of similar magnitude - the 1895 Charleston, Missouri, earthquake in the New Madrid seismic zone and the 1994 Northridge, California, earthquake. Red indicates minor to major damage to buildings and their contents. Yellow indicates shaking felt, but little or no damage to objects, such as dishes.

Figure 4.2.4-4: 1895 and 1994 Magnitude Map

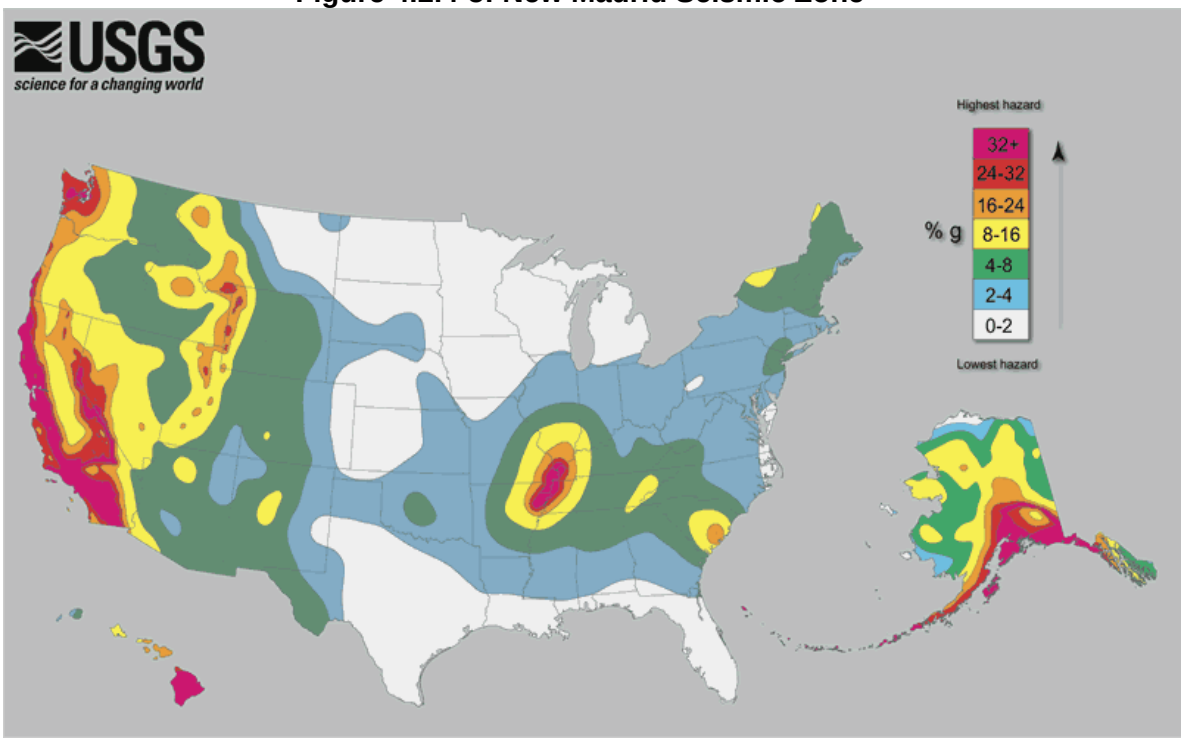


Source USGS

Earthquake shaking also may be significantly amplified or damped by the soils or rock immediately beneath a site. This is particularly true for thick sediments that underlie most of eastern and southern Arkansas. Because of local geologic variations, however, regional maps are not detailed enough to show these amplification characteristics on scales appropriate for use in urban planning, local earthquake hazard mitigation and response planning efforts.

Variation in earthquake risk in the state can be shown on USGS Seismic Hazard Maps. These maps are based on current information about the rate at which earthquakes occur in different areas and on how far strong shaking extends from earthquake sources. The earthquake ground motions that have a given probability of being exceeded in 50 years are shown using contour intervals. A map of Arkansas showing peak ground acceleration expressed as a percentage of g (g is the acceleration of a falling object due to gravity) with 10% probability of exceedance in 50 years, is shown in Figure 4.2.4-5. One of the most prominent features on this map is a zone of high hazard in northeast Arkansas that extends northeast into nearby states. This highest hazard area is the New Madrid Seismic Zone.

Figure 4.2.4-5: New Madrid Seismic Zone

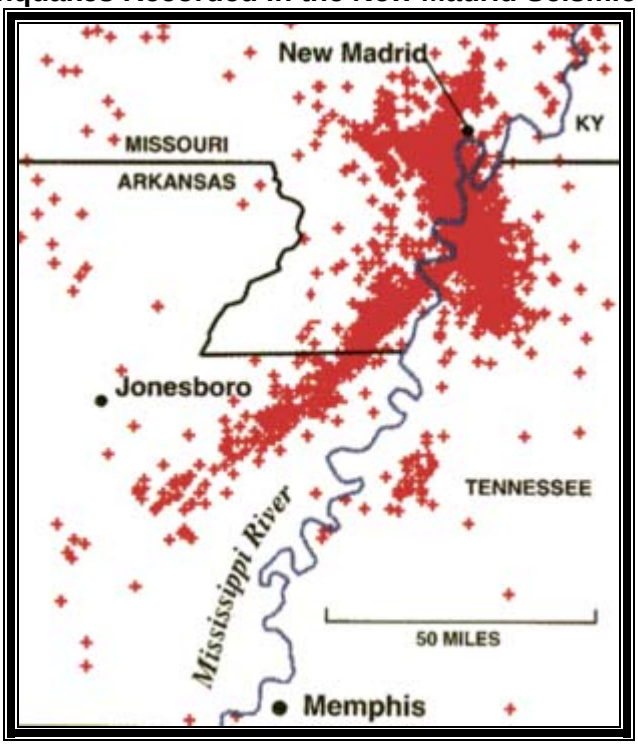


Source: USGS

Previous Earthquake Occurrences

The HMP Sub-Committee is constantly monitoring the seismic activity in the state in coordination with the Central United States Earthquake Consortium (CUSEC). The New Madrid area is constantly active; however, no large magnitude events have occurred recently. The following data profiles the previous occurrences.For the 2010 update, the Sub-Committee found the map below to be the most current map available.

Figure 4.2.4-6: Earthquakes Recorded in the New Madrid Seismic Zone (1974-2005)



Source: CUSEC

New Madrid Earthquakes: The New Madrid Seismic Zone (NMSZ), located in the northern part of the Mississippi Embayment, is the most seismically active region in eastern North America. The 1811 - 1812 series of earthquakes, commonly known as the New Madrid Earthquakes, produced damaging intensities over areas far greater than any historical earthquake in the conterminous United States. These and other historical earthquakes, as well as recent seismic activity, indicate that the New Madrid Seismic Zone has a high potential for generating damaging earthquakes. Considering the isoseismal map for the 1811 - 1812 earthquake sequence, a conclusion is easily drawn that with the current distribution of population and infrastructure within the region, a repetition of the sequence similar to that in 1811-1812 would likely cause widespread destruction of property and loss of life.

During the winter of 1811-1812, a sequence of the three largest earthquakes in the recorded history of this region occurred. The three main shocks, which occurred on December 16, 1811, January 23, 1812 and February 7, 1812, had epicentral Modified Mercalli (Table 4.2.4-1) intensities of XI, X-XI and XI-XII and estimated body-wave magnitudes (m_b) of 7.2, 7.1, and 7.4 and estimated surface-wave magnitudes (M_s) of 8.5, 8.4, and 8.8, respectively. The first of these events (December 16, 1811) occurred

on the southern branch of the fault system in eastern Arkansas near Marked Tree in Poinsett County. On the same date, two additional large events occurred on the same fault in Arkansas. Historic documents (e.g. newspapers, letters, and diaries) and geological field studies established that there was relative uplift and subsidence of the land by as much as 3m - 6m over an area of approximately 2,600 km^2. Arkansas' 40-mile-long, half-mile-wide Lake Saint Francis was formed by these earthquakes.

Since 1812, only two large earthquakes of surface-wave magnitude greater than 6.0 have occurred in the central United States, both in the New Madrid Seismic Zone. The first earthquake, which struck on January 4, 1843, was centered in Arkansas at the extreme southern end of the Arkansas branch of the NMSZ (near Marked Tree). It had a surface-wave magnitude of 6.3, and an area of Modified Mercalli intensity of VI or greater that encompassed about 60,000 square miles. The earthquake caused structural damage in Memphis, southwest Tennessee, northeast Arkansas, and the extreme northwest corner of Mississippi. The second large historic earthquake occurred near Charleston, Missouri, at the northern end of the New Madrid Seismic Zone in 1812. This earthquake had a surface-wave magnitude of 6.7.

Other Significant Earthquake Events: In addition to the 1811-1812 earthquake series, the United States Geological Survey has documented the following significant historic earthquakes in Arkansas:

Outside the Mississippi Embayment, the earliest shock listed for Arkansas occurred in October 1882. Since few reports were received from the region most affected, the epicenter of this shock is not well known. Several investigators have placed the origin near El Reno, Oklahoma, rather than western Arkansas. The shock threw bricks from chimneys at Sherman, Texas, and shook houses strongly at Fort Smith, Arkansas. It was felt in areas covering parts or all of Arkansas, Oklahoma, Kansas, Texas and Missouri, about 135,000 square miles.

An earthquake also occurred near Melbourne, about 95 miles northeast of Little Rock, in December 1883. Rockslides occurred on a railroad cut and thunderous earth noises were heard. Glassware and crockery broke and buildings shook at Melbourne.

A shock in March, 1911, about 40 miles south of Little Rock, was so severe at Pine Bluff that hundreds of excited residents crowded into the streets in panic, and windows were broken in several sections of the city. At one school, walls cracked and plaster fell on pupils. "Glasses were shaken from counters in confectionery stores and dishes were broken in many kitchens," the record notes. The shock was felt throughout southeastern Arkansas and in adjacent states.

During the period 1911 to 1933, two local intensity V earthquakes centered in the Black Rock - Pocahontas area of northeastern Arkansas; two additional intensity V tremors were noted, one near Little Rock, the other near Marked Tree, and both were felt over 30,000 square mile areas. None of these caused property damage, but they alarmed much of the populations near their centers.

The early morning of December 9, 1933, brought another minor tremor to Arkansas. Many residents of Manila, in Mississippi County, were awakened by a sharp earthquake that broke windows in several homes.

Very light tremors in 1937 and 1938 in the northeastern part of Arkansas were felt over 25,000 and 90,000 square miles of Arkansas and several surrounding states. Neither was damaging. This region is noted for relatively light-intensity shocks being felt over extremely large areas.

One of the few earthquakes centered in southwestern Arkansas occurred in June 1939. It cracked plaster in buildings at Arkadelphia and was felt throughout the southern portion of Arkansas.

After the 1939 earthquake, only light tremors (all under intensity V) were noted until January 25, 1955. The 1955 tremor was centered in northeastern Arkansas near the Missouri - Tennessee border and caused some property damage in the bordering states. At Dyersburg, Tennessee, a brick pillar supporting a porch was thrown down; at Finley, plaster, walls and ceilings cracked. Windows cracked in the small town of Hayti, Missouri. Thousands of residents over a 30,000 square mile area were awakened by this early morning event.

Arkansas was again relatively quiet seismically for 14 years, until New Year's Day of 1969. During this period, however, three shocks in northeastern Texas and southern Missouri caused some damage in Arkansas. The strongest of the three was centered in southeastern Missouri in March 1963. It cracked windows, plaster, concrete and walls in several Arkansas towns.

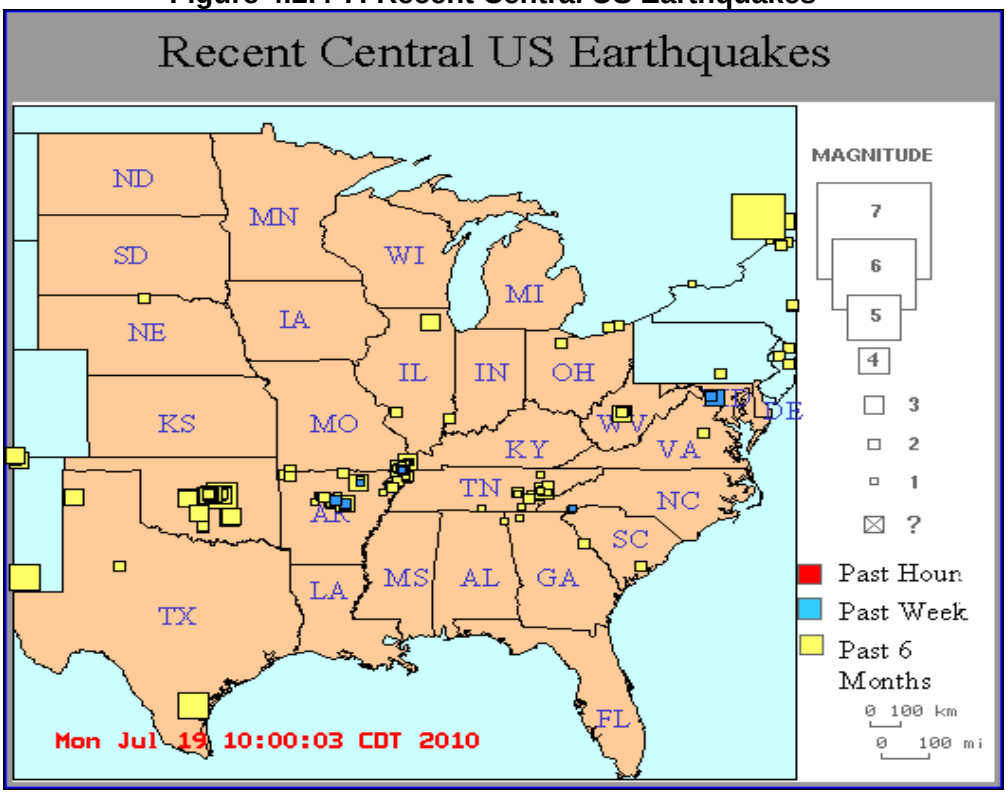
On January 1, 1969, a tremor centered about 19 miles northwest of Little Rock caused much commotion in the area. In Little Rock, plaster cracked and furniture was moved about in some homes. Trees and utility wires swayed and shook throughout a wide area. Residents in southern Missouri and western Tennessee also noted the shock.

In January of 1982 Faulkner County was jolted by a small earthquake that initiated a series of seismic events. That swarm of seismic activity lasted for years and produced over 40,000 earthquakes. In 1982 thousands of events occurred in a relatively short period of time, over 19,000 during the first year. Most of the thousands of seismic events were too small to be felt but at least 93 earthquakes were felt in the local area by at least one person during that first year. Three earthquakes of the 1982 Enola series were magnitude four or greater, with the largest being 4.5.

In May of 2001, central Arkansas was shaken by an earthquake with a 4.4 magnitude. The epicenter of this earthquake was located in Faulkner County, about three miles northwest of Enola, the same area as the 1982 series of earthquake events. This event was felt widely in central Arkansas and some people were awakened by it. Reports of shaking ranged as far away as Ft. Smith, southeast of Stuttgart, and the Missouri border region. The trembler did not cause any structural damage, but a fallen mirror and some broken china were reported in the epicentral area.

Recent Activity: The area around the New Madrid Fault is constantly active. The map below was produced on July 19, 2010 and shows the earthquakes within the last week and the past six months of the date above.

Figure 4.2.4-7: Recent Central US Earthquakes



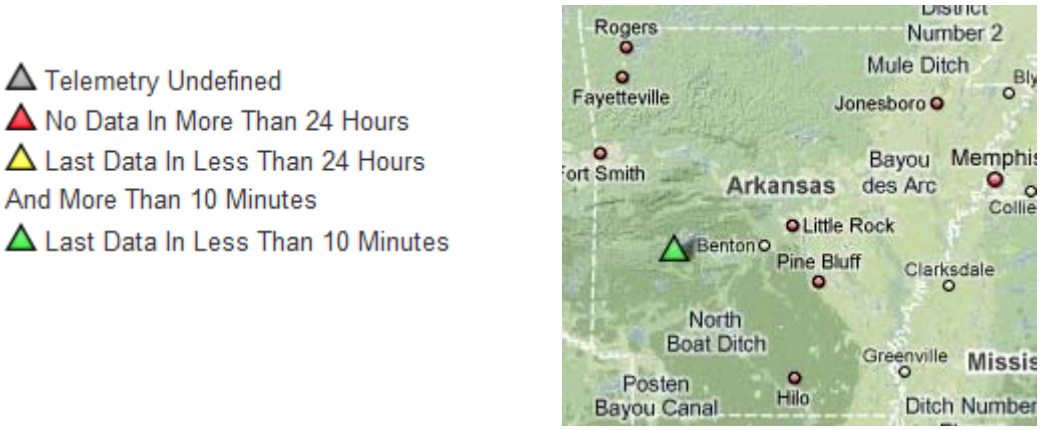
Source: USGS

Probability of Future Earthquake Events

Like meteorologists, earth scientists present forecasts of earthquakes as the chance or "probability" of an earthquake occurring in a specific time interval. It is generally accepted that earthquakes can be expected in the future as frequently as they have occurred in the recent past. We determine how often earthquakes reoccur from historical and geological (pre-historical) studies. Sand blow deposits, found throughout northeastern Arkansas and surrounding states, are believed to be the byproduct of strong ground shaking associated with large earthquakes. Sand blow deposits in this area have been dated at about A.D. 900 and A.D. 1450 and suggest that major earthquakes (magnitude seven or greater) reoccur in the region approximately every 500 years, with the most recent sequence being in 1811-1812. Using these data (which were also used to produce the National Seismic Hazard Maps) the USGS and the Center for Earthquake Research and Information of the University of Memphis now estimate that the probability of a repeat of the 1811 - 1812 earthquakes (magnitude 7.5 to 8.0) in the NMSZ over the next 50 years is seven to 10%. The probability that a magnitude 6.0 or larger earthquake will occur in the next 50 years is 25 to 40%. Earthquakes in the approximate range of magnitude 7.5 to 8.0 are capable of causing widespread damage over a large region. Magnitude 6.0 earthquakes can cause serious damage in areas close to the earthquake's location.

As previously discussed, the New Madrid Fault is a very active area of seismic events. Every month Arkansas can expect to have some type of seismic event, although usually low. The map below shows an example of the seismic occurrences in the New Madrid region and the frequency for which they occur. This map is produced daily by the Advanced National Seismic System and shows the activity for July 23, 2010.

Figure 4.2.4-8: Example and Frequency of Seismic Occurrences on July 23, 2010



Source: Advanced National Seismic System

The HMP Sub-Committee has determined that there is a high probability of future earthquakes in the state, along the New Madrid Fault, and throughout the surrounding area. However, the probability of a major event is much lower; therefore the probability of earthquakes was rated as **"Likely"**. The Sub-Committee recognizes the difficulty in predicting seismic events and is committed to continually monitoring this situation as new data becomes available.

4.2.5 Wildfire Hazard Profile

This Wildfire profile was developed in the original plan, amended in the previous update, and modified again in 2010. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to wildfire.

Wildfire Profile

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around. Naturally occurring and non-native species of grasses, brush and trees fuel wildfires. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. A Wildland-Urban Interface Fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wild lands or vegetative fuels. Areas with a large amount of wooded, brush and grassy areas are at highest risk of wildfires. Additionally, areas that have experienced prolonged droughts, or are excessively dry, are also at risk of wildfires.

Short-term loss caused by a wildland fire can include the destruction of timber, wildlife habitat, scenic vistas and watersheds. Vulnerability to flooding increases due to the destruction of watersheds. The removal of vegetation may also increase vulnerability to landslides. Long-term effects include smaller timber harvests, reduced access to affected recreational areas and destruction of cultural and economic resources and community infrastructure.

Wildfire behavior is based on three primary factors: fuel, topography and weather. The type and amount of fuel, as well as its burning qualities and level of moisture, affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components, is also a factor in that it expresses the pattern of vegetative growth and open areas. Topography is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity and wind (both short and long-term) affect the severity and duration of wildfires.

Historically, the southern United States has led the national wildland fire statistics in both frequency and size of area burned. In this century, major fire years in the south have corresponded to periods of drought. In Arkansas, the drought years of 1930, 1938, 1952, 1963, and 1980 resulted in heavy damage to the state's timberlands. Socioeconomic changes have also led to increased fire activity. Forest fuels increase following human activities like logging and conversion of open areas into timber producing lands. In the early years of the 20th century most of Arkansas' virgin pine forests were logged out leaving behind huge areas of slash. These areas were very susceptible to wildland fires and generally remain high risk areas.

Recent research on wildfires in Arkansas using fire statistics of the Arkansas Forestry Commission (AFC) Individual Fire Reports found that arson was the overwhelming cause of fires. These fires were on average twice the size of all other types of fires.

Topography, climate, weather and fuels play significant roles in determining both fire seasons and the severity of wildfires. Northern Arkansas has one fire season, occurring in the spring with generally larger fires and more frequent fires. Southern Arkansas has two fire seasons, spring and fall, with generally smaller fires and slightly lower frequency of occurrence.

The Arkansas Forestry Commission completes a fire report on each fire, its rangers and foresters suppress. Information on a fire report includes the location of the fire, what caused the fire, whose land it was on and how large it was. The Forestry Commission classifies fire origins into one of nine causes (Table 4.2.5-1). Based on data from 1992 through 2003, it was found that the majority of fires in Arkansas are incendiary. Almost 44% of fires and nearly 58% of acres burned over this twelve-year period were maliciously set. The next most common cause of fires was debris burning which caused 28% of the fires and almost 23% of acres burned. Lightning was the cause of only 3.6% of the fires in Arkansas (Table 4.2.5-1).

Table 4.2.5-1: Causes of Fires in Arkansas Based on Data Collected from 1992-2008.

Fire Cause	Number of Fires	Acres Burned
Incendiary	12,367 (43.8%)	224,728 (55.7%)
Debris Burning	8636 (28.1%)	94,362 (22.7%)
Smokers	614 (2.4%)	5,140 (1.5%)
Railroad	522 (1.9%)	4,727 (1.3%)
Campfires	311 (1.1%)	3,727 (0.9%)
Equipment Use	1,834 (6.0%)	16,824 (3.52%)
Children	486 (1.7%)	3,044 (0.8%)
Lightning	1,108 (3.6%)	15,454 (3.2%)
Miscellaneous	3,220 (11.4%)	40,696 (10.3%)

For the 2010 plan revision, the HMP Sub-Committee acquired the latest version of the Arkansas Forestry Commission's database for wildfire events and the following information was calculated to enhance and update this hazard profile.

During the five year period of 2004 - 2009, there were 10,407 reported fire events across the state with a total of 143,476 acres burned. As of 2010, there have already been 794 reported fires with over 11 thousand acres burned according to the Arkansas Forestry Commission.

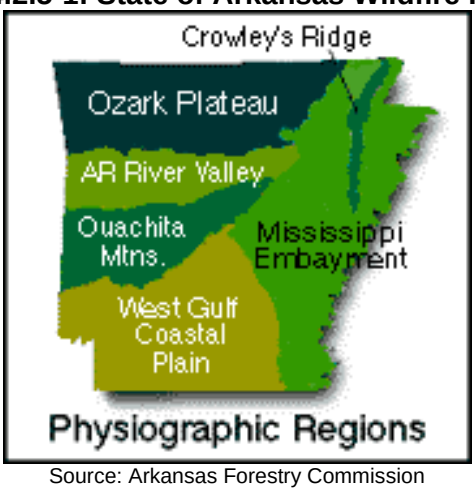
- 2004 - There were 1,654 reported fires with a total of 22,612 acres burned
- 2005 - There were 2,674 reported fires with a total of 34,907 acres burned
- 2006 - There were 2,964 reported fires with a total of 42,042 acres burned
- 2007 - There were 1,222 reported fires with a total of 17,123 acres burned
- 2008 - There were 846 reported fires with a total of 10,636 avres burned
- 2009 - There were 1,047 reported fires with a total of 16,156 acres burned
- 2010 - There were 794 reported fires with a total of 11,737 acres burned from January to June of 2010

Arkansas averages a total of 1,872 forest fires per year with an average of 28,695 acres burned.

Geographic Area Affected by Wildfires

Wildfires have occurred in every county in the state but are most common in the south central to southwest parts of the state within the heavily forested Gulf Coastal Plain and southern Ouachita Mountains provinces. Fires are least common in the heavily agricultural Mississippi Embayment in eastern Arkansas. The following map shows the different regions of the state.

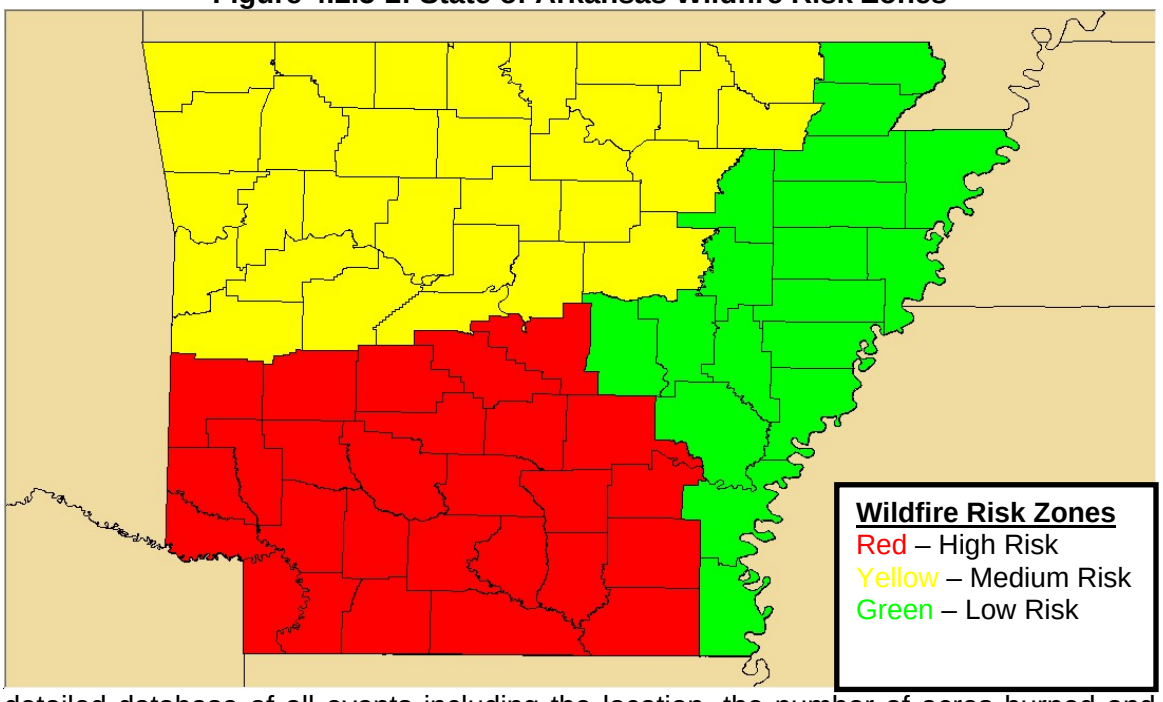
Figure 4.2.5-1: State of Arkansas Wildfire Regions



Source: Arkansas Forestry Commission

The following map shows the regions color-coded for risk of wildland fires. The southern counties in red are the ones in the area most susceptible to fires while the counties in green are in the Mississippi Embayment and have the lowest risk for fires.

Figure 4.2.5-2: State of Arkansas Wildfire Risk Zones



detailed database of all events including the location, the number of acres burned and

the cause of the event.The committee has included the best available data for wildfires from the database. The map below is a national compilation from the USGS that shows all fires with over 250 acres burned from 1980 through 2003. This is the most up to date map for wildfires for the 2010 update process. Based on this map, the larger fires in Arkansas tend to occur in the

northwest corner of the state or in the southeast region. Though the larger events have occurred in these areas, the HMP Sub-Committee continues to consider the areas in the southwest region to have the highest likelihood of fire events due to the topography and the fire fuel levels.

Figure 4.2.5-3: National Compilation of All Fires from 1980 through 2003

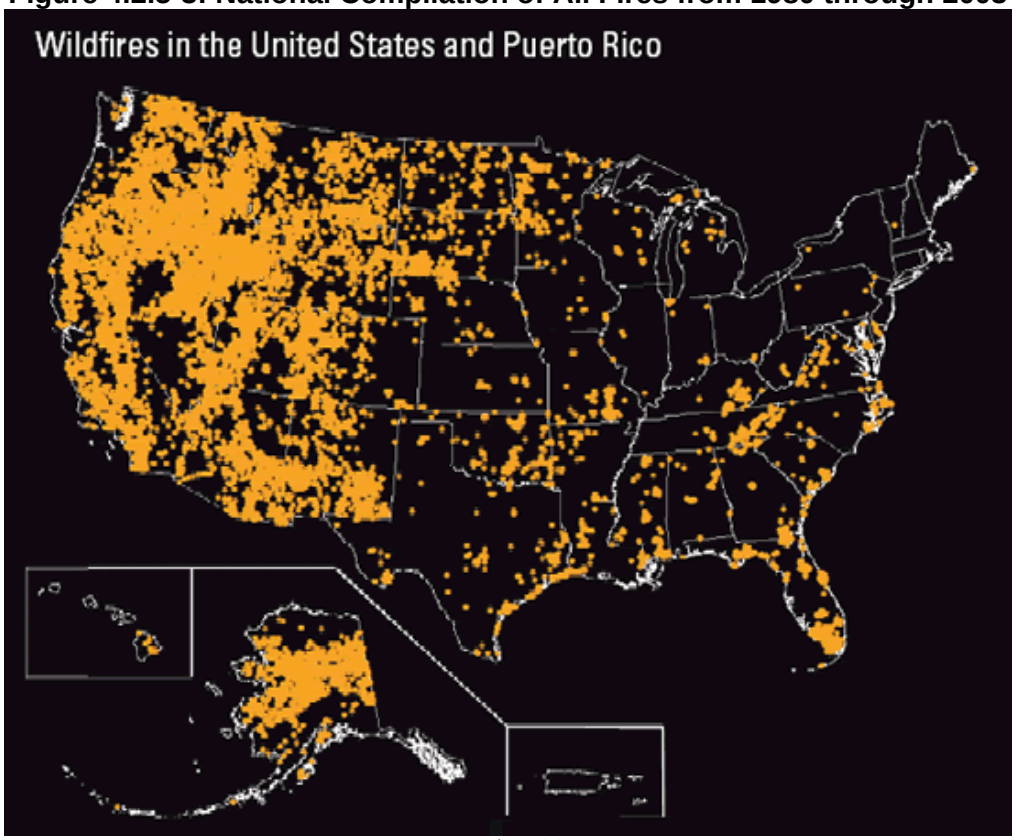


Image by USGS
Locations that experienced wildfires greater than 250 acres between 1980 and 2003

October 1963 Eagleton Burn: Sparks from a railroad train traveling north on its run between New Orleans and Kansas City ignited a major wildfire in the Ouachita National Forest on October 30, 1963 near Mena in Western Arkansas. Conditions were very favorable for fire as October had been one of the driest and hottest months on record in central and western Arkansas. The area was already 30 inches below normal in rainfall and a 30 mile-per hour wind was blowing. Eighteen days in October, including this one, had been classified as Class 5, or extreme fire danger. A fire dispatcher watching from Rich Mountain tower saw smoke when the train passed. He said the fire started at the foot of Blackfork Mountain and within 19 minutes had topped the mountain. “It then began to jump as far ahead as half a mile,” he said. The Eagleton Burn, the name given the fire by the Forest Service, raged for 78 hours. It burned 13,673 acres, including 12,322 of the Ouachita National Forest and 1,351 acres of private land. Foresters called in 300 soldiers from Fort Chaffee and every other man they could find to help. A total of 1,077 men fought day and night to bring the fire under control. Men worked another 15 days cleaning up after the fire and extinguishing all burning materials. The Eagleton Burn was the nation’s worst forest fire in 1963.

2000 Statewide Fires**:** There were 41,599 acres of timber destroyed by fires in Arkansas during this year.

January 9, 2006 Hamburg**:** Several families in Ashley County were evacuated from their homes after a 3,000-acre wildfire jumped a state highway and threatened their houses. No injuries were reported. State Forestry Commission officials said the massive wildfire destroyed four homes, two camping trailers and two outbuildings. Even though firefighters worked through the night, they could not contain the blaze until the next day. The evacuated families lived along Arkansas State Highway 8. Firefighters said the fire was six miles long and one mile wide. Firefighters from four volunteer departments used 11 dozers and two air-tankers to fight the blaze. According to the Associated Press, at least 35 wildfires burned in Arkansas during this same period.

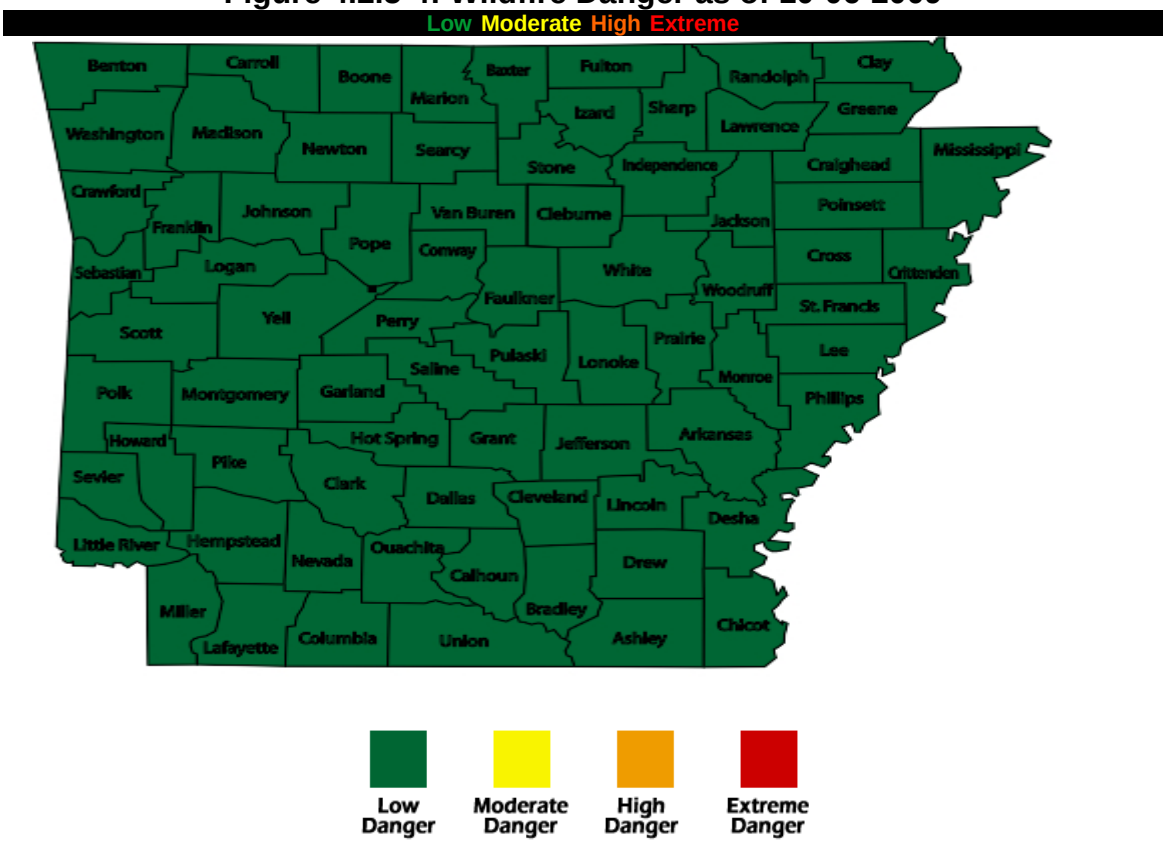
March 2010 Wildfires: AFC personnel responded to 128 fires that burned 3,123 acres and single engine air tankers (SEATs) made 42 water drops across Arkansas Saturday and Sunday. County Judges in Faulkner, Greene and Van Buren Counties have issued burn bans, and more than two-thirds of the state is experiencing moderate wildfire danger conditions.

Probability of Future Wildfire Events

The HMP Sub-Committee has analyzed this profile and the various risks associated with wildfires and considered the probability of future events to be **"Highly Likely"**. In fact, based on the historical evidence, it is a virtual certainty that the state will experience a number of fires every year. However, the outlook for 2010 is relatively encouraging based on the current weather information provided by NOAA and the National Weather Service. One way to assess the wildfire threat is the KBDI index. The KBDI is a soil/duff drought index that ranges from zero (no drought) to 800 (extreme drought) and is based on soil capacity of eight inches of water. The depth of soil required to hold eight inches of moisture varies. A prolonged drought "high danger" (KBDI) influences fire intensity largely because fuels have lower moisture content. The Burning Index (BI) is a number related to the contribution of fire behavior to the effort of containing a fire. The BI (difficulty of control) is derived from a combination of Spread Component (how fast it will spread) and Energy Release Component (how much energy will be produced). In this way, it is related to flame length. This is based on rate of speed and heat per unit area according to the Fire Behavior Prediction System. The BI is expressed as a numeric value related to potential flame length in feet multiplied by 10. The scale is open-ended which allows the range of numbers to adequately define fire problems, even during low to moderate fire danger.

The following map provides details for the current probabilities associated with fires as of October 6th, 2009. This map is updated as needed by the Arkansas Forestry Commission. This map is generated by assessing KBDI values as well as direct input from each district fire representative:

Figure 4.2.5-4: Wildfire Danger as of 10-06-2009



Qualitative Data for Map Key:

KBDI	
0-200	Soil moisture is high and does not contribute signifacntly to fire intensity.
201-400	Typical of late spring. Lower litter and duff layers are drying and beginning to contribute to fire intensity
401-600	Typical of late summer. Lower litter and duff layers burn intensely
601-800	Associated with severe drought and increased wildfire occurrence. Intense deep burning fires with significant downwind spotting. Live fuels burn actively.

Source: Arkansas Forestry Commission

The following two maps are from the National Inter-Agency Fire Center showing the areas across the country with high potential for fires based on a variety of factors including the following:

- On-going drought levels
- Temperature levels
- Precipitation levels
- Fire fuel levels

Figure 4.2.5-5: National Significant Wildland Fire Potential Outlook, July 2010

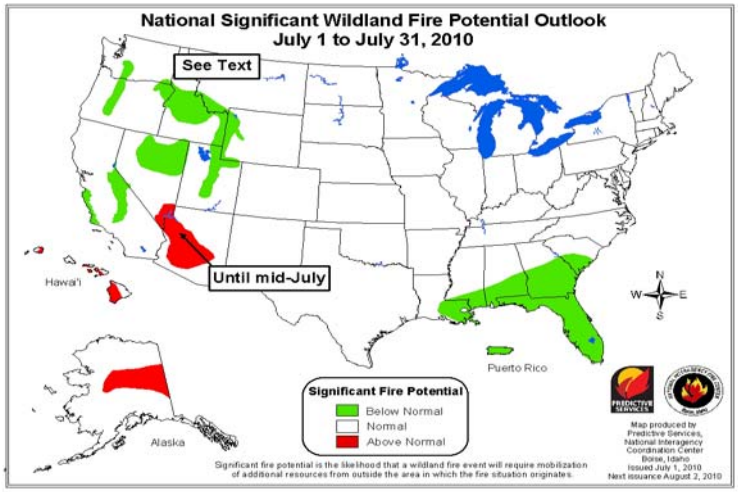
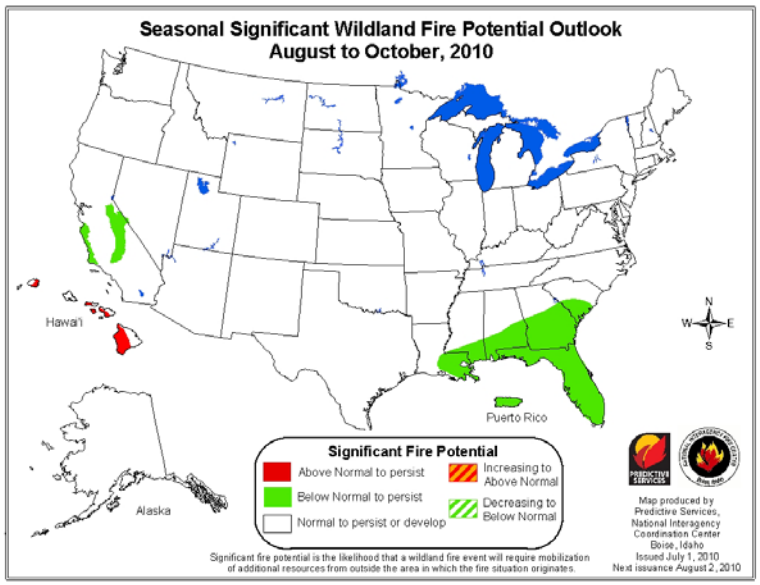


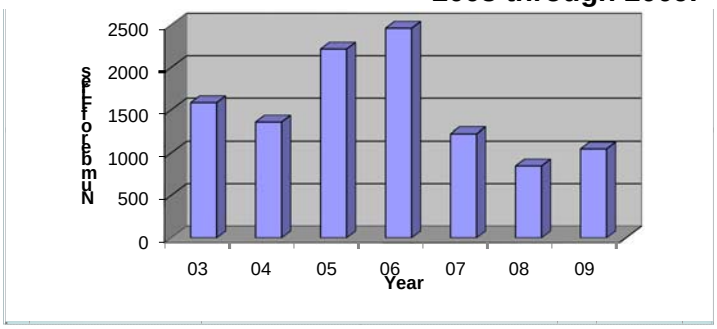
Figure 4.2.5-6: Seasonal Significant Wildland Fire Potential Outlook, August – October 2010



Based on the National Inter-Agency Fire Center (NIFC) assessments, the State of Arkansas was in the “Below Normal” range for 2008 and remained in this range through the summer of 2009. Therefore, the probability of future fire events for the foreseeable future has not been increased due to variable factors.

Based on Arkansas Forestry Commission data collected from 2003 through 2009, the average number of fires that required suppression annually in Arkansas was 1,872. The average area burned annually was 28,695 acres. Figure 4.2.5-7 shows the number of fires requiring suppression each year between 2003 and 2009. The largest number of fires suppressed in one year was 2,964 in 1952, whereas the fewest number of fires requiring suppression was 978 in 1944. Note the overall trend of a general decrease in number of fires per year.

Figure 4.2.5-7: Number of Fires Requiring Suppression Annually in Arkansas from 2003 through 2009.



Source: Arkansas Forestry Commission

Although fires occur at all times of the year in Arkansas, February through April is the peak fire season with March having the largest average number of fires (692). The period of least fire activity is during May and June.

4.2.6 Landslide Hazard Profile

This Landslide profile was developed in the original plan, amended in the previous update, and modified again in 2010. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state’s mitigation strategy with respect to landslides. Due to no major occurrences of landslides in the past three years, no updates were made to the landslide profile.

Landslide Profile

Studies by FEMA and others have found that landslides occur in every state and cause over $2 billion in building and highway losses and approximately 25 to 50 deaths annually in the United States. It has been estimated that about 40 percent of the United State's population has been exposed to the direct and indirect effects of landslides. Although landslides may not be preventable, their devastating effects on humans and their property is avoidable and can be mitigated.

Landslides have occurred in nearly every county in Arkansas. They have destroyed or damaged roads, railroads, bridges, mining facilities, parks and recreational areas, residential and commercial buildings, sewers, dams, reservoirs, forests, fisheries and farms. Damage caused directly by landslides is largely undocumented or often reported incorrectly. The devastating effects of landslides often are attributed to the triggering event such as a flood, earthquake or storm.

"Landslide" is a term that encompasses many phenomena involving lateral and down slope movement of earth materials such as rock, soil and/or artificial fill. The term covers a broad category of events, including mudflows, mudslides and debris flows, rock falls, rockslides, debris slides, earth flows and soil creep. Landslides can occur as sudden, short-lived events, or as a slow moving slide mass (such as the Portuguese Bend Landslide of southern California, which has moved at a rate of three feet per year since 1956) or as soil creep. All landslides are triggered by causes such as weaknesses in the rock and soil, earthquake activity, the occurrence of heavy rainfall or snowmelt or construction activity, changing some critical aspect of the geological environment.

Landslides may also be involved in or triggered by other natural hazards. For example, the safety of a dam can be severely compromised by upstream landslides or the collapse of slopes bordering the reservoir or dam abutments. Landslides and flooding are closely related because both involve precipitation, runoff and ground saturation. Debris flows usually occur in small, steep channels and are often mistaken for floods. Landslides and lateral spreads often result from seismic activity as experienced in Arkansas during the 1811-1812 New Madrid earthquakes. The simultaneous or sequential occurrences of interactive hazards may produce cumulative effects that differ significantly from those expected from any one event.

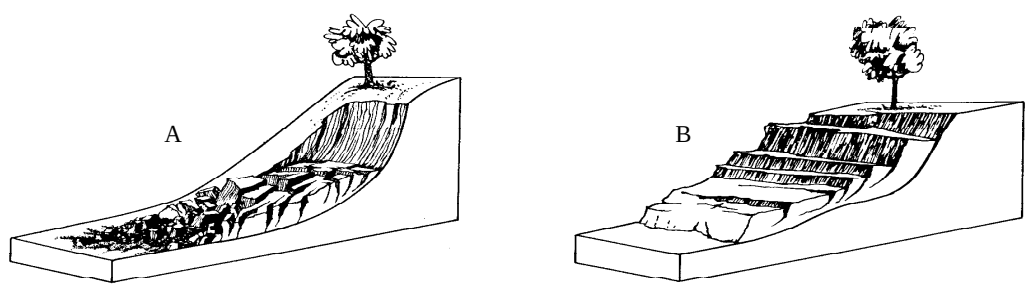
Landslides are classified by the type of movement that occurs and the type of material involved (Figure 4.2.6-1). The types of movement are slides, flows; lateral spreads, falls and topples. The types of material involved in landslides include bedrock and soil (including artificial fill). Soils are described as material that is either predominantly coarse (debris) or predominantly fine (earth). A combination of two or more of the principal types of flows is referred to as a complex movement.

Figure 4.2.6-1: Classification of Slope Movements (Adapted from Varnes, 1978).

Type of Movement			Type of Material		
			Bedrock	Engineering Soils	
				Predominantly coarse material	Predominantly fine material
Falls			Rock fall	Debris fall	Earth fall
Topples			Rock topple	Debris topple	Earth topple
Slides	Rotational	Few Units	Rock slump	Debris slump	Earth slump
	Translational	Many Units	Rock slide	Debris slide	Earth slide
Lateral Spreads			Rock spread	Debris spread	Earth spread
Flows			Rock flow (deep creep)	Debris flow (soil creep)	Earth flow (soil creep)

Slides: One of the most common types of movements is sliding. Slides of rock or soil involve downward displacement along one or more failure surfaces (also referred to as a discontinuity, rupture or slip surface). The material from the slide may be broken into a number of pieces or remain as a single, intact block. Sliding can be translational or rotational (Figure 4.2.6-2). Rotational motion involves movement turning about a specific point, where translational sliding is movement down slope on a path roughly parallel to the slip surface. The most common example of a rotational slide is a slump, which has a strong, backward rotational component and a curved upwardly-concave failure surface. Slides and slumps are common throughout Arkansas, especially along streams and highways. Slides are commonly initiated when the bottom of a slope is removed (by running water or human activity), thereby steepening the overall slope to the point that a landslide will occur.

Figure 4.2.6-2: Examples of a translational slide (A) and a rotational slide (B) or slump (Nilsen et al.), 1979)

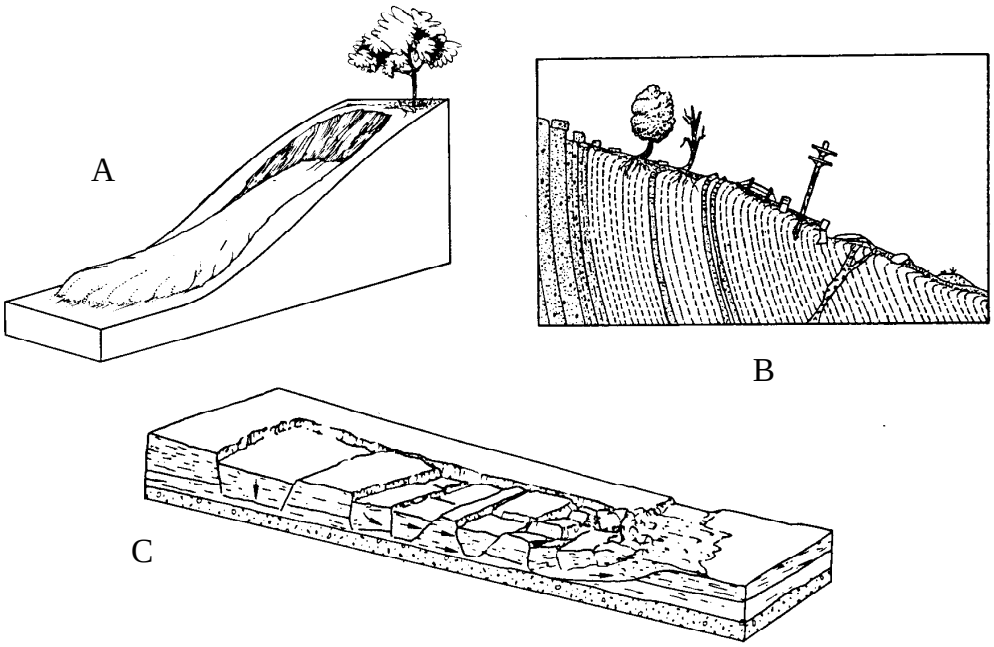


Flows: Flows consist of slurries of loose rocks, soil, organic matter, air and water moving down slope in the manner similar to a viscous fluid. They are distinguished from slides by having high water content and are thoroughly deformed internally during movement. While flows can dominate the failure, they are commonly observed as a minor component or extension of the toe (bottom of the landslide) of a slide or fall (Figure 4.2.6-3, Panel A). Although flows are not as severe a problem in Arkansas as in

some of the western states, they are common in all areas of our state, especially along the slopes of Crowley's Ridge (Cronin, 1992; see McFarland, 1992). A type of flow known as soil creep is an extremely slow and steady process that may persist over long periods of time (Figure 4.2.6-3, Panel B). It is commonly observed in weathered bedrock and soil on steep slopes throughout Arkansas.

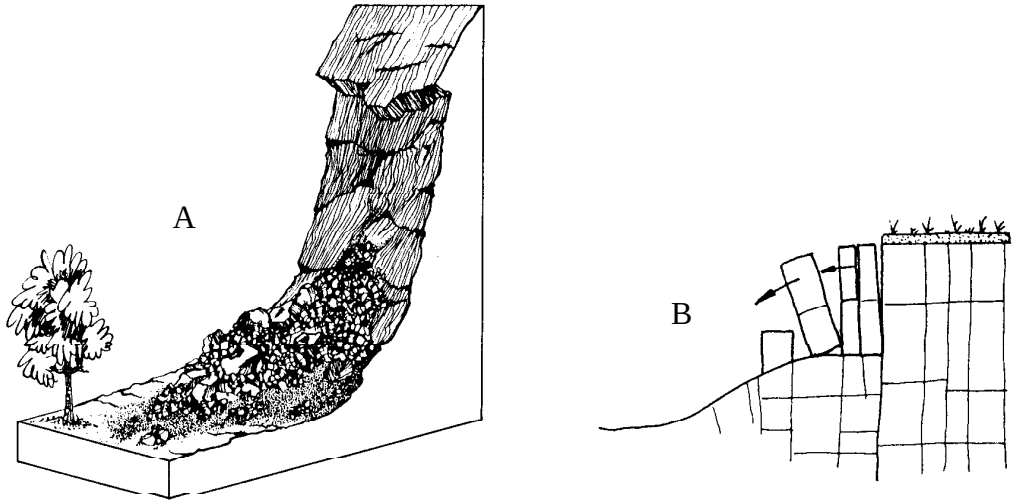
Lateral Spreads: The slow-to-rapid lateral extensional movements of rock or soil masses on almost level ground are known as lateral spreads (Figure 4.2.6-3, Panel C). In fine-grained soils, such as quick clays, lateral spreading occurs if the soils are remolded or disturbed by construction or grading. Loose, granular soils commonly produce lateral spreads through the process of liquefaction. Liquefaction is the transformation of a granular material from a solid state into a liquefied state as a consequence of increasing the water pressure in the spaces between the grains of sand. Liquefaction is caused by vibration of the earth produced by a strong earthquake. While the documentation of lateral spreading in Arkansas is extremely poor, there is detailed mapping of liquefaction in the vicinity of the New Madrid Seismic Zone in the northeastern part of the state.

Figure 4.2.6-3: Two common flows include an earth flow (A), and (B) soil creep. Panel (C) illustrates lateral spreading.



Falls and Topples: Falls occur when masses of rock or other material detach from a steep slope or cliff and descend by free falling, rolling, or bouncing (Figure 4.2.6-4, Panel A). Topples consist of the forward rotation of rocks or other material about a pivot point on a hill slope (Figure 4.2.6-4, Panel B). Topples generally develop in rock slopes divided into blocks by vertical fractures or joints oriented parallel to the slope face. Falls and topples can be triggered by an earthquake or erosion at the base of the affected slope. In Arkansas, falls and topples are infrequent in occurrence and are restricted to the rock outcrops of the Ouachita and Ozark Mountains, and the bluff faces of the Arkansas River valley.

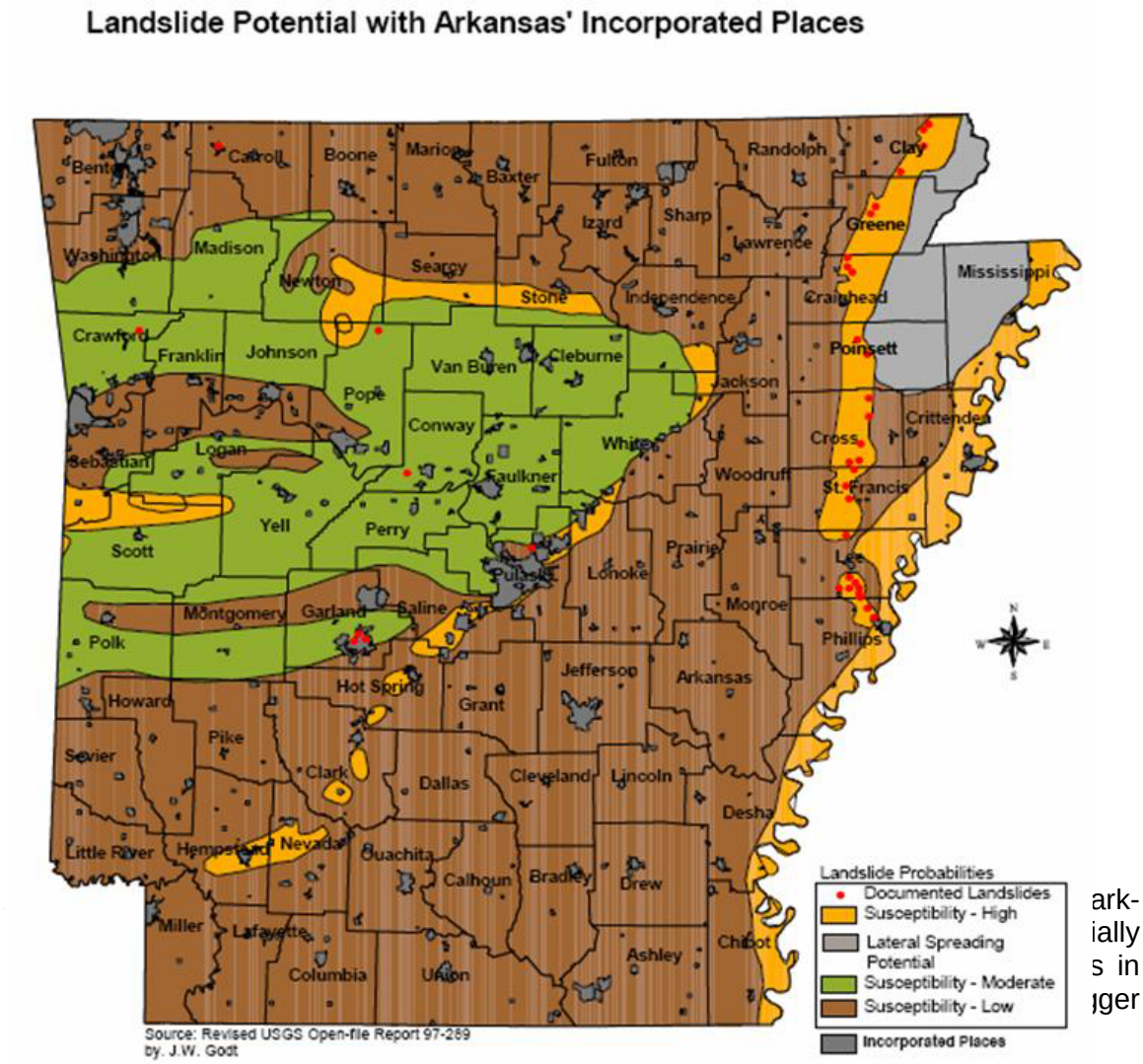
Figure 4.2.6-4: Panel (A) shows a rock fall (Nilsen, et al., 1979) and (B) illustrates fall Progression.



Geographic Area Affected by Landslides

The University of Arkansas-Little Rock used USGS data to produce the map Figure 4.2.6-5 showing the areas of the state with potential for landslide events.

Figure 4.2.6-5: Landslide Potential with Arkansas' Incorporated Places



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Except for Crowley's Ridge, the New Madrid Seismic Zone (NMSZ), and Hot Springs, no detailed study of specific landslides or areas of landslide susceptibility has been conducted in Arkansas. The study of Crowley's Ridge by McFarland (1992) inventoried the ridge's present landslides and concluded that more work is needed to "broaden our insight into the landslide hazard of Crowley's Ridge" and that an earthquake large enough to cause landslides is in our future. Studies within NMSZ have shown the extent of liquefaction in Arkansas and projected that the next large earthquake should produce liquefaction covering the same area. Following the Hot Springs landslide of November 11, 1995, a rockfall hazard evaluation report was prepared by Woodward-Clyde (1997) for the City of Hot Springs. The report concluded that it would cost approximately $3,000,000 to construct the needed mitigation measures in the downtown area. No other landslide investigations or risk assessments have been performed in Arkansas.

A few nationwide studies of landslides and debris flows have been conducted, in which an attempt has been made to assess areas where landslides have occurred and areas that are susceptible to landslides (see Godt, 1997; Highland et al., 1997; Radbruch-Hall et al., 1982). Susceptibility to landsliding is defined as the probable degree of response

of rocks and soils to natural or artificial cutting, loading of slopes or to unusually high precipitation. However, very little work specific to Arkansas and its geology has been performed in an effort to assess landslide susceptible areas.

The studies that have included Arkansas as part of the study or have been performed in Arkansas include the generalized work of Godt (1997) and Radbruch-Hall et al. (1982), a landslide survey of Crowley's Ridge by McFarland (1992), and the numerous site visits by the geologists of the Arkansas Geological Commission (AGC). These site visits were generally made at the invitation of the AHTD or the property owner of the landslide, were reconnaissance in nature, and generally no public report was generated.

The aforementioned studies, as well as any landslide susceptibility study, evaluated the contributing natural and human factors and how they interrelate. The principal natural factors are topography, geology and rainfall. The human activities include cut-and-fill construction for highways, construction of buildings and railroads and mining operations.

Topography influences stream erosion that, in turn, influences slope angle and gradient. The steeper the slope the more susceptible it is to sliding. Human activities are constantly reshaping the contours of the land (topography) and thus, altering the natural slope. The strength of rocks, that is, their resistance to erosion, is an important geologic factor in the landslide process. Certain bedrock formations or soil types appear to be more susceptible to movement. Examples in Arkansas include areas of highly weathered Pennsylvanian Age shale, the Fayetteville Shale Formation in the northwest part of the state and many of the clay layers in the eastern part of the state.

Rainfall has a pronounced effect on landscape (slope) development. It has the capacity to erode and undermine slope surfaces, and that which is absorbed increases poor water pressure and weight and lubricates inherently weak zones of rock and soil. Generally, it is assumed that unusually high precipitation or changes in existing conditions can initiate landslide movement in areas where rocks and soils have experienced landslides in the past. Unfortunately, earthquake influences were neither evaluated nor included in the results of these previous studies.

Previous Landslide Occurrences

May 19, 2005 Greers Ferry Lake: Early on the morning of March 28, 2005, after two days of rain, a significant landslide occurred on the north side of Stevens Point on the south shore of Greers Ferry Lake. The slide collided, in part, with a house; crushing the garage on the south side of the house and tearing a small room off the west side. The slide ultimately involved an area extending from a sandstone ledge over 100 feet in elevation above the house down to and into the lake over 100 feet in elevation below the house and extending to either side of the house.

resulting from the landfall of Hurricane Rita, several landslides (rock falls, mud/debris flows and slumps) were started, including one very large landslide that destroyed a house.

Hot Springs Landslides: Several significant landslides have occurred in downtown Hot Springs, Arkansas in recent years. Three of these are described below.

January 29, 2005 "Duck-Crusher" Landslide: A rock fall landslide occurred in Hot Springs along Central Avenue. This fall was caused by the separation of gunnite (sprayed-on concrete) from the high wall of the parking lot cut. Little of the material that fell was original hillside rock. Most of it was the concrete, with a much smaller amount of rock material falling last and covering the collapsed concrete slabs. More of this wall of sprayed-on concrete is likely to fail again for the same reasons. One of the biggest frustrations in geology is that we can tell people what is going to happen, where it's going to happen and why it's going to happen, but we can't tell them when it's going to happen. Based on current evidence it would appear that the best remedial action would be to remove the rest of the gunnite from the high wall and re-establish the wall of large concrete "bricks" in its current position. This would allow the small rock falls that will occur from time to time to be safely contained. This does not mean that a large landslide will not occur, just that the geologic conditions currently observable do not suggest a large landslide is likely in the near future.

May 17, 2004

February 1, 2005

Source: http://www.geology.ar.gov/pdf/The%20Duck%20Crusher%20Landslide%20Site.pdf

April 2004 Newton and Madison County Landslides: Heavy rainfall between six and 10 inches fell over a large part of northern Arkansas over a three day period through the morning of April 24th, 2004 resulting in widespread flash flooding over the northern part of the state. Numerous county roads and bridges were flooded by several feet of water and were impassable for a period of time. Some county roads also sustained damages due to washouts. This heavy rainfall triggered five landslides along state highways in Newton and Madison Counties, partially or completely shutting down two state highways. On May 7, Newton and Madison Counties, along with 12 other Arkansas Counties, were declared Federal Disaster areas (FEMA-1516-DR). An initial estimate to repair these five landslide areas was $1.4 million.

November 11, 1995: A rock slide occurred along an exposed northeast scarp of West Mountain in downtown Hot Springs, Arkansas. In a matter of seconds, several hundred tons of rock and slide debris crashed through the back wall and second floor of the Hot Springy Dingy Novelty store and portions of two other buildings along Central Avenue. The slide crushed one person and injured two others in the novelty store. Although the size of the landslide was small (i.e., approximately 43 feet long and 30 feet high), its damage to life and property was most severe (McFarland and Stone, 1995; Engineering and Geological Services, Inc., 1995; Woodward-Clyde Consultants, 1997).

March 23, 1984: The southwest end of North Mountain in downtown Hot Springs slid into an open parking lot between the Arlington Hotel and its parking deck. This portion of North Mountain had been modified and oversteepened by excavating into the hillside to accommodate a larger parking lot. A small retaining wall and fence had been placed at the toe of the hill to intercept rocks and boulders that fell from the cut wall, in hopes of protecting any cars in the parking lot. The hotel's engineer had noticed rocks falling from the cut slope several hours before the landslide occurred. He was standing by the hillside when the landslide began and barely escaped. The landslide failure was along joints and fractures that had been weakened and lubricated by spring rains. Although none of the slide debris and boulders spilled out onto Central Avenue, most of the parking lot was destroyed. At the suggestion of the Arkansas Geological Commission, part of the slide mass was left in place at the toe of the slope to act as a buttress and help stabilize the hillside from future slides.

Probability of Future Landslide Events

According to the Arkansas Highway and Transportation Department, the annual frequency of significant landslide events is three to four per year. However, this number varies considerably (between zero and over 20) depending primarily on precipitation characteristics that year. With this information, the HMP Sub-Committee has determined that landslides will continue to occur in the state and cause damage. The probability of landslides is very difficult to calculate for most landslides are related to other hazards including:

- Severe storms with heavy rains
- Flooding
- Earthquakes

Based on the historical records, there is a high probability that landslides will occur in the high risk areas along the eastern border and along the Ozark-Ouachita mountainous region in the central western area of the state. Generally, there is a low probability of landslides for the rest of the state; however isolated areas especially with human development may be susceptible to this hazard. Based on the available reported data since 1984, there have been seven landslides that were reported in the State of Arkansas, however many landslides occur without being reported due to little or no damage therefore, the states overall probability rating was determined to be **"Possible"**. This lack of data is considered a data limitation and a corresponding mitigation item has been included in the Mitigation Strategy chapter of this plan.

4.2.7 Expansive Soil Hazard Profile

This Expansive Soil profile was developed in the original plan, amended in the previous update, and modified again in 2010. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to expansive soil. Due to no reported occurrences of expansive soils in the past three years, no updates were made to the profile for this hazard.

Expansive Soil Profile

Expansive soil (or swelling soil) is soil or soft rock that increases in volume when the moisture content of the soil increases and decreases in volume when moisture content decreases. The clay mineral montmorillonite, as well as other minerals of the smectite clay mineral group within the soil, is nearly always the cause of the volume change. When water is added to these expansive clay minerals, the water molecules are pulled or adsorbed into gaps between the clay plates. As more water is absorbed, the plates are forced farther apart, leading to an expansion of the soil's volume or an increase in soil pressure. In pure form, montmorillonite clays may swell to over 15 times their dry volume. Most soils, however, contain only small amounts of montmorillonite so that expansion of more than 1.5 times the dry soil volume is rare. The force of expansion is capable of exerting pressures of over 20,000 pounds per square foot.

Although not well known to the general public, expansive soils are responsible for major economic losses. Various studies estimate that expansive soils result in somewhere

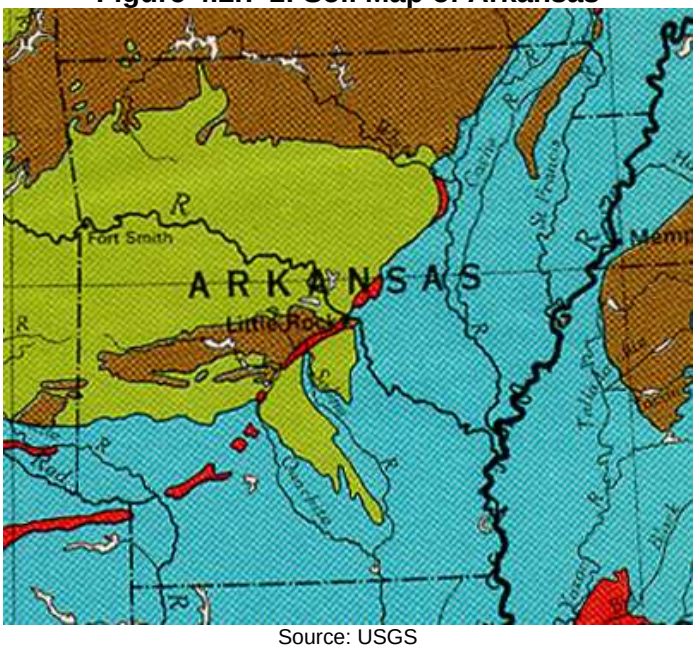
between $2 and $11 billion in annual losses in the United States, significantly more than other natural hazards. Other studies have suggested that approximately 10% of the new homes constructed annually in the United States are subjected to significant damage during their useful lives by expansive soils and an additional 60% of homes sustain minor damage.

Expansive soils cause differential movement and horizontal pressure on structures resulting in cracked driveways, cracked sidewalks and basement floors, heaving of roads and highway structures and disruption of pipelines and sewer lines. Damage to homes can range from hairline plaster cracks and sticking doors to condemnation or complete destruction. Expansive soils occurring on slopes can also result in slow but damaging down-slope movement of material (creep) or even landslides.

Geographic Area Affected by Expansive Soils

Although all parts of Arkansas have the potential to be affected by expansive soils, they are most abundant in the southeastern part of the state within the Mississippi Alluvial Plain and Gulf Coastal Plain Physiographic Provinces (Figure 4.2.7-1). The northern part of the state (northern Ozark Plateaus) and the central Ouachita Mountains are least affected by expansive soils.

Figure 4.2.7-1: Soil Map of Arkansas



Source: USGS

MAP LEGEND

- Unit contains abundant clay having high swelling potential
- Part of unit (generally less than 50%) consists of clay having high swelling potential
- Unit contains abundant clay having slight to moderate swelling potential
- Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential
- Unit contains little or no swelling clay
- Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost states only)

Previous Expansive Soil Occurrences

Although expansive soils occur throughout much of Arkansas, the soils are rarely highly expansive; therefore, the average citizen does not notice their effects. Reports of severe damage to foundations are rare and not well documented. Arkansas Geological Commission geologists have investigated but not formally documented moderate to severe expansive soil occurrences in southwest Little Rock (Pulaski County), Cabot (Lonoke County) and other locations in Lonoke County. Details of damage were not available. The Arkansas Highway and Transportation Department tests soils for expansivity (plasticity index) and engineers/implements measures prior to road construction thus, mitigating damage. Roads built on highly expansive soils prior to the recognition of this hazard, such as parts of Interstate 30 between Little Rock (Pulaski County) and Arkadelphia (Clark County), have developed long wavelength "roller coaster" undulations. The HMP Sub-Committee has decided to add the collection of expansive soil data as a mitigation "action item" to be considered by the state as funding becomes available.

Probability of Future Expansive Soil Events

Unlike other natural hazards discussed in this plan, expansive soil is a long-term condition that often causes incremental damage to a structure over a period of many years. It therefore cannot easily be attributed to an event or occurrence. When there is a significant natural or human induced excursion in expansive soil moisture content near a structure, accelerated damage may occur.

Although little noticed, soil expansion and contraction in the state is a high frequency/high probability event as it occurs daily and therefore causes damage to structures on a daily basis. This incremental damage, however, rarely leads to significant damage in Arkansas.

The probability of this event occurring in the southern and eastern portion of the state is higher than the central, northern or western region. Also, as the state experiences more issues with water levels along the Mississippi River and the Sparta Aquifer in the southeastern corner, this issue of expansive soil may begin to occur more frequently. Therefore, the HMP Sub-Committee considers the probability for this hazard to be rising as more data is collected. Since there are no reported expansive soils events, the states overall probability for this hazard is considered **"Unlikely"**. This is considered a data limitation and a corresponding mitigation action can be found in the Mitigation Strategy in Chapter 5 of this plan.

4.2.8 Straight-line Wind Hazard Profile

This Straight-line Wind Profile was developed in the original plan, amended in the previous update, and modified again in 2010. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to straight-line winds.

Straight-line Winds Profile

Straight-line wind is any wind that is not associated with rotation. This term is used mainly to differentiate a severe storm from tornadic winds. Straight-line winds originate as a downdraft of rain-cooled air, which reaches the ground and spreads out rapidly, producing a potentially damaging gust of wind up to 100 mph. In recent years, there have been several occasions in Arkansas in which winds greater than 100 mph have been measured. Winds of 58 mph (50 knots) or more are considered severe. The horizontal component of near-surface wind phenomena is the most significant aspect of the hazard.

The HMP Sub-Committee has profiled this hazard separately but it is difficult to differentiate these events from the effect of the related hazards of severe storms and subsequent tornados.

Geographic Area Affected by Straight-line Winds

Based on data from the National Climatic Data Center's Severe Storms Database from 1996 through 2010, all counties in Arkansas have experienced severe (>58 mph) straight-line winds and straight-line wind damage, although not all counties appear to be evenly affected. Based on this data, the northwest corner and central part of the state most often are affected by severe straight-line winds, whereas the eastern part of the state is the least affected.

Previous Straight-line Wind Occurrences

The NCDC database generally combines the listing for high winds with thunderstorms; nonetheless, some events are designated specifically as wind events. Of the hundreds of thunderstorms that occur every year, all have winds associated with the storm. However, during a two year period (January 2007 through March 2010), the NCDC lists the following events as strictly wind events:

Table 4.2.8-1: Wind Events from January 2007 through March 2010

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
ARZ074	2/24/2007	16:00 PM	Strong Wind	49 kts.	0	0	150K	0K
ARZ005	4/11/2007	13:15 PM	Strong Wind	30 kts.	1	1	0K	0K
ARZ021 - 042	4/11/2007	14:40 PM	High Wind	50 kts.	0	0	0K	0K
ARZ056	10/24/2007	11:45 AM	Strong Wind	35 kts.	0	0	10K	0K
ARZ036	11/14/2007	14:15 PM	Strong Wind	40 kts.	0	0	7K	0K
ARZ040 - 052	12/22/2007	14:00 PM	Strong Wind	34 kts.	0	0	5K	0K
ARZ030 - 037 - 042 - 053	12/22/2007	15:00 PM	Strong Wind	36 kts.	0	0	5K	0K

ARZ003 - 012 - 021 - 031 - 039 - 043 - 055 - 062 - 066	12/22/2007	16:00 PM	Strong Wind	31 kts.	0	0	5K	0K
ARZ004 - 013 - 023 - 032 - 044 - 056 - 063>065 - 068	12/22/2007	17:00 PM	Strong Wind	33 kts.	0	0	5K	0K
ARZ033 - 046>047 - 057 - 069	12/22/2007	18:00 PM	Strong Wind	31 kts.	0	0	5K	0K
ARZ005 - 014>016 - 024	12/22/2007	19:00 PM	Strong Wind	30 kts.	0	0	5K	0K
ARZ006	12/22/2007	19:30 PM	Strong Wind	32 kts.	0	0	5K	0K
ARZ007	12/22/2007	20:00 PM	Strong Wind	34 kts.	0	0	5K	0K
ARZ003>007 - 012>016 - 021>025 - 030>034 - 037>047 - 052>057 - 062	1/29/2008	11:00 AM	High Wind	50 kts.	0	0	250K	0K
ARZ003>007 - 012>016 - 021>025 - 030>034 - 037>047 - 052>057 - 062	1/29/2008	11:00 AM	Strong Wind	48 kts.	1	0	250K	0K
ARZ001	1/29/2008	11:50 AM	High Wind	61 kts.	0	0	0K	0K
ARZ019 - 029	1/29/2008	11:56 AM	High Wind	61 kts.	0	0	10K	0K
ARZ020	1/29/2008	12:15 PM	High Wind	61 kts.	0	0	20K	0K
ARZ011	1/29/2008	12:30 PM	High Wind	61 kts.	0	0	20K	0K
ARZ002	1/29/2008	12:35 PM	High Wind	52 kts.	0	0	0K	0K
ARZ010	1/29/2008	12:48 PM	High Wind	52 kts.	0	0	0K	0K
ARZ060 - 070	1/29/2008	14:00 PM	Strong Wind	46 kts.	0	0	5K	0K
ARZ028	1/29/2008	14:40 PM	High Wind	61 kts.	0	0	30K	0K
ARZ072	1/29/2008	14:45 PM	Strong Wind	43 kts.	0	0	50K	0K
ARZ008 - 009	1/29/2008	15:11 PM	High Wind	50 kts.	0	0	30K	0K
ARZ017	1/29/2008	15:15 PM	High Wind	50 kts.	0	0	30K	0K
ARZ018	1/29/2008	15:42 PM	High Wind	50 kts.	0	0	50K	0K
ARZ026	1/29/2008	15:45 PM	High Wind	50 kts.	0	0	15K	0K
ARZ027	1/29/2008	15:52 PM	High Wind	50 kts.	0	0	20K	0K

ARZ035	1/29/2008	16:03 PM	High Wind	50 kts.	0	0	5K	0K
ARZ048	1/29/2008	16:10 PM	High Wind	50 kts.	0	0	40K	0K
ARZ036	1/29/2008	16:30 PM	High Wind	50 kts.	0	0	5K	0K
ARZ073	1/29/2008	16:50 PM	Strong Wind	43 kts.	0	0	10K	0K
ARZ049	1/29/2008	17:00 PM	High Wind	52 kts.	0	0	0K	0K
ARZ058	1/29/2008	17:15 PM	High Wind	50 kts.	0	0	10K	0K
ARZ009	4/10/2008	5:00 AM	Strong Wind	39 kts.	0	0	4K	0K
ARZ020	9/13/2008	20:00 PM	High Wind	56 kts.	0	0	20K	0K
ARZ019	9/14/2008	1:00 AM	High Wind	61 kts.	0	0	25K	0K
ARZ001 - 010	9/14/2008	1:30 AM	High Wind	52 kts.	0	0	20K	0K
ARZ029	9/14/2008	2:00 AM	High Wind	50 kts.	0	0	10K	0K
ARZ002 - 011	9/14/2008	3:00 AM	High Wind	52 kts.	0	0	300K	0K
ARZ061	10/6/2008	21:05 PM	Strong Wind	43 kts.	0	0	0K	0K
ARZ008 - 017>018 - 026	02/11/2009	09:00 AM	Strong Wind	32 kts.	0	0	10K	0K
ARZ028	02/11/2009	10:00 AM	Strong Wind	32 kts.	0	0	10K	0K
ARZ008 - 017>018 - 026	02/11/2009	09:00 AM	High Wind	35 kts.	0	0	0K	0K
ARZ073	07/16/2009	18:04 PM	High Wind	51 kts.	0	0	0K	0K
ARZ042	03/25/2010	11:50 AM	Strong Wind	18 kts.	1	0	0K	0K

The NCDC database also lists the following events as thunderstorms in the last three years that had a wind component with a magnitude of over 65 knots.

Table 4.2.8-2: Thunderstorm Events Over 65 Knots 2006 - 2010

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1. Alma	03/09/2006	01:58 PM	Tstm Wind	70 kts.	0	0	25K	0
2. Black Rock	03/09/2006	04:55 PM	Tstm Wind	65 kts.	0	0	1K	0
3. Haskell	03/09/2006	09:45 AM	Tstm Wind	65 kts.	0	0	0	0
4. Crossett	03/09/2006	10:54 AM	Tstm Wind	67 kts.	0	0	700K	0
5. Oil Trough	03/09/2006	10:55 AM	Tstm Wind	68 kts.	0	0	0	0
6. Bentonville Muni Arp	03/12/2006	10:10 PM	Tstm Wind	70 kts.	0	0	750K	0

7. Wabbaseka	05/10/2006	12:47 AM	Tstm Wind	68 kts.	0	0	0	0
8. Guy	06/22/2006	03:55 PM	Tstm Wind	68 kts.	0	0	0	0
9. Greenwood	07/12/2006	06:47 PM	Tstm Wind	65 kts.	0	0	75K	0
10. Eureka Spgs	07/20/2006	04:35 PM	Tstm Wind	70 kts.	0	0	25K	0
11. Maumelle	08/11/2006	04:30 PM	Tstm Wind	65 kts.	0	0	0	0
12. Lewisville	08/25/2006	06:45 PM	Tstm Wind	65 kts.	0	0	80K	0
13. Corning	09/22/2006	03:30 PM	Tstm Wind	70 kts.	0	0	30K	0
14. Brinkley	11/15/2006	03:50 AM	Thunderstorm Wind	65 kts.	0	0	100K	0K
15. Pearcy	03/27/2007	14:28 PM	Thunderstorm Wind	70 kts.	0	0	125K	0K
16. Aurora	06/10/2007	15:05 PM	Thunderstorm Wind	65 kts.	0	0	2K	0K
17. Cave City	08/13/2007	17:08 PM	Thunderstorm Wind	65 kts.	0	0	75K	0K
18. Cave City	08/13/2007	17:11 PM	Thunderstorm Wind	65 kts.	0	0	125K	0K
19. Proctor	10/18/2007	17:45 PM	Thunderstorm Wind	70 kts.	0	3	125K	0K
20. Gravette	01/07/2008	23:20 PM	Thunderstorm Wind	70 kts.	0	0	2K	0K
21. Pea Ridge	01/08/2008	02:20 AM	Thunderstorm Wind	70 kts.	0	4	100K	0K
22. Garfield	01/08/2008	02:30 AM	Thunderstorm Wind	70 kts.	0	0	25K	0K
23. Culler	01/08/2008	11:51 AM	Thunderstorm Wind	65 kts.	0	0	40K	0K
24. Booneville Muni Arpt	03/18/2008	10:57 AM	Thunderstorm Wind	80 kts.	0	0	2.0M	0K
25. Paragould Muni Arpt	03/18/2008	15:58 PM	Thunderstorm Wind	65 kts.	0	0	5K	0K
26. Paragould	03/18/2008	16:00 PM	Thunderstorm Wind	65 kts.	0	0	0K	0K
27. Paragould Muni Arpt	03/18/2008	16:47 PM	Thunderstorm Wind	65 kts.	0	0	20K	0K
28. Thornton	04/08/2008	19:10 PM	Thunderstorm Wind	65 kts.	0	0	250K	0K
29. Excelsior	04/09/2008	22:23 PM	Thunderstorm Wind	70 kts.	0	0	25K	0K
30. Turner	05/10/2008	19:30 PM	Thunderstorm Wind	96 kts.	0	0	500K	0K
31. Texarkana	05/22/2008	16:15 PM	Thunderstorm Wind	87 kts.	0	0	2.0M	0K
32. Paris	06/01/2008	12:00 PM	Thunderstorm Wind	65 kts.	0	0	2.7M	0K

33. Hindsville	07/05/2008	17:11 PM	Thunderstorm Wind	70 kts.	0	0	5K	0K
34. Birdtown	02/11/2009	01:45 AM	Thunderstorm Wind	70 kts.	0	0	300K	0K
35. Formosa	02/11/2009	01:50 AM	Thunderstorm Wind	70 kts.	0	0	125K	0K
36. Choctaw	02/11/2009	02:00 AM	Thunderstorm Wind	65 kts.	0	0	500K	0K
37. Letona	02/11/2009	02:45 AM	Thunderstorm Wind	75 kts.	0	3	750K	0K
38. Corning Muni Arpt	04/09/2009	23:00 PM	Thunderstorm Wind	90 kts.	0	0	0K	0K
39. Stuttgart	05/06/2009	01:20 AM	Thunderstorm Wind	70 kts.	0	0	1.5M	0K
40. Rock Spgs	05/06/2009	04:00 AM	Thunderstorm Wind	70 kts.	0	3	2.5M	0K
41. Dermott	05/06/2009	04:25 AM	Thunderstorm Wind	65 kts.	0	0	100K	0K
42. Mountain Home	05/08/2009	08:05 AM	Thunderstorm Wind	65 kts.	0	0	150K	0K
43. Bentonville	05/13/2009	10:45 AM	Thunderstorm Wind	70 kts.	0	0	100K	0K
44. Gentry	06/09/2009	22:37 PM	Thunderstorm Wind	70 kts.	0	0	25K	0K
45. Ozark	06/10/2009	18:57 PM	Thunderstorm Wind	70 kts.	0	0	30K	0K
46. Rogers	06/12/2009	11:10 AM	Thunderstorm Wind	74 kts.	0	0	0K	0K
47. Ft Smith	06/12/2009	11:33 AM	Thunderstorm Wind	70 kts.	0	0	25K	0K
48. Atkins	06/12/2009	12:55 PM	Thunderstorm Wind	78 kts.	0	0	1.5M	0K
49. Old Hickory	06/12/2009	13:01 PM	Thunderstorm Wind	70 kts.	0	0	1.8M	0K
50. Skunk Hollow	06/12/2009	13:28 PM	Thunderstorm Wind	70 kts.	0	0	1.5M	0K
51. Guy	06/12/2009	13:35 PM	Thunderstorm Wind	65 kts.	0	0	20K	0K
52. Mountain Spgs	06/12/2009	13:43 PM	Thunderstorm Wind	74 kts.	0	0	500K	0K
53. Ward	06/12/2009	13:44 PM	Thunderstorm Wind	65 kts.	0	1	250K	0K
54. Beedeville	06/12/2009	14:55 PM	Thunderstorm Wind	70 kts.	0	0	600K	0K
55. Oil Trough	06/12/2009	15:02 PM	Thunderstorm Wind	65 kts.	0	0	0K	0K
56. Greenwood	06/14/2009	01:00 AM	Thunderstorm Wind	70 kts.	0	0	10K	0K
57. Oak Grove	07/16/2009	01:00 AM	Thunderstorm Wind	70 kts.	0	0	20K	0K
58. De Queen/sevier Co A	07/20/2009	12:37 PM	Thunderstorm Wind	66 kts.	0	0	0K	0K
59. Bingen	07/20/2009	13:45 PM	Thunderstorm Wind	70 kts.	0	0	40K	0K

60. Ida	08/05/2009	02:15 AM	Thunderstorm Wind	65 kts.	0	0	375K	0K
61. Jacksons Store	08/05/2009	02:59 AM	Thunderstorm Wind	70 kts.	0	0	125K	0K
62. Ozark	10/08/2009	21:57 PM	Thunderstorm Wind	76 kts.	0	0	10K	0K
63. Dalark	10/09/2009	07:15 AM	Thunderstorm Wind	65 kts.	0	0	175K	0K
64. Hampton	10/09/2009	08:25 AM	Thunderstorm Wind	65 kts.	0	0	450K	0K
65. Dermott	10/09/2009	10:10 AM	Thunderstorm Wind	67 kts.	0	0	80K	0K
66. Fairfield	10/29/2009	22:00 PM	Thunderstorm Wind	78 kts.	0	0	250K	0K
67. Mc Gehee	10/30/2009	02:33 AM	Thunderstorm Wind	80 kts.	0	0	250K	0K

The following details are provided for a few specific cases of straight-line wind damage:

September 14, 2008 Wind Storms: Hurricane Ike made landfall near Galveston, Texas around 2 am CDT on 9/13 and moved northward across northern Texas to near Tyler and then northeastward into Arkansas near Ozark during the early morning hours of the 14th. The combination of a cold front passing into the region and the proximity of the tropical storm to the area resulted in high winds across much of northwest Arkansas. Trees, large tree limbs, and power lines were blown down. Some trees fell onto and blocked roads while some others fell on homes and businesses.

January 29, 2008 Wind Storms: A strong cold front approached from the plains during the morning of January 29th. The front arrived during the early afternoon hours, and winds shifted to the northwest. Wind speeds of 30 to 40 mph were common, with gusts over 50 mph. Approximately 80,000 power outages occurred. Damages from this event estimated at $250 thousand.

July 2003 Memphis Wind Storms: On the morning of July 22, 2003, downtown Memphis, Tennessee was hit hard by a downburst wind event that produced winds over 100 mph. Numerous trees, power lines, power poles and radio towers were blown down. Some of the trees fell on houses producing major damage. At least 20 buildings collapsed. Numerous homes and buildings were damaged and a few were destroyed. Among the damaged buildings was the Gibson Guitar factory in downtown Memphis. The city's main entertainment district, Beale Street, was shut down for a week. One person was killed when a tree fell on his house, crushing him. Over 300,000 homes in the county were without electricity. Most were without power for anywhere from two days to two weeks. Several people were killed due to post-storm related issues such as carbon monoxide poisoning from their improper use of generators. Property damage in Memphis from this straight-line wind event was estimated to be over $40 million dollars.

Across the Mississippi River in West Memphis (Crittenden County), Arkansas, wind damage occurred but was less severe than in Memphis because of lower wind speeds (75 mph) and less infrastructure. About 20 mobile homes were damaged. Several boathouses and a grain elevator were damaged in Horseshoe Lake and five tractor-trailers were blown over. Numerous trees were blown down with some of the trees falling

on houses. Damage estimates for Crittenden County were $100,000. Numerous other communities in eastern Arkansas suffered damages from this wind event.

115 mph Winds, Waldenburg: The strongest straight-line winds recorded in Arkansas, 115 mph (100 Knots), occurred in May of 2003 near Waldenburg (Poinsett County). This wind speed is equivalent to a low-end F2 tornado. A grain silo was damaged near Waldenburg and a house trailer was destroyed. Numerous trees were blown down with some of the trees falling on houses. The National Weather Service estimated property damage at $25,000.

Nashville Severe Storm, 2000**:** In May of 2000, 98 mph winds near Nashville (Howard County) caused pine, oak and pecan trees over a 15-mile wide area to be flattened. Two homes were destroyed, five homes suffered major damage, 30 homes suffered minor damage, three mobile homes were totally destroyed and one new motor home was crushed by a fallen tree. No injuries or deaths occurred. The National Weather Service estimated property damage from this straight-line wind event at $1.1 million.

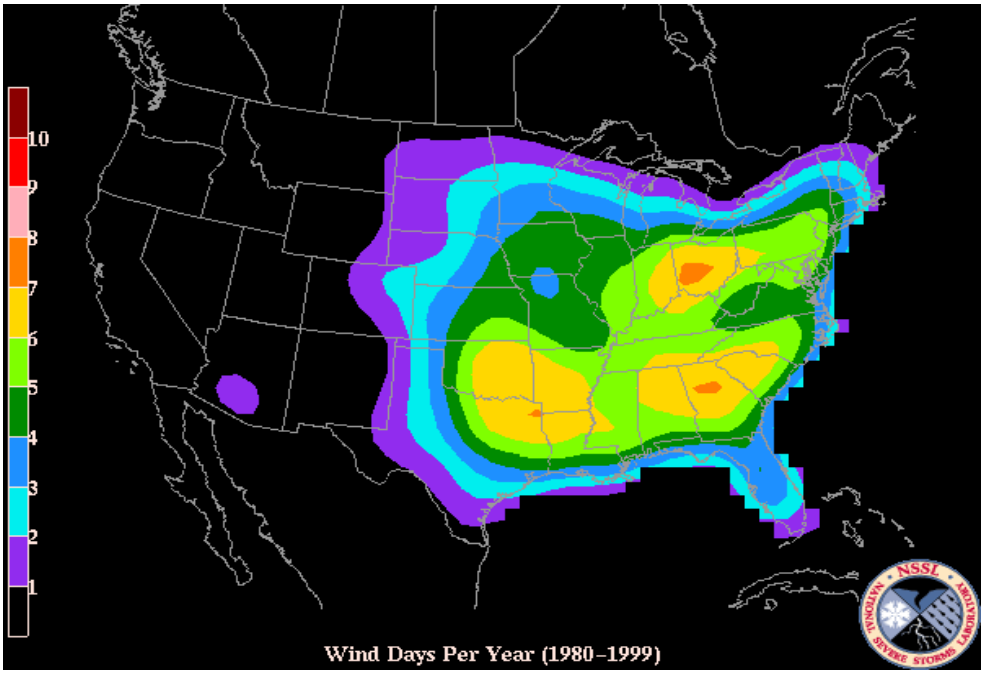
El Dorado Severe Storm, 1998**:** This severe storm with winds of over 80 mph toppled trees throughout the El Dorado (Union County) area and caused damage to many homes, businesses and power lines. A large broadcasting tower was blown down and a tree fell across a home totally demolishing it. Residents were evacuated after a nitric acid tank was blown down near an El Dorado chemical plant. The spill residue was contained and neutralized on-site. There was one injury reported when a man was trapped inside his car after a tree fell on it. The National Weather Service estimated property damage at $1 million.

Probability of Future Straight-line Wind Events

In the period from 1996 through 2010, NCDC data indicates that Arkansas experienced 6,111, thunderstorm/straight-line wind events. This is an average of 254 events per year statewide. This number may be misleading as the same thunderstorm system may result in numerous “events” as it moves across the state through other communities.

The National Oceanographic and Atmospheric Association’s (NOAA) National Severe Storms Laboratory (NSSL) initiated a project to estimate the likelihood of severe weather hazards in the United States. One aspect addressed is the total annual threat of severe storms in the United States. The mean number of days per year with one or more >50 knot (>58 mph) events within 25 miles of a point is shown in Figure 4.2.8-1. Note that most of Arkansas lies within the six to seven wind days per year interval, with the northeast part of the state in the four to six wind days per year interval. The pattern changes when winds of >65 knots (79 mph) are considered (Figure 4.2.8-2).

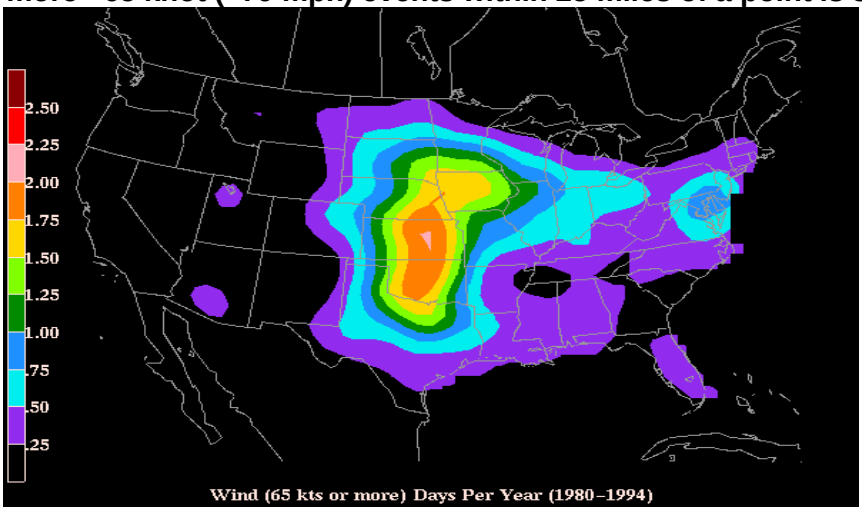
Figure 4.2.8-1: The Total Annual Threat of a Severe Storm in the U.S. Based on NOAA. (NSSL data between 1980 and 1999): The mean number of days per year with one or more >50 knot (>58 mph) wind events within 25 miles of a point is shown.



Source: NOAA

When these higher wind speeds are considered, western Arkansas shows the highest annual threat (0.5 to 1 >65 knot wind day per year) whereas the eastern part of the state exhibits a lower threat (0 to 0.5 >65 knot wind days per year) (Figure 4.2.8-2).

Figure 4.2.8-2: The Total Annual Threat of a Severe Storm in the US based on NOAA NSSL data between 1980 and 1994: The mean number of days per year with one or more >65 knot (>79 mph) events within 25 miles of a point is shown.



Source: NOAA

The HMP Sub-Committee has analyzed this hazard separately however; the results are difficult to interpret without considering that straight-line winds are associated with strong storm systems that usually involve tornadoes and flooding. The probability of strong storms impacting the state is a virtual certainty based on past historic data. Since straight-line winds occur during these storms, the Sub-Committee has agreed that the probability of winds occurring and impacting the state is **"Highly Likely"**.

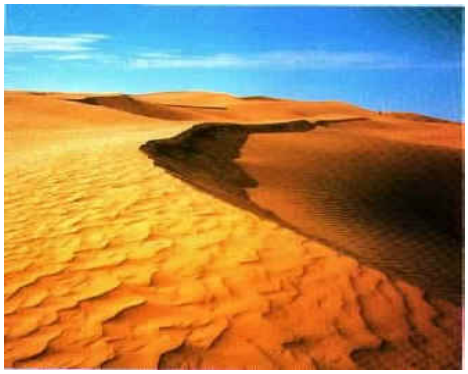
4.2.9 Drought Hazard Profile

This drought profile was developed in the original plan, amended in the previous update, and modified again in 2010. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to drought.

Drought Profile

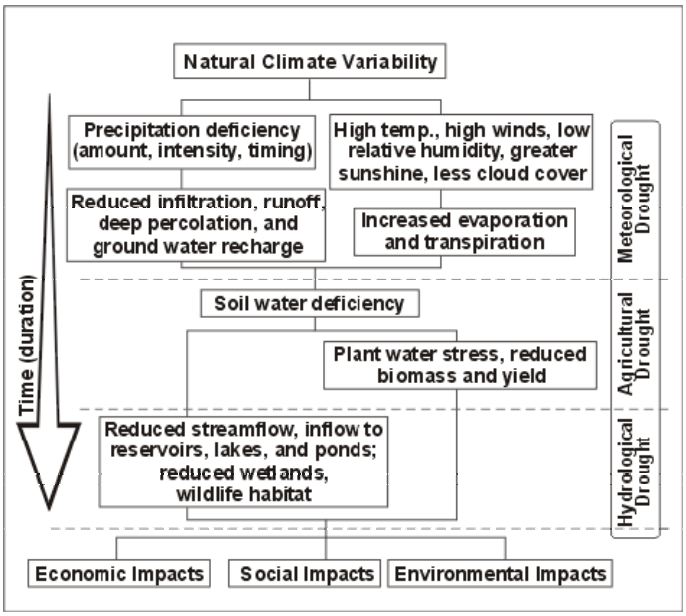
Drought is a normal, recurrent feature of climate. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group or environmental sector. Drought is a temporary aberration; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate.

Drought



Aridity

Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area, a condition often perceived as "normal." It is also related to the timing (i.e., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness (i.e., rainfall intensity, number of rainfall events) of the rains. Other climatic factors such as high temperature, high wind and low relative humidity are often associated with it in many regions of the world and can significantly aggravate its severity.



When drought begins, the agricultural sector is usually the first to be affected because of its heavy dependence on stored soil water. Soil water can be rapidly depleted during extended dry periods. If precipitation deficiencies continue, then people dependent on other sources of water will begin to feel the effects of the shortage. Those who rely on surface water (i.e., reservoirs and lakes) and subsurface water (i.e., ground water), for example, are usually the last to be affected. A short-term drought that persists for three to six months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.

In 1965, W.C. Palmer developed an index to measure the departure of the moisture supply (Palmer, 1965). Palmer based his index on the supply-and-demand concept of the water balance equation, taking into account more than just the precipitation deficit at specific locations. The objective of the Palmer Drought Severity Index (PDSI), as this index is now called, was to provide measurements of moisture conditions that were standardized so that comparisons using the index could be made between locations and between months (Palmer 1965).

The Palmer Index is most effective in determining long-term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses a zero as normal, and drought is shown in terms of minus numbers; for example, minus two is moderate drought, minus three is severe drought, and minus four is extreme drought. The advantage of the Palmer Index is that it is standardized to the local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions.

Table 4.2.9-1: Palmer Drought Severity Index (PDSI)

Palmer Classifications	
4.0 or more	extremely wet
3.0 to 3.99	very wet
2.0 to 2.99	moderately wet
1.0 to 1.99	slightly wet
0.5 to 0.99	incipient wet spell
0.49 to -0.49	near normal
-0.5 to -0.99	incipient dry spell
-1.0 to -1.99	mild drought
-2.0 to -2.99	moderate drought
-3.0 to -3.99	severe drought
-4.0 or less	extreme drought

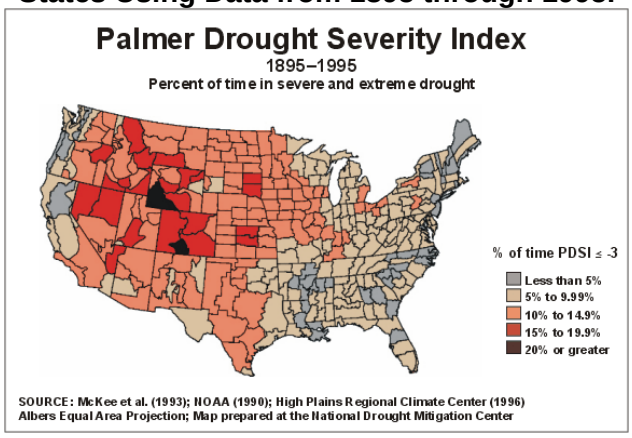
Scientists don't know how to predict drought a month or more in advance for most locations. Predicting drought depends on the ability to forecast two fundamental meteorological surface parameters, precipitation and temperature. From the historical record we know that climate is inherently variable. We also know that anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on air-sea interactions, soil moisture and land surface processes, topography, internal dynamics and the accumulated influence of dynamically unstable synoptic weather systems at the global scale.

Geographic Area Affected by Drought

The State of Arkansas experiences cyclical drought on a regular basis and there appear to be long-term trends toward a drier climate and warmer weather. The HMP Sub-Committee has thoroughly researched the past and current drought conditions and has determined that the drought conditions tend to affect the western portion of the state slightly more than the east, however the severity of drought conditions has been variable over the years effecting the east, north, south and central randomly and somewhat equally. All of the maps below detail the geographic areas affected during the specific time periods.

The state appears to be experiencing drought conditions currently and has been for the past few years. Based on historical Palmer Drought Severity Indices (PDSI) reconstructed by tree rings (since 1700) and instrumentally (since 1895), as well as recent experiences, the entire State of Arkansas can be affected by drought. Based on composite PDSI reconstructions between 1895 and 1995, western Arkansas is slightly more at risk to drought than eastern Arkansas (Figure 4.2.9-1).

Figure 4.2.9-1: Historical Map of Palmer Drought Severity Index in the United States Using Data from 1895 through 1995.



The following two PDSI maps show the updated and current drought conditions in the state. As of June 2010, the state has returned to a normal level after the relatively severe conditions in 2006.

Figure 4.2.9-2: Hydrological Conditions (June 2010)

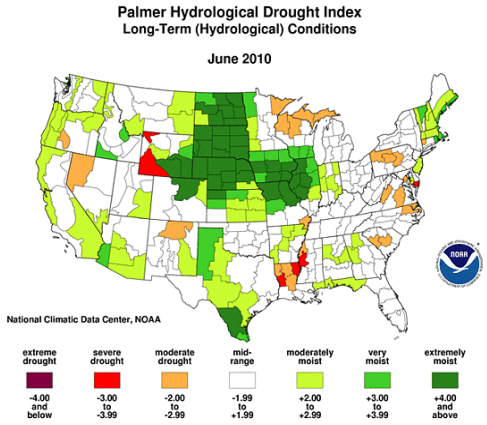
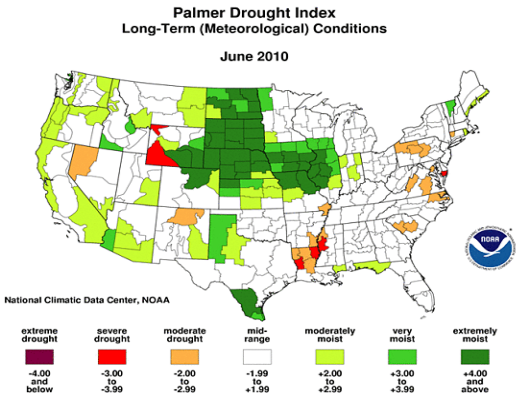


Figure 4.2.9-3: Meterological Conditions (June 2010)



Previous Drought Occurrences

The NCDC data has details about drought events in Arkansas; however, some of the data appears to be incomplete. The database lists the following events from 1950 through 2010; however, the damage tables are not completed with damage details.The planning team agreed that this is a data limitation and a corresponding mitigation action to collect more detailed reports can be found in the Mitigation Strategy section in Chapter 5 of this plan. This also includes three events that occurred in this plan update.

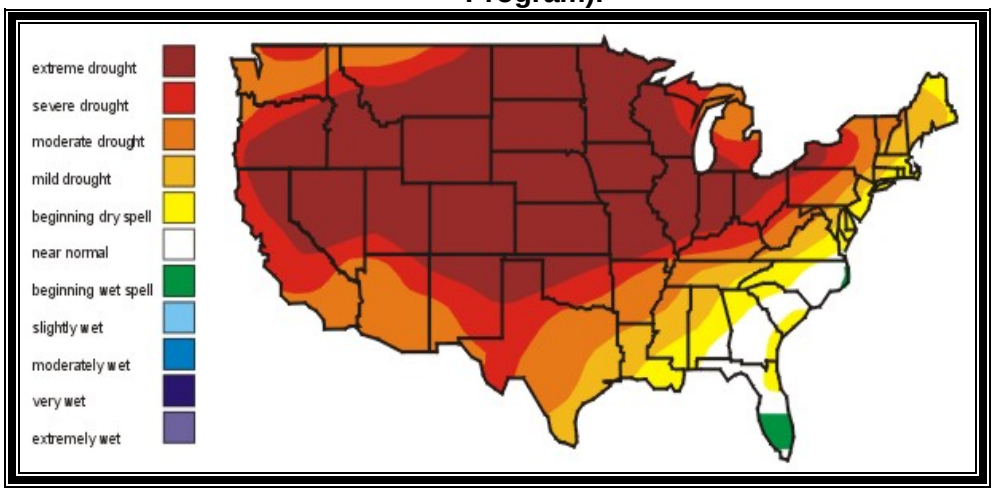
Table 4.2.9-2: Drought Occurrences from 1950-2010

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 ARZ050>051 - 059>060 - 070>071	05/14/1996	08:00 AM	Drought	N/A	0	0	0	0
2 ARZ003>007 - 012>016 - 021>025 - 030>034 - 037>047 - 052>057 - 062>069	09/08/2000	06:00 PM	Drought	N/A	0	0	0	0
3 ARZ050>051 - 059>061 - 070>073	08/01/2005	12:00 AM	Drought	N/A	0	0	0	0
4 ARZ001>002 - 010>011 - 019>020 - 029	11/01/2005	12:00 AM	Drought	N/A	0	0	0	0
5 ARZ001>002 - 010>011 - 019>020 - 029	12/01/2005	12:00 AM	Drought	N/A	0	0	0	0
6 ARZ050>051 - 059 - 070>071	12/01/2005	12:00 AM	Drought	N/A	0	0	0	0
7 ARZ001>002 - 010>011 - 019>020 - 029	01/01/2006	12:00 AM	Drought	N/A	0	0	0	0
8 ARZ001>002 - 010>011 - 019>020 - 029	02/01/2006	12:00 AM	Drought	N/A	0	0	0	0
9 ARZ001>002 - 010>011 - 019>020 - 029	03/01/2006	12:00 AM	Drought	N/A	0	0	0	0
10 ARZ001>002 - 010>011 - 019>020 - 029	04/01/2006	12:00 AM	Drought	N/A	0	0	0	0
11 ARZ001>002 - 010>011 - 019>020 - 029	05/01/2006	12:00 AM	Drought	N/A	0	0	0	0
12 ARZ074 - 075	10/01/2006	00:00 AM	Drought	N/A	0	0	0K	1.0M
13 ARZ008 - 017>018 - 026>028 - 035>036 - 048>049 - 058	08/01/2007	23:00 PM	Drought	N/A	0	0	0K	0K
14 ARZ008 - 017>018 - 026>028 - 035>036 - 048>049 - 058	09/01/2007	23:00 PM	Drought	N/A	0	0	0K	0K
15 ARZ008 - 017>018 - 026>028 - 035>036 - 048>049 - 058	10/01/2007	00:00 AM	Drought	N/A	0	0	0K	0K
				TOTALS:	0	0	0	1.000M

Along with these NCDC listed events; the HMP Sub-Committee has provided details about the following previous drought events.

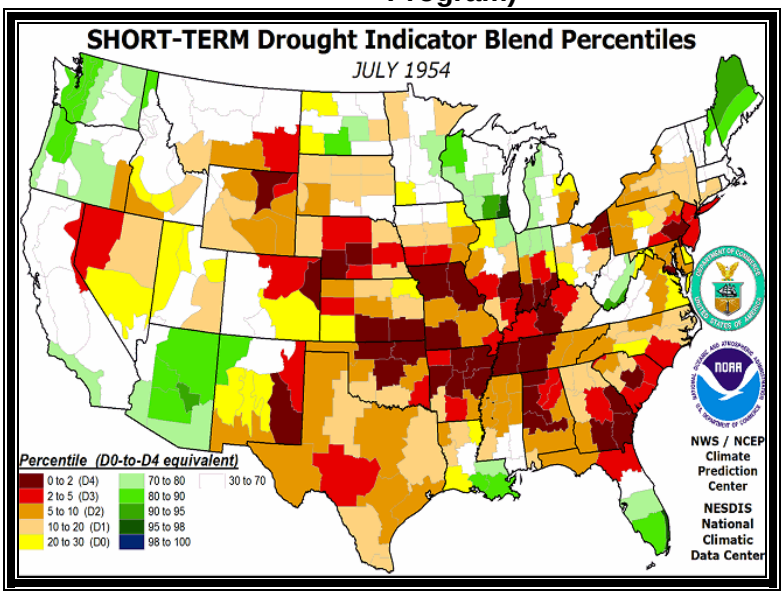
The Dust Bowl Drought: Arkansas was involved in a prolonged drought during the 1930s that resulted in dust storms and much economic misery to go along with the depression. Many summers from 1930 through 1939 were hot and dry. The worst dust storms in Arkansas came during 1934. The first dust storm was on April 11 and several others followed through the spring and summer. Ozark had 54 consecutive days of 100-degree weather during 1934. That is the state record for the most consecutive 100-degree days. An instrumental PDSI map of the United States showing the severity of drought in Arkansas in 1934 is shown in Figure 4.2.9-4.

Figure 4.2.9-4: Instrumental Palmer Drought Severity Index Map for the United States Reconstructed for 1934 (Source; NOAA Paleoclimatology Program).



The Droughts of 1953 and 1954: A statewide drought during the summer and fall of 1953 resulted in 100-degree weather through the month of September and even into early October in some areas. Wilson, in Mississippi County, went 101 days — from July 18 through October 26 — without measurable rainfall which is the longest dry spell in the state. In 1954, a heat wave covered Arkansas from June 7 through September 10 and there was an accompanying drought. It was the hottest summer on record in Little Rock and there were a record 46 days of 100-degree weather and 115 days of 90-degree weather. There was 100-degree weather on 16 out of 17 days and 10 consecutive 100-degree days during that period. An instrumental PDSI map of the United States showing the severity of drought in Arkansas in 1954 is shown in Figure 4.2.9-5.

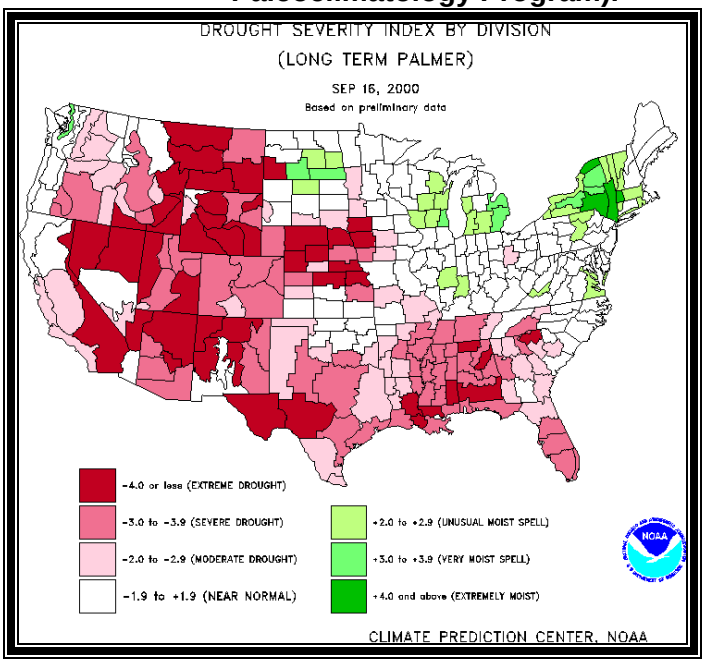
Figure 4.2.9-5: Instrumental Palmer Drought Severity Index Map for the United States, reconstructed for 1954 (Source; NOAA Paleoclimatology Program)



The Summer of 1980: A heat wave and accompanying drought covered Arkansas from June 22 through September 17. It produced the hottest month on record in Little Rock. There was a record 20 consecutive days of 100-degree weather that included 10 consecutive days of 105 degrees. There were 41 days of 100-degree weather and 103 days of 90-degree weather in Little Rock this time. Spatial Hazard Events and Losses for the United States (SHELDUS) data indicate that this drought cost $50,000,000 in property damage and $450,000,000 in crop damage in Arkansas.

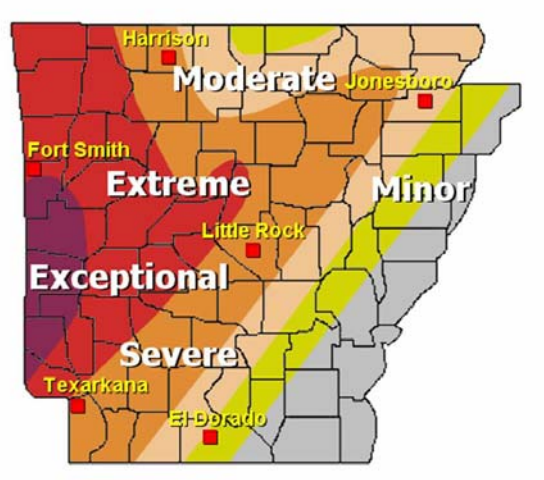
Late Summer Heat Wave and Drought of 2000: A dry period began at the beginning of July and continued through October in most of Arkansas. This was part of a long-term drought that began in the spring of 1998. A heat wave set in by mid-August with widespread 100-degree temperatures across the state through early September. Little Rock had its hottest month on record in August. There were 11 consecutive days of 100 degrees from August 25 through September 4 and Little Rock reached an all-time record high temperature of 111 degrees on August 30. Only 67 inches of rain was measured in July and August combined. A severe thunderstorm brought some rain to the Little Rock area on September 1st ending 27 straight days with no precipitation (a record). On September 8th, the governor of Arkansas asked that all 75 counties in Arkansas be declared agricultural disaster areas. With foliage drying, grass fires became numerous. A 1,200-acre fire spread through the Petit Jean State Park in Conway County in early September, with several forested areas completely burned. SHELDUS loss estimates for this drought were $50,000,000 for property damage and $450,000,000 for crop damage. A PDSI map of the United States showing the severity of drought in Arkansas in 2000 is shown in Figure 4.2.9-6.

Figure 4.2.9-6: Long-term Drought Severity Index Maps for the United States Reconstructed for 2000 and 2005/2006 (Source; NOAA Paleoclimatology Program).



Drought of 2005 and 2006: Based on information provided by the Drought Monitor (a collaborative effort between the National Weather Service, the Climate Prediction Center, the Drought Mitigation Center, the United States Department of Agriculture, the United States Geological Survey and several other participants), much of western Arkansas was affected by a severe to exceptional drought in 2005 and early 2006. The Arkansas map below shows the conditions as of February 16, 2006. The drought continued through 2006 as detailed by the drought monitor maps below. As for May 2007, the conditions improved somewhat (Figure 4.2.9-8).

Figure 4.2.9-7: Drought Conditions as of February 16, 2006

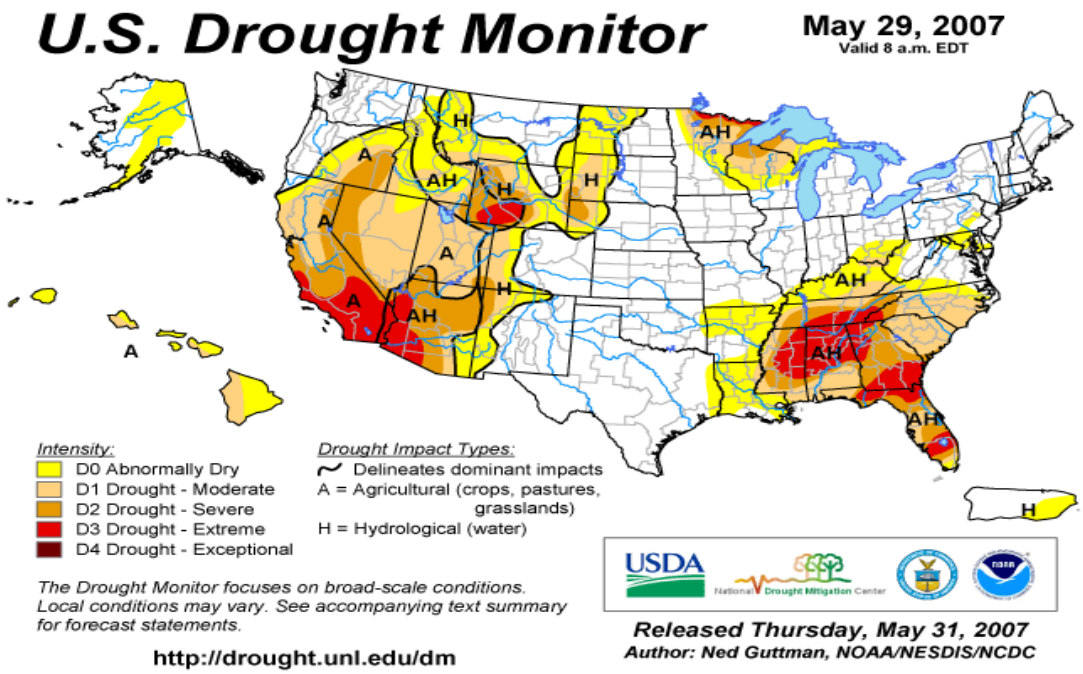


Source: Climate Prediction Center

Arkansas saw only 34 inches of rainfall during 2005 as opposed to the 50 inches of rain that the state usually receives each year. Preliminary estimates show 2005 as the second-driest year on record for most of Arkansas. All of the state's 75 counties were declared disaster areas because of the drought. The rice crop wasn't affected much by the drought in 2005, but farmers and cattlemen experienced continuing impacts during the on-going drought in 2006.

The drought increased the risks and dangers related to fire. The Arkansas Forestry Commission posted burn bans in 52 of the state's 75 counties. Experts described the wildfire conditions as ideal. Fourteen western Arkansas counties were on the "extreme fire danger" list. The counties in northeast, eastern and south-central Arkansas were the least affected by these on-going drought conditions. By early January 2006 there had been 256 reported fires in Arkansas whereas the 10-year average was about 67 for this time of the year.

Figure 4.2.9-8: U.S. Drought Monitor (May 2007)



Probability of Future Drought Events

Based on instrumental Palmer Drought Severity Index data between 1895 and 1995, eastern and central Arkansas have experienced severe to extreme drought conditions less than 5% of the time. Western, north-central and south central Arkansas has experienced severe to extreme drought conditions between 5% and 10% of the time (Figure 4.2.9-1).

Using annual PDSI maps from 1730 through 1995 developed by the NOAA Paleoclimatology Program, it was found that Arkansas experienced severe to extreme drought conditions 23 times over this 265-year period, approximately one drought every 11.5 years. Drought years included: 1736, 1737, 1767, 1772, 1801, 1855, 1874, 1901, 1911, 1913, 1914, 1918, 1925, 1930, 1934, 1936, 1941, 1953, 1954, 1955, 1956, 1963, and 1964, 1980, 2000, and 2005-2007.

As of the date of this revision (2010), Arkansas is not currently experiencing long-term drought conditions.However, based on the previous occurrences of drought conditions in the state; the probability of drought events occurring with some frequency is considered **"Possible"**. As the state continues to develop with higher populations and more economic activity related to agriculture, livestock and poultry, these drought conditions and drier trends may begin to have a profound impact.

Figures 4.2.9-9 and 4.2.9-10 show the drought condition continues to improve from 2007 to 2010. However, conditions can change if the state experiences extreme heat events and low precipitation levels over a period of time.

Figure 4.2.9-9: U.S. Seasonal Drought Outlook from May 17, 2007 to August, 2007

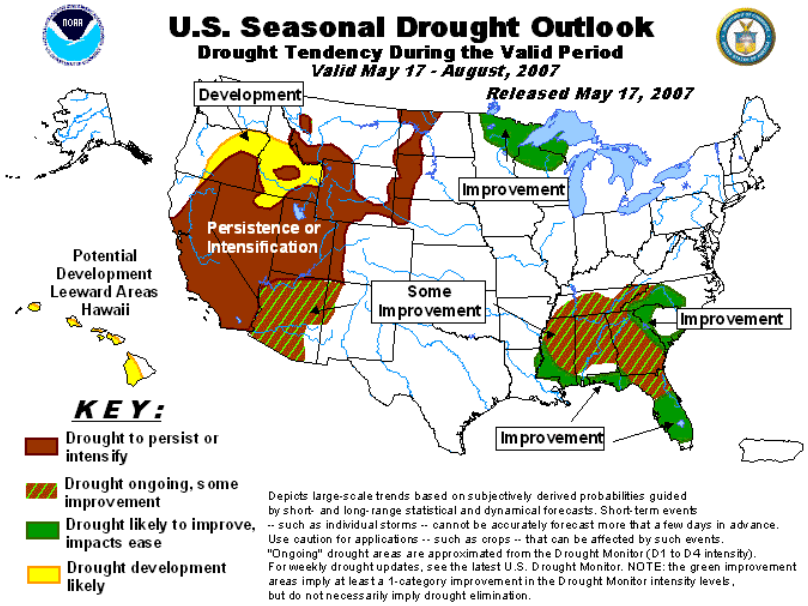
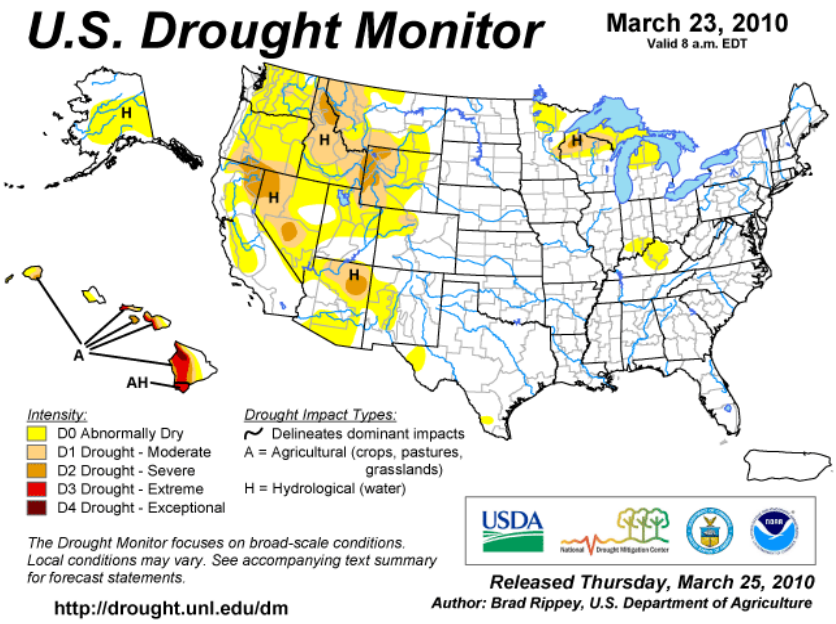


Figure 4.2.9-10: U.S. Drought Monitor as of March 23, 2010



The long-term trend in Arkansas appears to be toward higher temperatures. The two maps below show that Arkansas had experienced significantly warmer temperatures over the long-term period since 1971 and that these conditions continued to be higher in 2010.

Figure 4.2.9-11: Composite Temperature Anomalies

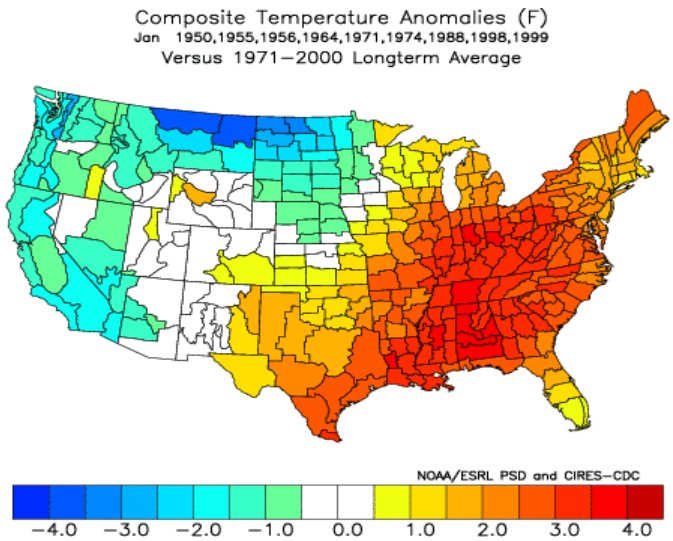
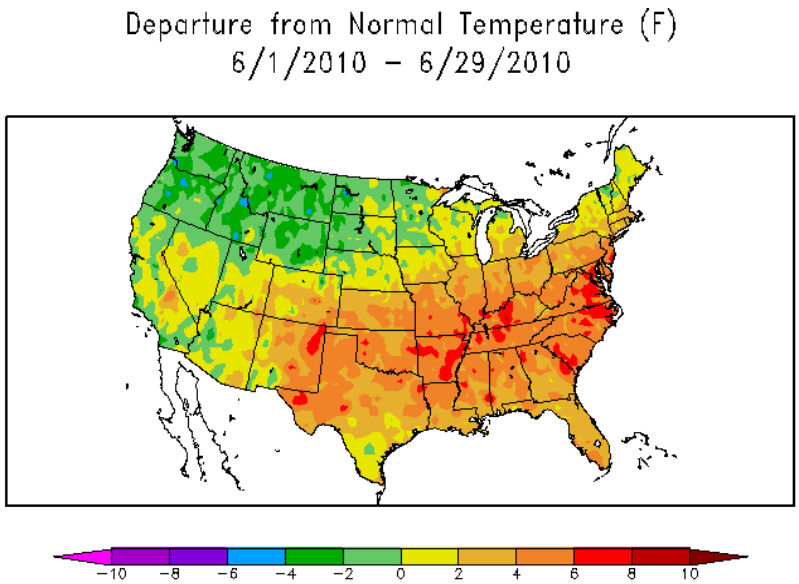
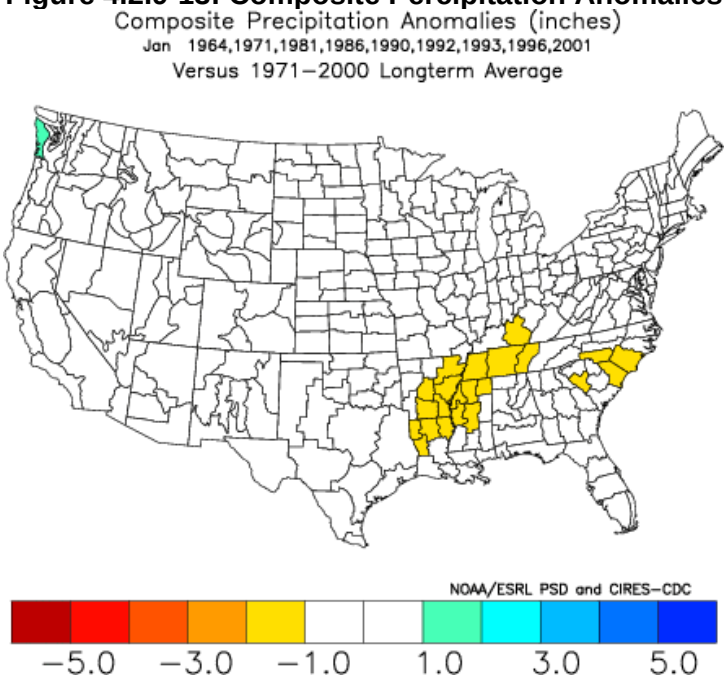


Figure 4.2.9-12: Mean Temperature Anomaly 30-Day Mean Ending June, 2010



Likewise, the long-term trend for most of the state is towards slightly drier seasons. The precipitations anomalies for the 30-year period are detailed below. The area in southern Arkansas has been impacted the most while the areas in the northwest region have been experiencing more normal trends.

Figure 4.2.9-13: Composite Percipitation Anomalies



4.2.10 Severe Storm Hazard Profile

The Severe Storm Hazard Profile was a new addition to the 2007 State of Arkansas All-Hazard Mitigation Plan update. Based on input from local FEMA approved mitigation plans, it was determined that severe storms are of great concern at the local level, and therefore should be reflected in the statewide vulnerability analysis. The HMP Sub-Committee voted to include lightning and hail as part of the overall severe storm profile for the previous mitigation plan update (Version 3), and maintained this format for the 2010 update (Version 4). This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to severe storms.

Severe Storm Profile

Thunderstorms sometimes referred to as "thunder events" are recorded and observed as soon as a peal of thunder is heard by an observer at a NWS first-order weather station. A thunder event is composed of lightning and rainfall, and can intensify into a severe thunderstorm with damaging or deadly hail, high winds, tornadoes, and flash flooding. Thunderstorms spawn as many as 1,000 tornadoes each year.

Lightning is a discharge of atmospheric electricity, accompanied by a vivid flash of light, from a thunderstorm, frequently from one cloud to another, sometimes from a cloud to

the earth. The sound produced by the electricity passing rapidly through the atmosphere causes thunder.

Hail is frozen water droplets formed inside a thunderstorm cloud. They are formed during the strong updrafts of warm air and downdrafts of cold air, when the water droplets are carried well above the freezing level to temperatures below 32 degrees Fahrenheit. Then the frozen droplet begins to fall, carried by cold downdrafts, and may begin to thaw as it moves into warmer air toward the bottom of the thunderstorm.

Geographic Area Affected by Severe Storms

Thunderstorms and lightning are underrated killer events experienced in every region of Arkansas where people and property are exposed to damage, injury and loss of life. Everywhere they occur, thunderstorms are responsible for significant structural damage to buildings, forest and wildfires, downed power lines and trees and flash flooding. During the past decade, more than 15,000 lightning-induced fires resulted in widespread property damage and the loss of two million acres of forest. Each year lightning causes an average of 93 deaths and 300 injuries in the United States. Lightning also causes several million dollars in damage to homes, businesses, churches and barns each year. Lightning is a problem for all communities in Arkansas. Electrical fires, electricity loss and damage to equipment are a few of the main hazards associated with lightning strikes.

NOAA reports that severe storms were responsible for 23 fatalities in 1993, and associated lightning strikes caused 43 deaths. For the same year, damage from thunderstorm winds amounted to $348.7 million, while lightning caused $32.5 million in damage. Severe thunderstorms were involved in 327 Federal Disaster Declarations from 1975 to 1995.

Hail usually occurs during severe thunderstorms, which also produce frequent lightning, flash flooding and strong winds, with the potential of tornados. The size ranges from smaller than a pea to as large as a softball, and can be very destructive to buildings, vehicles and crops in Arkansas.

Even small hail can cause significant damage to young and tender plants. Hail usually lasts an average of 10 to 20 minutes but may last much longer in some storms. Hail causes $1 billion in damage to crops and property each year in the U.S. Anyone out of doors during a thunderstorm is exposed and at risk of injury from lightning. More people are killed by lightning strikes while participating in some form of recreation than any other activity. The peak periods for hailstorms, late spring and early summer, coincide with the Southwest's most critical agricultural seasons for wheat, corn, rice, soy beans and tobacco. Arkansas also has significant exposure to hailstorms, and virtually all buildings and crops in the state are at risk.

Based on NCDC data, 31 severe storm events have occurred in the State of Arkansas that resulted in $500,000.00 or more in reported property damages. These events are listed below.

Table 4.2.10-1: NCDC Reported Events for Severe Storms (1996-2010)

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1. Pleasant Plains	04/19/1996	11:03 PM	Severe Storm	50 kts.	0	0	500K	0
2. Rogers	02/20/1997	09:15 PM	Severe Storm	0 kts.	0	0	1.0M	0
3. Marshall	03/01/1997	03:30 PM	Severe Storm	50 kts.	0	0	2.0M	0
4. El Dorado	02/10/1998	04:30 PM	Severe Storm	70 kts.	0	1	1.0M	0
5. Nashville	05/12/2000	07:57 PM	Severe Storm	85 kts.	0	0	1.1M	0
6. Countywide	05/24/2000	11:10 PM	Severe Storm	0 kts.	0	0	500K	0
7. De Queen	09/02/2000	02:30 PM	Severe Storm	80 kts.	0	0	2.0M	0
8. Highfill	04/15/2001	12:51 AM	Severe Storm	86 kts.	0	0	1.0M	0
9. Trumann	04/30/2002	11:55 AM	Severe Storm	0 kts.	0	0	500K	0
10. Wynne	12/18/2002	08:20 PM	Severe Storm	80 kts.	0	2	750K	0
11. Bentonville	05/16/2003	05:05 AM	Severe Storm	70 kts.	0	0	700K	0
12. Nashville	06/02/2004	05:45 PM	Severe Storm	60 kts.	0	0	500K	0
13. Crossett	03/09/2006	10:54 AM	Severe Storm	67 kts.	0	0	700K	0
14. Bentonville Muni Arp	03/12/2006	10:10 PM	Severe Storm	70 kts.	0	0	750K	0
15. Hon	03/18/2008	10:33 AM	Severe Storm	50 kts.	0	0	500K	0K
16. Booneville Muni Arpt	03/18/2008	10:57 AM	Severe Storm	80 kts.	0	0	2.0M	0K
17. Turner	05/10/2008	19:30 PM	Severe Storm	96 kts.	0	0	500K	0K

18. Texarkana	05/22/2008	16:15 PM	Severe Storm	87 kts.	0	0	2.0M	0K
19. Paris	06/01/2008	12:00 PM	Severe Storm	65 kts.	0	0	2.7M	0K
20. Center Ridge	06/09/2008	15:10 PM	Severe Storm	60 kts.	0	0	500K	0K
21. Choctaw	02/11/2009	02:00 AM	Severe Storm	65 kts.	0	0	500K	0K
22. Letona	02/11/2009	02:45 AM	Severe Storm	75 kts.	0	3	750K	0K
23. Stuttgart	05/06/2009	01:20 AM	Severe Storm	70 kts.	0	0	1.5M	0K
24. Rock Spgs	05/06/2009	04:00 AM	Severe Storm	70 kts.	0	3	2.5M	0K
25. Shady Grove	06/12/2009	12:18 PM	Severe Storm	61 kts.	0	0	500K	0K
26. Atkins	06/12/2009	12:55 PM	Severe Storm	78 kts.	0	0	1.5M	0K
27. Old Hickory	06/12/2009	13:01 PM	Severe Storm	70 kts.	0	0	1.8M	0K
28. Skunk Hollow	06/12/2009	13:28 PM	Severe Storm	70 kts.	0	0	1.5M	0K
29. Mountain Spgs	06/12/2009	13:43 PM	Severe Storm	74 kts.	0	0	500K	0K
30. Beedeville	06/12/2009	14:55 PM	Severe Storm	70 kts.	0	0	600K	0K
31. Bradley	10/09/2009	07:05 AM	Severe Storm	57 kts.	0	0	500K	0K

Source: NCDC

Along with these NCDC listed events; the HMP Sub-Committee has provided details about the following previous damage-producing severe storm events.

Previous Severe Storm Occurrences

Arkansas experiences a high number of thunderstorms each year, the majority of which occur in the warm months. Given that Arkansas recorded 840 tornadoes from 1996-2010, it follows that the state would experience a high number of severe thunderstorms as well (severe thunderstorms are defined in the United States as having either tornadoes, gusts at least 58 mph, or hail at least ½ inch in diameter).The threats from thunderstorms are four-fold: winds (straight-line and tornadic), heavy rainfall (flash flooding), large hail and lightning.

May 6, 2009 Storms: Trees were down on houses, vehicles, and power lines. Approximately 30 homes were damaged and three people were injured by the falling trees. Much of the roof was removed from an exhibition building at the Drew County Fairgrounds. Unstable air, fronts meandering in the state, and areas of low pressure aloft contributed to severe weather, including a few tornadoes. At Arkansas Post (Arkansas County), the rain contributed to making it the wettest May ever recorded.

June 1, 2008 Storms, Logan County**:** Six houses suffered major damage, 20 had moderate damage, and 27 had minor damage. Four businesses had major damage, including a car dealership, two shop buildings, and a lumber company. At the car dealership, 37 cars were damaged, primarily due to flying debris and the collapse of three concrete block walls of an adjacent building. Three other businesses suffered moderate damage, and six had minor damage. Many trees were blown down, some of which fell on houses. Arkansas' second-oldest cherry tree was toppled. Many power lines were blown down and about 40 utility poles had to be replaced.

The Ashley County Storm: On March 9, 2006, a potent squall line of thunderstorms moved across Ashley County and caused widespread damage, especially across southern and eastern sections of the county. As the squall line moved through, a small segment of the line pushed out ahead of the line. This "bow segment" caused extensive damage along a swath from just south of Crossett to near Portland. The most significant damage occurred just south and southeast of Crossett. Along the damage swath, numerous trees and power lines were blown down. Several structures sustained damage along with a few outbuildings which were blown away. A total of $500,000 in property damage was recorded.

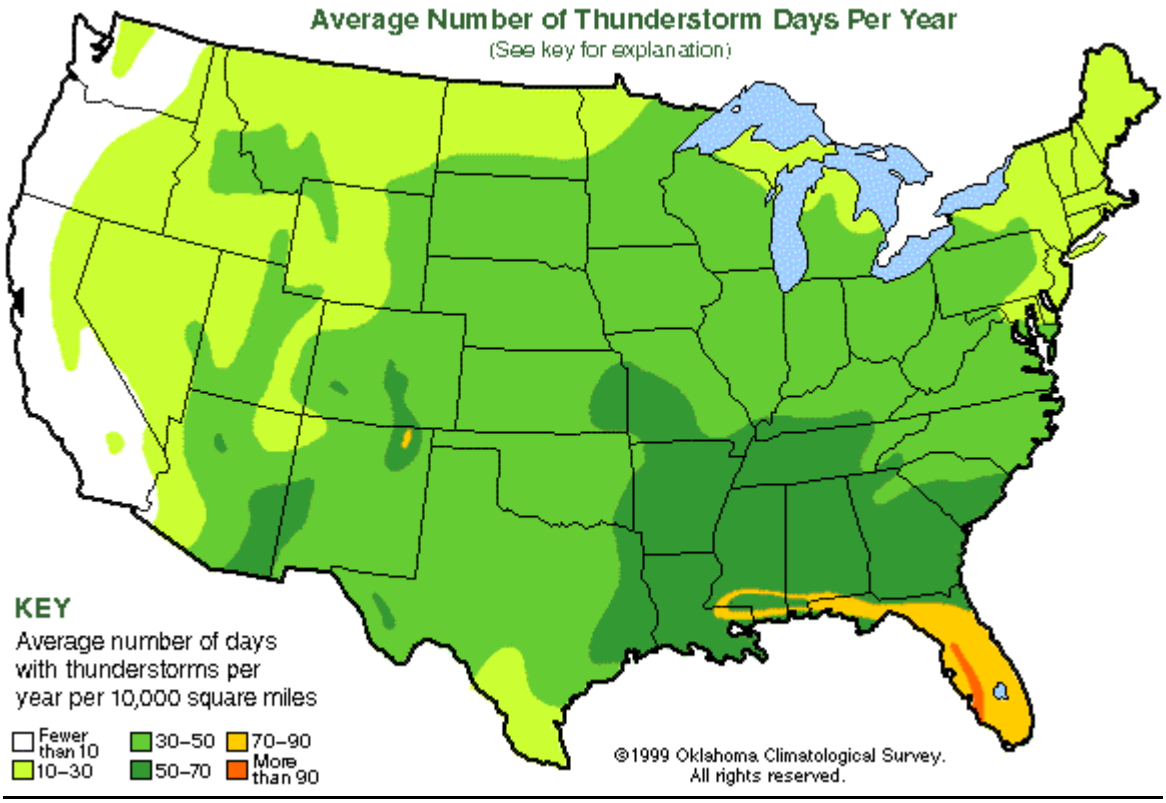
The Bentonville Storm: On May 16, 2003, this severe storm, estimated at 80 miles an hour, did significant damage in Bentonville. The brick walls of part of a business were reduced to rubble as the winds were let in as its garage door was blown open. Nine homes in the southeast part of the town's Walnut Ridge subdivision were damaged. Large tree limbs were blown down throughout the city with many of them knocking down power lines and causing power outages. Over $700,000.00 in property damage was recorded.

The Texarkana Storm: Two severe thunderstorms came together over the south side of the city. One severe storm was moving northeastward from southern Bowie County while the other was moving northwestward through Miller County. Both storms collided in an area just south of downtown Texarkana. As a result of the collision, the storm cores collapsed in an area just east of State Line Avenue over a several block area between 16th and 20th Streets. Numerous large trees were snapped or uprooted onto homes and cars in the Glendale Subdivision. As the survey expanded outward to the north near 24th Street and the Woodlawn Cemetery, trees were noted to have fallen in a north or northeastward direction typical of a microburst. Damage was found as far northeast as the Calvary Cemetery area with trees downed in a north to northeast direction. Trees were also uprooted and snapped on the Texas side of State Line Avenue with a heavier concentration along Magnolia Street between 24th Street and 30th Streets. It was noted that the trees fell in a northwesterly direction which would be expected if a microburst had occurred to the south and east of those locations. Numerous homes were damaged on the Texas side of State Line Avenue as a result. Powerlines were also downed throughout the area as a result of either poles snapping or trees falling on the lines. The

area impacted by the microburst is approximately 3.5 miles long to the northeast of the origin and four miles in width from one end of the damage swath to the other. City and County officials estimate that 44 homes sustained major damage with an unknown number of vehicles damaged. At least 100 damage reports have been collected thus far. Only one minor injury occurred when a tree fell on a home injuring an elderly woman inside. All of Miller County was considered a disaster area after the damage that resulted from the microburst across the northern portion of the county.

The Brinkley Storm: On July 2, 1994, this severe storm downed numerous trees, some of which fell on parked cars in the town on Brinkley. A number of homes and businesses were damaged by fallen trees. Some power lines were also pulled down by falling trees. One mobile home was destroyed and several others were damaged. An airplane was flipped over at the municipal airport. Over $500,000.00 was reported in property damage.

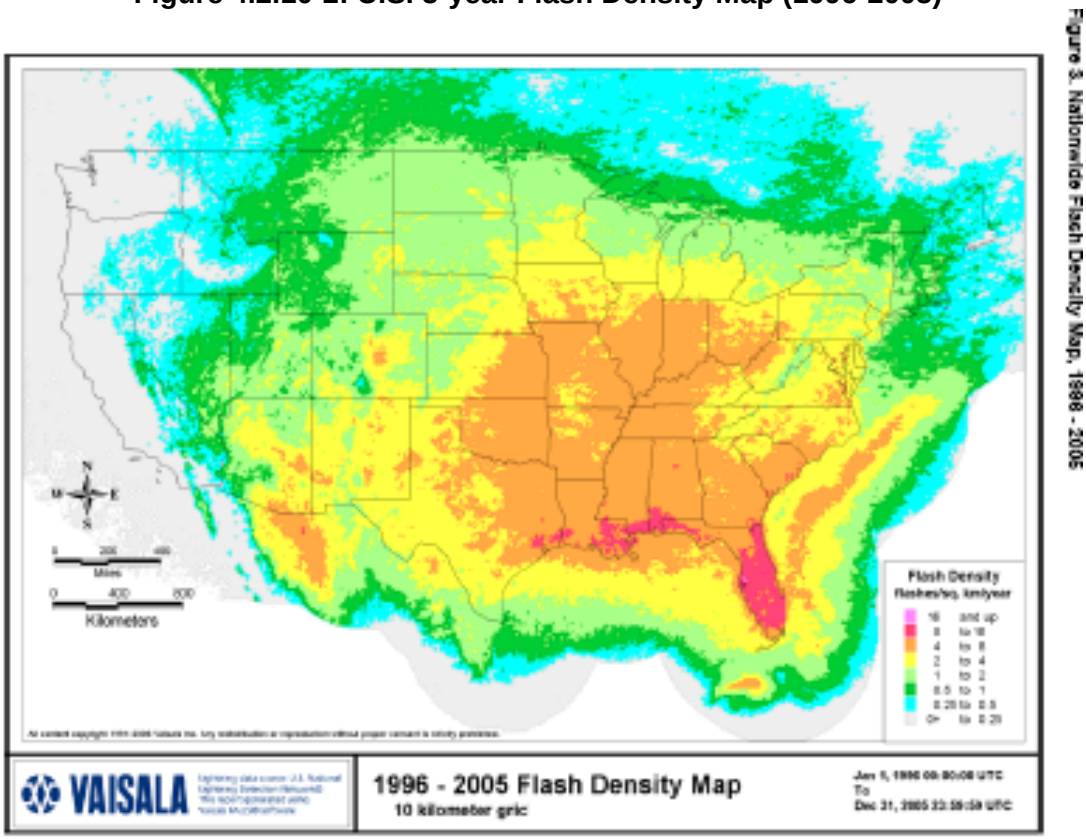
Figure 4.2.10-1: Average Number of Thunderstorm Days Per Year



Lightning Profile

Lightning occurs in conjunction with severe storms and impacts the State of Arkansas. The following map shows that flash density of lightning with Arkansas experiencing a medium to high level of activity compared to the remainder of the country.

Figure 4.2.10-2: U.S. 5-year Flash Density Map (1996-2005)



Lightning is a thunderstorm's second leading cause of death each year (flooding remains number one). Usually, single events caused by lightning are less dramatic than single events caused by hurricanes, floods or tornadoes. Old data said successive flashes were on the order of 3-4 km apart. New data shows half the flashes are about 9 km apart. According to statistics from the National Climatic Data Center (NCDC), 13 deaths and 71 injuries resulted from lightning strikes within Arkansas since 1993.

Based on NCDC data, 25 lighting events have occurred causing over $75,000.00 in property damage since 1996 in Arkansas. These events are listed below:

Table 4.2.10-2: NCDC Reported Lighting Events since 1996 in Arkansas

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Benton	04/12/1996	08:45 PM	Lightning	N/A	0	0	300K	0
2 Hartman	09/23/1996	11:05 PM	Lightning	N/A	0	0	120K	0
3 Maumelle	05/28/1997	01:00 AM	Lightning	N/A	0	0	135K	0
4 Malvern	04/27/1998	12:20 AM	Lightning	N/A	0	0	2.3M	0
5 Hattieville	05/03/1998	02:15 AM	Lightning	N/A	0	0	150K	0
6 Johnson	06/30/1999	05:00 AM	Lightning	N/A	0	0	75K	0
7 Hot Spgs	04/14/2001	07:00 PM	Lightning	N/A	0	0	90K	0
8 Pettigrew	08/21/2002	11:30 AM	Lightning	N/A	0	0	100K	0
9 Lockesburg	04/05/2005	08:38 PM	Lightning	N/A	0	0	125K	0
10 Ashdown	03/09/2006	03:00 AM	Lightning	N/A	1	0	100K	0
11 Little Rock	04/03/2007	20:15 PM	Lightning	N/A	0	0	2.5M	0K
12 Forrest City	05/09/2007	20:55 PM	Lightning	N/A	0	0	90K	0K
13 Woodberry	05/15/2007	16:10 PM	Lightning	N/A	0	0	500K	0K
14 Garland	06/19/2007	09:00 AM	Lightning	N/A	0	0	100K	0K
15 Emerson	07/19/2007	17:15 PM	Lightning	N/A	0	0	80K	0K
16 Levy	07/20/2007	14:35 PM	Lightning	N/A	0	0	3.0M	0K
17 Clarksville	10/01/2007	00:36 AM	Lightning	N/A	0	0	125K	0K
18 Maumelle	11/21/2007	15:56 PM	Lightning	N/A	0	0	200K	0K
19 Diaz	12/20/2007	04:00 AM	Lightning	N/A	0	0	150K	0K
20 Lonoke	03/15/2008	03:15 AM	Lightning	N/A	0	0	1.0M	0K
21 Mrriltn Petit Jn Pk	05/22/2008	12:00 PM	Lightning	N/A	0	0	90K	0K
22 Brockwell	06/20/2008	07:53 AM	Lightning	N/A	0	0	100K	0K
23 England	07/05/2008	12:05 PM	Lightning	N/A	0	0	450K	0K
24 Sherwood	07/10/2008	14:00 PM	Lightning	N/A	0	0	500K	0K
25 Joan	07/22/2008	14:45 PM	Lightning	N/A	0	0	200K	0K
26 Paragould	07/12/2009	03:43 AM	Lightning	N/A	0	0	1.0M	0K
27 Hempwallace	07/16/2009	13:30 PM	Lightning	N/A	0	0	100K	0K

Source: NCDC

Along with these NCDC listed events; the HMP Sub-Committee has provided details about the following previous damage-producing lightning events.

***July 12, 2009*:** A lightning strike started a fire at the Martin Sprocket & Gear Incorporated Plant in Paragould. The fire destroyed all the warehouses and ten percent of the plant received heavy smoke damage from the fire.

The Apartment Complex Lightning Event: On June 30, 1999, lightning caused a fire that heavily damaged a duplex in Johnson. Major flash flooding resulted across northwest Arkansas when a line of thunderstorms, containing torrential rainfall and associated with a nocturnal MCS, moved slowly southeastward across northwest Arkansas on the morning of June 30. Major flash flooding was reported in several locations, most notably in the Fort Smith area and western Benton County. The following are rainfall amounts measured at major airports across the region: NW Arkansas Regional Airport (Highfill)...3.20", Fort Smith Regional Airport...2.62", and Drake Field (Fayetteville)...2.39". This came on top of an already-wet spring and measurable rainfall in the two days preceding this event.

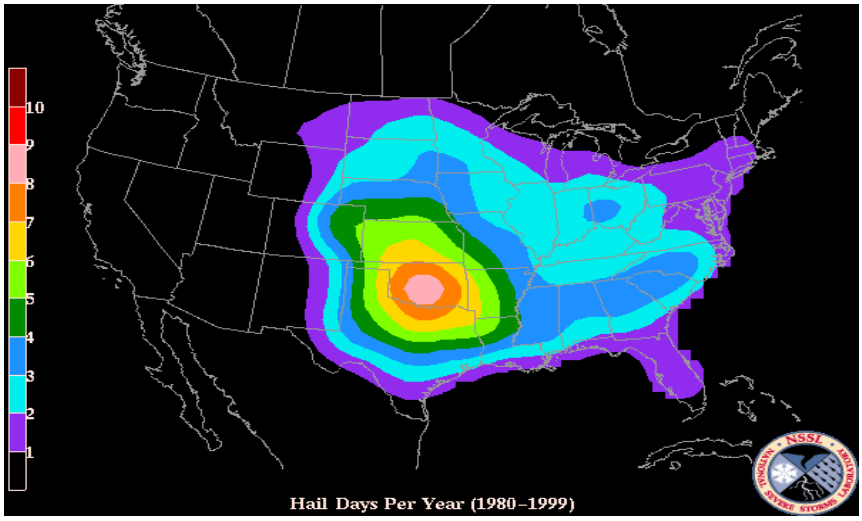
The Heber Springs Lightning Event: On June 28, 1997, a group of people were attending a picnic on the shore of Greers Ferry Lake at the Old Highway 25 Park. Lightning struck nearby and injured 12 people. One other person was killed as a result of being struck. The extent of injuries to the others struck consisted of burns. Most of the injured were treated and released from the hospital the same day and several others were kept for observation. No property or crop damage was reported for this event.

The 911 Operations Lightning Event: On October 26, 1995, lightning struck a transmission tower at the 911 Operations Center in Little Rock. The lightning travelled into the building and knocked out a portion of the 911 computer system. The equipment was repaired a few days later. Damage was estimated at around $150 thousand.

Hail Profile

While flooding is the most deadly severe thunderstorm hazard, hail is the most expensive. Arkansas crop losses due to hail average over $3.0 million per year in loss claims alone—not including property/casualty claims. Hail damage to automobiles, roofs, windows and farm crops is staggering. Large hail is also a threat to small mammals and it kills many birds. Large hail is generally one inch in diameter or larger and can cause a great deal of damage. Large hailstones can fall at speeds faster than 100 mph.

Figure 4.2.10-3: Hail Days per Year (1980-1999)



Although not a significant threat to human life, hail is extremely damaging. The table below lists the 15 most damaging Arkansas hail events since 1996, as reported by NCDC.

Table 4.2.10-3: Fifteen Most Damaging Hail Events Since 1996

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD
1 Fayetteville	04/22/1996	12:12 AM	Hail	1.75 in.	0	0	9.0M
2 Alma	03/05/1999	04:35 PM	Hail	4.50 in.	0	1	800K
3 Ozark	03/05/1999	05:05 PM	Hail	2.75 in.	0	0	600K
4 Charleston	03/26/2000	06:30 PM	Hail	2.75 in.	0	0	200K
5 Ozark	10/05/2000	07:33 PM	Hail	1.75 in.	0	0	250K
6 Corning	06/03/2001	05:05 AM	Hail	2.75 in.	0	0	400K
7 Lepanto	04/30/2002	12:00 PM	Hail	1.75 in.	0	0	3.0M
8 Fayetteville	07/13/2003	05:20 AM	Hail	2.75 in.	0	0	50.0M
9 Decatur	03/12/2006	09:41 PM	Hail	4.00 in.	0	0	2.5M
10 White	02/05/2008	15:06 PM	Hail	2.75 in.	0	0	1.0M
11 Halley Jct	02/05/2008	15:55 PM	Hail	4.25 in.	0	0	600K
12 Sulphur Spgs	03/14/2008	19:43 PM	Hail	1.75 in.	0	0	300K
13 (txk)texarkana Arpt	03/31/2008	22:59 PM	Hail	4.00 in.	0	0	85.0M
14 Ft Smith	04/09/2008	19:32 PM	Hail	1.75 in.	0	0	500K
15 Van Buren	04/09/2008	19:40 PM	Hail	2.75 in.	0	0	150K

Along with these NCDC listed events, the HMP Sub-Committee has provided details about the following previous damage-producing hail events.

The Alma Hail Event: On March 5, 1999, a large hail event was recorded around Alma Arkansas. There were several reports of extremely large hail around Alma. The largest report was of giant softball-sized hail, while there were also reports of quarter and golfball-sized hail just north of Alma. Such enormous hail caused widespread damage in Alma. Many cars sustained windshield and body damage. Just one auto body shop reported that it had written estimates from hail damage totaling $140,000. Many roofs also sustained major damage. At the Eagle Crest Golf Course, the hail left small craters on the greens, closing the course for several days while the crater marks were filled. A photo in the Alma Journal newspaper showed a softball-sized pock mark on the golf greens. A child was treated for injuries at a local hospital after being struck by the hail. Summary of events for March 5, 1999 follow: An approaching cold front and an upper level disturbance kicked off several severe thunderstorms in northwest Arkansas on March 5. The largest severe thunderstorm developed in Sequoyah County Oklahoma and then strengthened as it moved across Crawford and Franklin Counties along

Interstate 40. Along the way, this storm produced giant hail as large as baseballs and softballs. This storm demonstrated strong rotation, producing a brief tornado touchdown just west of Alma and considerable damage from softball-sized hail in Alma. A second weaker, though severe, thunderstorm formed over southern Crawford County and followed the same path as the first storm. Finally, a severe thunderstorm moved out of northeast Oklahoma and clipped northwest Benton County, producing marginally severe hail.

The Urbanette Hail Event: On March 1, 2007 a broad swath of hail up to golfball size occurred across the northeastern portion of Carroll County. The largest hail reportedly damaged homes and automobiles. A moist, unstable air mass had developed across northwestern Arkansas ahead of a strong upper level disturbance that moved across the Southern Plains during the early morning hours of the 1st. Thunderstorms erupted along and ahead of a cold front as it moved across the area. A total of $100,000.00 in damages was recorded in the town of Urbanette.

March 31, 2008 Texarkana: Very large hail fell across the entire city of Texarkana, Arkansas resulting in widespread damage to automobiles, home roofs and windows. The estimated monetary damage amount at the time of this publication was nearly 65 million dollars and according to local emergency management officials, this amount would likely be adjusted upward. The hail damage was particularily bad in downtown Texarkana, Arkansas. The city hall's Spanish tile roof, some of the hardest material known as far as roofing material is concerned, was damaged and destroyed. Many car dealerships inventory was deemed a total loss from the hail. Hail stones not only broke out car windows but went completely through the roofs of some dealerships and then busted out car windows inside the facilities. Damage estimates from this event: $85 million

June 30, 2009 Oakgrove: A devastating hailstorm, several miles wide, affected northern portions of North Little Rock and continued eastward through Sherwood and on into the area between Jacksonville and Galloway. In North Little Rock, hail up to 1 inch in diameter pelted the National Weather Service office at the North Little Rock airport for 6 minutes, from 5:11 to 5:17 PM CDT. The hail became larger as it progressed farther to the east. The Indian Hills and Windsor Valley subdivisions in North Little Rock were particularly hard-hit, as some of the hail increased to golf ball size (1.75 inches). Roofs were ruined and cars were dented. In Sherwood, much of the hail was golf ball size, and some of it was even larger. The hailstones poked holes in vinyl siding, ruined roofs, dented cars, and smashed car windshields. City officials indicated that thousands of roofs would have to be replaced. Automobile dealerships along U.S. Highway 67/167 were very hard-hit. One dealer said it was the first time in the 40 year history of the dealership that they were going to have to hold a hail sale. The largest hail was baseball size (2.75 inches) and was reported in the southern part of Sherwood. The hailstorm then continued eastward into Lonoke County. For the sake of completeness, all hail reports received by the National Weather Service are listed individually. Damage estaimate for this storm: $60 million.

Probability of Future Severe Storm Events

Arkansas severe storm statistics (1950-2009) are as follows:

- 9,909 severe storm events total
- An average of 168 severe storm events per year
- 21 total deaths from severe storms
- 215 total injuries from severe storms
- Over 50 million in recorded property damage

Severe storm events are common throughout the State of Arkansas. The probability of at least one severe storm event per year in each county in Arkansas is **"Highly Likely"**.

4.2.11 Hazardous Materials Event Hazard Profile

This hazardous materials profile was not a part of the original natural hazard plan developed in 2004. This profile was added during the 2006 revision in order to meet the EMAP standards for man-made and technological hazards. The HMP Sub-Committee reviewed this profile again as part of the 2007 revision for FEMA's three-year review, and once more as part of the 2010 update process. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to hazardous materials events.

Hazardous Materials Profile

As an industrialized nation, the United States produces, transports, stores, uses, and disposes of millions of tons of hazardous materials every day. They can be found virtually everywhere in daily society including: in trucks, trains and ships that transport hazardous substances; in industrial production, storage and use; and in active and abandoned hazardous waste sites. Under normal conditions, these substances are controlled and pose no threat to human life and the environment. But when a release occurs, they can produce disastrous results. These materials, in their various forms, can cause death, serious injury, long-lasting health effects, and can damage buildings, homes, and other property. A hazardous materials incident can range from a chemical spill on our highways to groundwater contamination by naturally occurring methane gas. Releases of these hazardous products often occur during their daily shipment and use on Arkansas highways, railroads, pipelines and other transportation methods.

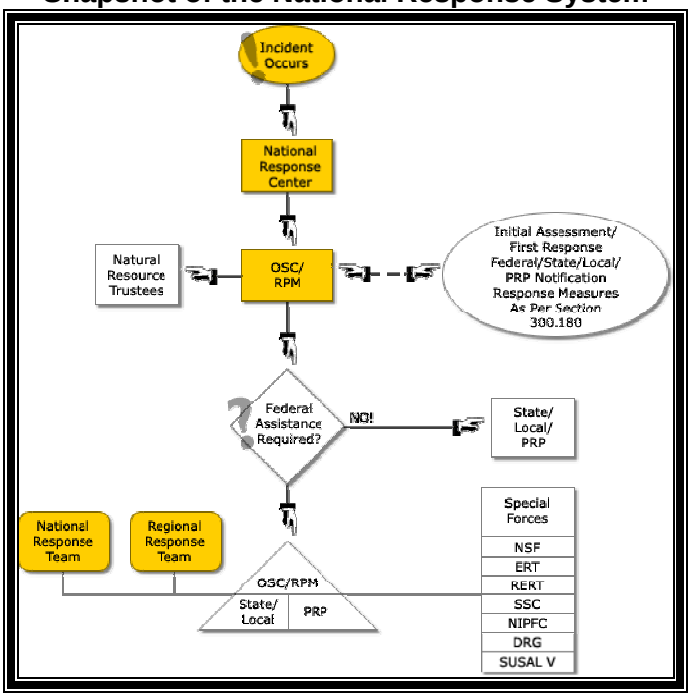
Hazardous materials are chemical substances, which if released or misused can pose a threat to the environment or health. These chemicals are found throughout Arkansas, in areas of industry, agriculture, medicine, research, consumer goods and a multitude of others. Hazardous materials can come in the form of explosives, flammable and combustible substances, poisons and radioactive materials. Many hazardous materials do not have a taste or an odor. Some materials can be detected because they cause physical reactions such as watering eyes or nausea. Some hazardous materials exist beneath the surface of the ground and can be recognized by an oil or foam-like appearance.

Response to Hazardous Materials (HAZMAT) Events

U.S. National Response Team: The U.S. National Response Team (NRT) is an organization of 16 federal departments and agencies responsible for coordinating emergency preparedness and response to oil and hazardous substance pollution incidents. The Environment Protection Agency (EPA) and the U.S. Coast Guard (USCG) serve as Chair and Vice Chair respectively. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Code of Federal Regulations (40 CFR part 300) outline the role of the NRT and Regional Response Teams (RRTs). The response teams are also cited in various federal statutes, including Superfund Amendments and Reauthorization Act (SARA) – Title III and the Hazardous Materials Transportation Act (HMTA).

This National Response System promotes coordinated emergency response actions and guarantees the availability of resources to cover all possible release scenarios.

Snapshot of the National Response System



The National Response System routinely and effectively responds to a wide range of oil and hazardous substance releases. It is a multi-layered system of individuals and teams from local, state and federal agencies, industry, and other organizations that share expertise and resources to ensure that oil spill control and cleanup activities are timely and efficient, and that they minimize threats to human health and the environment. The heart of the system is the National Contingency Plan (NCP), a regulation developed to ensure that the resources and expertise of the federal government are available immediately for oil or hazardous substance releases that are beyond the capabilities of local and state responders. The NCP provides the framework for the National Response System and establishes how it works.

Key components in the National Response System include the National Response Center, the National Response Team, the thirteen Regional Response Teams and the federal On-Scene Coordinators (OSCs). They work with state and local officials to develop and maintain a network of response contingency plans that enable the nation to respond effectively to hazardous substance and oil emergencies. When an incident occurs, these organizations coordinate with the OSC in charge so that all necessary resources such as personnel and equipment are made available, and so that containment, cleanup and disposal activities are timely, efficient and effective. Through this safety net provided by the federal government, the nation has successfully contained several major oil spills and releases of hazardous substances time and again, minimizing the impacts on human health and the environment.

When a release or spill occurs, the company responsible for the release, its response contractors, the local fire and police departments, and the local emergency response personnel provide the first line of defense. When needed, a variety of state agencies stand ready to support, assist, or take over response operations if an incident is beyond local capabilities.

National Response Center: The primary function of the National Response Center is to serve as the sole national point of contact for reporting all oil, chemical, radiological, biological and etiological discharges into the environment anywhere in the United States and its territories. In addition to gathering and distributing spill data for Federal On-Scene Coordinators and serving as the communications and operations center for the National Response Team, the NRC maintains agreements with a variety of federal entities to make additional notifications regarding incidents meeting established trigger criteria. The NRC also takes Terrorist/Suspicious Activity Reports and Maritime Security Breach Reports. Details on the NRC Organization and specific responsibilities can be found in the National Oil and Hazardous Substances Pollution Contingency Plan.

Rules and Regulations Regarding Hazardous Materials

The Department of Transportation regulates routes and speed limits used by carriers. They monitor the types of hazardous materials crossing state lines. In 1986, Congress passed the Superfund Amendments and Reauthorization Act (SARA) of 1986. Title III of this legislation requires that each community in Arkansas establish a Local Emergency Planning Committee (LEPC) to be responsible for developing an emergency plan for the preparation of and the response to chemical emergencies in that community. This emergency plan must include the following:

- Identification of local facilities and transportation routes where hazardous materials are present.
- Procedures for immediate response in case of an accident (this must include a community-wide evacuation plan).
- A plan for notifying the community that an incident has occurred.
- Names of response coordinators at local facilities.
- A plan for conducting exercises to test the plan.

The plan is reviewed by the State Emergency Response Commission (SERC) and publicized throughout the community. The LEPC is required to review, test and update the plan each year.

The Emergency Planning and Community Right-to-Know Act requires that detailed information about hazardous substances in or near communities be available at the public's request. The law provides stiff penalties for companies that fail to comply and allows citizens to file lawsuits against companies and government agencies to force them to obey the law.

Comprehensive Environmental Response, Compensation, Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Over five years, $1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. The CERCLA:

- Established prohibitions and requirements concerning closed and abandoned hazardous waste sites;
- Provided for liability of persons responsible for releases of hazardous waste at these sites; and
- Established a trust fund to provide for cleanup when no responsible party could be identified.

The law authorizes two kinds of response actions:

- Short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response.
- Long-term remedial response actions, that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on EPA's National Priorities List (NPL).

HAZMAT in Arkansas

A hazardous materials accident can occur virtually anywhere within Arkansas; however hazardous substances are most often released as a result of transportation accidents or because of chemical accidents in plants. Communities located near chemical manufacturing plants are particularly at risk. However, hazardous materials are transported throughout Arkansas via roadways, railways, pipelines, waterways, and air daily, so virtually any area is considered vulnerable to an accident. However, the overlapping of one or more of these modes of transportation within an area increases the risk of a HAZMAT event occurring. Using the statistics through the year 2009, of the thousands of HAZMAT events that occur on average each year in this country, about 258 occur annually in Arkansas, or twice the national average. Since 1991, Arkansas

averaged around 3.2 HAZMAT events per county per year. However for the total of "serious events" as recorded by the DOT only 1.6% of the total occurred in Arkansas.

Table 4.2.11-1: Serious Hazardous Material Releases in 2009

Mode	Total incidents	Deaths	Injuries		Damages($ thousands)
			Major	Minor	
Total USA	388	5	23	69	55,594
Arkansas	9	0	2	3	270

Source: U.S Department of Transportation, PHMSA

The HMP-Sub-Committee has researched the number of events in the state and found the following statistics for hazardous material incidents in Arkansas as reported by the US Department of Transportation in their HAZMAT summary by state for the year 2009. The average number and the nature of HAZMAT events have not significantly changed over the past nine years.

Table 4.2.11-2: Arkansas Hazardous Materials Incidents by Mode: 2009

Mode	Total incidents	Deaths	Injuries		Damages($ thousands)
			Major	Minor	
Highway	138	0	1	3	286
Rail	7	0	1	1	17
Air	6	0	0	0	0
Water [1]	0	0	0	0	0
Total	151	0	2	4	303

Source: U.S Department of Transportation, PHMSA

In Arkansas, hazardous materials that are in transit present unique challenges to emergency responders, emergency planners, enforcement personnel and other state and local government agencies. Hazardous materials in various forms can cause death, serious injury, long-lasting health effects and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on Arkansas highways, railroads, waterways and pipelines. Varying quantities of hazardous materials are manufactured, used or stored at an estimated 4.5 million facilities in the United States—from major industrial plants to local dry cleaning establishments or gardening supply stores.

As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced.
In Arkansas, HAZMAT incidents typically take two forms, fixed facility incidents and transportation incidents. The major difference between the two is that it is reasonably possible to identify and prepare for a fixed-site incident, because laws require those facilities to report chemicals and quantities to the Arkansas Department of Emergency Management and to local authorities. Transportation incidents are substantially harder to prepare for because the exact chemicals, quantities and locations cannot be identified until the accident has actually happened. The vulnerability and impacts of a hazardous materials event in Arkansas can differ drastically due to the location of release, surrounding populations, mode of release and other significant scenarios. Because of this fact, the HMP Sub-Committee has chosen to discuss this portion of the Mitigation Plan in separate sections:

FIXED LOCATIONS: Commercial Facilities, Pine Bluff Arsenal and Meth Labs

TRANSPORTED: Highway, Pipeline, Railway, Air, and Water

Using the above-identified categories of HAZMAT events, the Sub-Committee has ranked these based on their "Frequency of Occurrence" and "Severity." This ranking of hazards is important in the mitigation planning process because it acts as a guide to address specific hazards and how they impact the State of Arkansas. Highway transported HAZMAT events occur most frequently; however, in many cases these are smaller events that do not cause a lot of damage or pose a great risk to surrounding populations. Rail events, on the other hand, have a much lower occurrence rate, but when these events do occur, their results are usually more severe and impact a much broader population.

Table 4.2.11-3: Rankings of HAZMAT Hazards

Hazard/Event	Frequency of Occurrence	Severity
Highway	1	4
Commercial Fixed Facility	2	5
Meth Labs	3	6
Rail	4	2
Pipeline	5	3
Water	6	7
Air	7	8
Pine Bluff Arsenal	8	1

U.S. Department of Transportation
Hazardous Materials Safety
Hazardous Materials Information System

Incidents By Mode and Incident Year

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Air	1,582	1,419	1,083	732	750	993	1,655	2,411	1,555	1,277	13,457
Highway	14,953	15,063	15,804	13,502	13,594	13,071	13,461	17,157	16,904	14,781	148,290
Rail	1,073	1,058	899	870	802	765	745	704	750	750	8,416
Water	8	17	6	10	10	17	69	68	61	98	364
Total	**17,616**	**17,557**	**17,792**	**15,114**	**15,156**	**14,846**	**15,930**	**20,340**	**19,270**	**16,906**	**170,527**

Fatalities By Mode and Incident Year

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Air	0	0	0	0	0	0	0	0	0	0	0
Highway	9	16	9	9	15	13	24	6	10	8	119
Rail	0	0	3	1	0	3	10	0	0	1	18
Water	0	0	0	0	0	0	0	0	0	0	0
Total	**9**	**16**	**12**	**10**	**15**	**16**	**34**	**6**	**10**	**9**	**137**

Injuries By Mode and Incident Year

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Air	12	5	13	4	1	11	78	2	8	7	141
Highway	218	164	109	118	105	155	179	192	161	149	1,550
Rail	35	82	46	14	13	122	693	24	56	63	1,148
Water	0	0	0	0	0	0	0	15	3	0	18
Total	**265**	**251**	**168**	**136**	**119**	**288**	**950**	**233**	**228**	**219**	**2,857**

Damages By Mode and Incident Year

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Air	286,104	271,629	309,189	108,630	100,483	188,481	198,316	670,521	88,030	191,434	2,412,817
Highway	34,359,417	51,029,966	47,737,482	48,075,528	49,109,443	47,537,360	40,141,241	59,097,740	45,149,520	39,815,638	462,053,335
Rail	30,662,952	26,546,958	21,247,655	9,745,140	4,126,165	13,901,020	15,454,556	10,739,810	27,301,219	10,073,338	169,798,813
Water	60,500	283,183	147,361	247,802	261,324	1,654,664	114,000	58,828	19,097	138,350	2,985,109
Total	**65,368,973**	**78,131,736**	**69,441,687**	**58,177,100**	**53,597,415**	**63,281,525**	**55,908,113**	**70,566,899**	**72,557,866**	**50,218,760**	**637,250,074**

Commercial Fixed Facility Hazard Profile

Any location where hazardous materials (HAZMAT) are fabricated, processed, or stored are at-risk for HAZMAT events. Hazardous materials are chemical substances, which if released or misused can pose a threat to the environment or human health. These chemicals are used in industry, agriculture, medicine, research and consumer goods.

HAZMAT incidents in Arkansas have historically occurred at fixed sites (i.e., processing plants, manufacturing plants, etc.). Natural disasters, particularly earthquakes, can cause HAZMAT releases at fixed sites and can hamper response efforts. Rain, high winds and fires can worsen conditions surrounding HAZMAT events, making it more difficult to contain releases and to mitigate the short and long-term effects. Fires involving certain types of HAZMAT may generate more toxic gas or smoke than would otherwise normally be observed in a “normal” fire.

For regulatory purposes, various federal and state organizations such as the U.S. Environmental Protection Agency (USEPA), Department of Transportation (DOT), Arkansas Department of Environmental Quality (ADEQ), and the Arkansas Department of Health and Human Services (ADHHS) have defined HAZMAT lists or classes. USEPA and ADEQ sort HAZMAT into the following categories: toxic agents (irritants, asphyxiates, anesthetics and narcotics, sensitizers); other types of toxic agents (hepatoxic and nephratoxic agents, carcinogens, mutagens); hazardous wastes; hazardous substances; toxic pollutants; and extremely hazardous substances.

The 1986 Act and subsequent state regulations require that companies report releases of designated hazardous chemicals to USEPA and ADEQ, even if those releases do not result in human exposure. Types of releases are:

Air emissions of gases or particles from a pressure relief valve, smokestack, ruptured reaction vessel, broken pipe or other equipment at a chemical plant or other fixed-site facility; from broken, loose-fitting, or punctured equipment, containers, or cylinders on transportation vehicles; and from solid or liquid discharges onto the ground or into the water;

Discharges as outflows from sewer or drain outfalls, runoff from spills on land, runoff from water used to control fires, or contaminated groundwater;

Discharges onto land;

Transfer of wastewater to public sewage plants; and

Transfer of wastes to offsite facilities for treatment or storage.

HAZMAT is stored, processed and handled at a range of facilities known as fixed-site facilities. Some examples of fixed-site facilities in Arkansas include:

Large manufacturing plants, storage terminals, large grain elevators, and landfills (open or closed); (Tyson Chicken, Teris Company).

Moderate-sized industrial users, warehouses, wastewater/sewage treatment plants, gasoline/propane terminals, wood treatment facilities, electrical substations, and isolated storage tanks for water treatment; and

Small quantity users and storage facilities such as school/research laboratories, florists/greenhouses, gas stations, hospitals/clinics, dry cleaners, airports, and hardware/automotive stores.

The primary cause of accidents at fixed sites often involves equipment failures, human errors, or unforeseen chemical reactions. An average of 63 HAZMAT releases and spills at fixed sites occurred in Arkansas each year between 1988 and 1996, according to the ADEM and ADEQ. Material storage and manufacturing plants account for 47.5 and 34 percent, respectively, of these incidents.

HAZMAT releases at fixed sites can cause a range of contamination from very minimal to catastrophic. The releases can go into the air, onto the surface, or into the ground and possibly into groundwater, or a combination of all. Although releases into the air or onto the ground surface can pose a great and immediate risk to human health, they are generally easier to remediate than those releases which enter into the ground or groundwater. Soil and groundwater contamination may take years to remediate causing possible long-term health problems for individuals and rendering land unusable for many years.

The federal government and the State of Arkansas have a long record of concern about HAZMAT releases and the potential impact on Arkansans and the environment. Several state and federal agencies, including ADEM, ADEQ, ADH, USEPA, DOT, and FEMA, provide training, technical assistance, and guidance to local governments, communities, and industry for planning, mitigation, and response for HAZMAT releases.

Fixed-site facilities are another area that can have major HAZMAT events. In 2009, there were about 3,000 reports of hazardous material events; this is an increase from 2,500 events reported in 2005. Some of the major locations of interest in Arkansas are Great Lakes Chemical, Lion Oil, Tyson Chicken, and Teris Company.

All locations having hazardous materials on-site must report their type and quantities of hazardous materials to the State of Arkansas. The data must be sent to ADEM on CD or diskette. ADEM has the right to issue fines up to $10,000 for individuals who do not comply with these regulations. The forms are known as Tier II reports and ADEM has an ongoing database of reporting members. All Tier II reports must be submitted by March 1st. The forms are good for one year.

As an advantage to dealing with events at the local level, Arkansas has developed the use of LEPC's, Local Emergency Planning Commissions. An LEPC is a group of agencies and members joined together in a community to coordinate emergency planning and initiatives for their community. There are 77 LEPC's in the State of Arkansas, 25 of which are active and ongoing.

Superfund Sites

Prior to EPA's regulation of hazardous wastes, much of our country's hazardous wastes were often stored or disposed of improperly -- either in landfills not designed to protect the environment or simply abandoned in open fields or dumped along roadways. In addition, abandoned industrial facilities that used chemicals and other hazardous substances may not have stored or disposed of them properly prior to closing operations.

Citizen concern over the extent of this problem led Congress to establish the Superfund Program in 1980 to locate, investigate and clean up the worst sites nationwide. The EPA administers the Superfund program in cooperation with individual states and tribal governments. Today, these Superfund sites are undergoing long-term cleanup actions which may take several years to fully study the problem, develop the right remedy and clean up the hazardous waste.

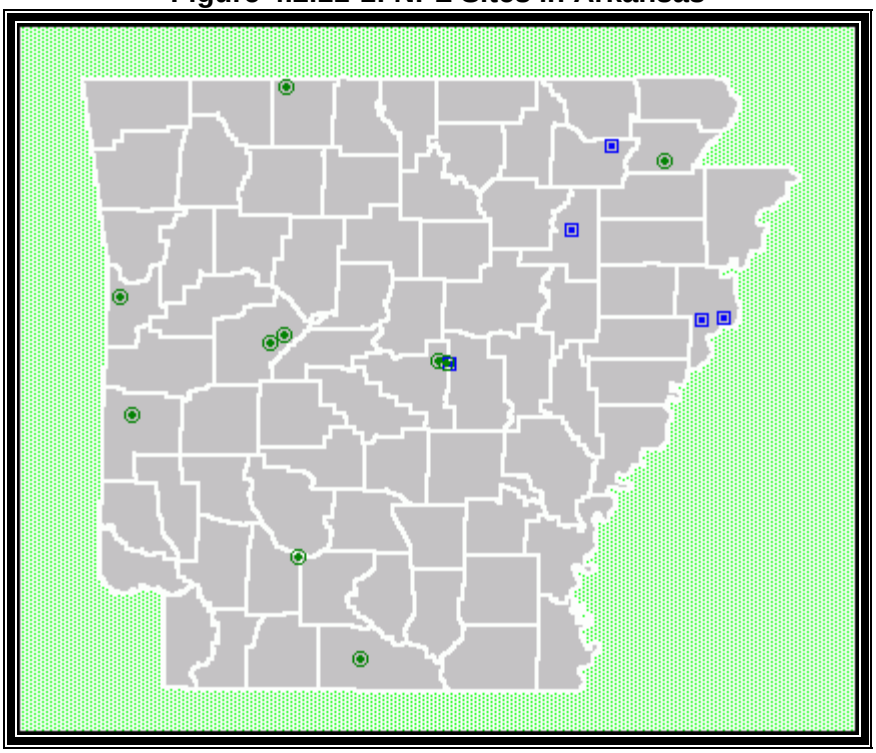
National Priorities List of Superfund

The National Priorities List (NPL) is a published list of hazardous waste sites in the country that are eligible for extensive, long-term cleanup under the Superfund program. To evaluate the dangers posed by hazardous waste sites, Environmental Protection Agency (EPA) has developed a scoring system called the Hazard Ranking System. EPA uses the information collected during the assessment phase of the process to score sites according to the danger they may pose to public health and the environment. Sites that score high enough on the Hazard Ranking System are eligible for the National Priorities List. Once a site is scored and meets the criteria, EPA proposes that it be put on the list. A site may also be proposed for the National Priorities List if the Agency for Toxic Substances and Disease Registry issues a health advisory for the site or if the site is chosen as the state's top priority site.

Table 4.2.11-4: Current NPL Sites within Arkansas as of 2010

State	City	Site Name	NPL Status
AR	EL DORADO	POPILE, INC.	Final
AR	FORT SMITH	INDUSTRIAL WASTE CONTROL	Final
AR	JACKSONVILLE	ROGERS ROAD MUNICIPAL LANDFILL	Final
AR	JACKSONVILLE	VERTAC, INC.	Final
AR	MENA	MID-SOUTH WOOD PRODUCTS	Final
AR	OLA/BIRTA	MIDLAND PRODUCTS	Final
AR	OMAHA	ARKWOOD, INC.	Final
AR	PARAGOULD	MONROE AUTO EQUIPMENT CO. (PARAGOULD PIT)	Final
AR	PLAINVIEW	MOUNTAIN PINE PRESSURE TREATING	Final
AR	READER	OUACHITA NEVADA WOOD TREATER	Final

Figure 4.2.11-1: NPL Sites in Arkansas



Map Key: Proposed: 0 Final: 10 Deleted: 5

Source: EPA

Previous Fixed-Site HAZMAT Occurrences

June 2010 Fayetteville, AR: University of Arkansas emergency personnel reported cleaning up approximately 500 milliliters of phenol that spilled from a broken container overnight at the Plant Sciences Building on Maple Street. Officials reported no injuries as a result of the spill.

February 21, 2005: The NRC received a report from Maytag of Searcy, AR of a 2,500-gallon release of muriatic acid from a storage tank into a storm water ditch. The incident was discovered on February 21, 2005 at 12:30 PM (CST). The material entered a storm water ditch which was a tributary to the Little Red River. There were no reports of any fires, injuries or evacuations.

January 2nd, 2005: The National Response Center was notified of a fire that occurred at the Teris Company facility in El Dorado, AR. The fire started shortly after 8:00 AM in a warehouse that stores 4,000-5,000 drums of hazardous waste. Local fire and police responded and ordered an evacuation of homes that could possibly be impacted by the smoke and fumes. No injuries or fatalities were reported. No major arteries were closed, however local roads near the facility were shut down. There was no threat of any water supply contamination. The fire was allowed to burn itself out to keep firefighters out of the vicinity of the hazardous waste.

January 13, 1999: On Wednesday, January 13th at 10:30 AM, there was an explosion of a naptha tank at the Cross Oil Refinery located in Smackover, Arkansas. The incident resulted in the death of three contractor workers who were working on the tank valve when the explosion occurred. The fire was extinguished with no off-site impact reported. The cause of the fire and explosion are unknown and under investigation.

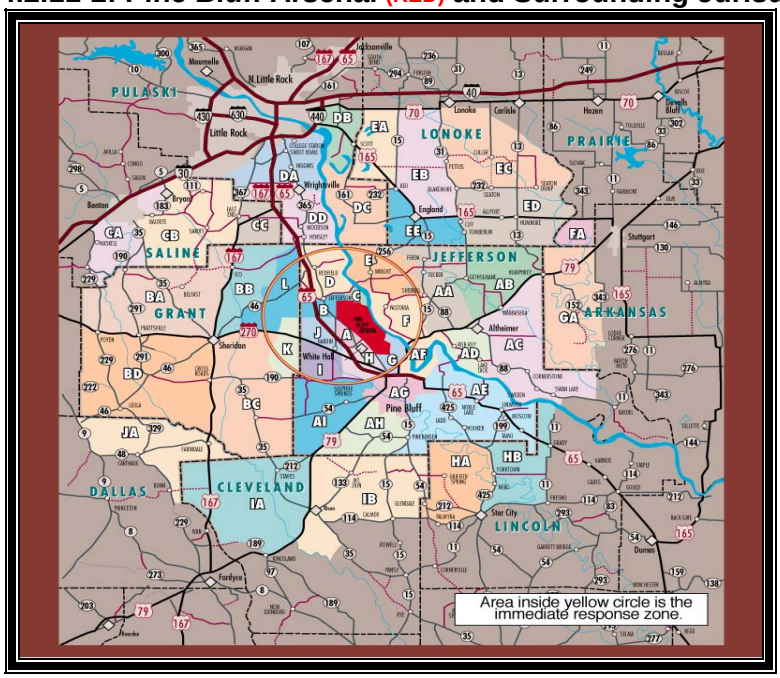
May 8, 1997: Shortly after 1:00 PM clouds of foul-smelling smoke began pouring from an herbicide and pesticide packaging plant in West Helena, Arkansas. An alert was sounded, employees evacuated, and the West Helena fire department was called. As three firefighters prepared to enter the plant, the chemical compounds exploded, collapsing a solid concrete block wall, and killing all three firefighters. As the odorous smoky cloud drifted away from the plant, authorities ordered residents in a 2-mile area downwind of the plant to evacuate and those in the 2- to 3-mile zone to shelter in place.

Probability of Future Fixed Site HAZMAT Events

Based on the many reported occurrences and the continuing presence of these various hazardous materials, there is a high probability of future HAZMAT related accidents at fixed sites throughout the State of Arkansas.

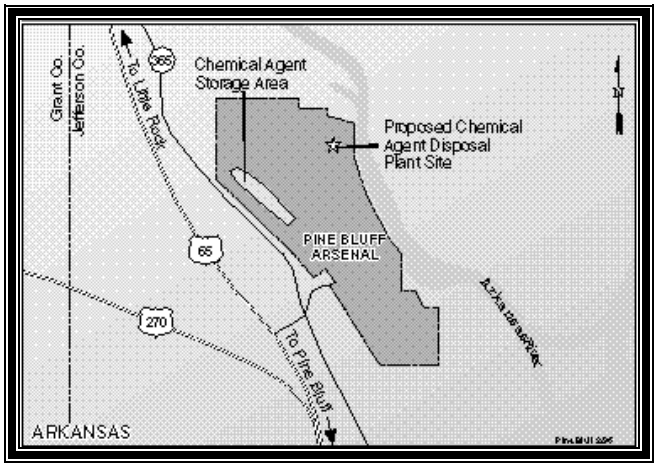
Pine Bluff Arsenal Hazard Profile: Pine Bluff Arsenal is one of eight Army installations in the US that currently store chemical weapons. The chemical weapons stored at the arsenal consist of various munitions and ton containers, containing GB or VX nerve agents or HD blister agent. The Army is working in partnership with state and local government agencies, as well as federal agencies like the Environmental Protection Agency and the Centers for Disease Control and Prevention, to safeguard the local community and protect the environment as these chemical weapons are stored and disposed of. The map below is the latest on file with GeoStor.

Figure 4.2.11-2: Pine Bluff Arsenal (RED) and Surrounding Jurisdictions



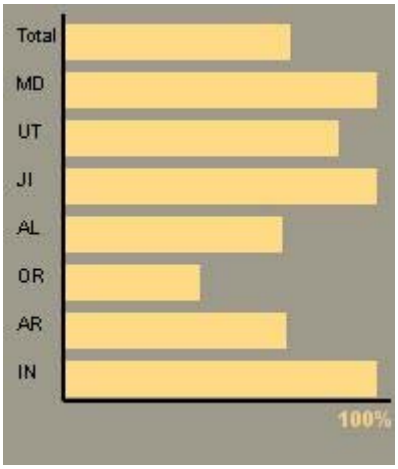
Source: GeoStor

The Pine Bluff Chemical Agent Disposal Facility is designed for the purpose of destroying the chemical weapons stored at the Pine Bluff Arsenal. The facility was completed in 2002, and the Army began disposal in 2004. The Pine Bluff Chemical Storage area maintains its stockpile on 431 acres of land located in the northwestern portion of Pine Bluff Arsenal.



The facility uses high-temperature incineration technology—a technology employed by the Army for more than a decade—safely and successfully, disposing of more than a quarter of the nation's original chemical weapons. As of April of 2010, the Pine Bluff Chemical Agent Disposal Facility has safely processed over 70 percent of their entire stockpile. The GB M55 rockets were being disposed of in the first disposal campaign, followed by the VX rockets, the VX landmines and finally the HD/HT bulk containers.

Figure 4.2.11-3: Agent Destruction Status Information



Agent Destruction Status

(Information is current as of 3/31/2010)

Percentage of original stockpile destroyed	72
Percentage of stockpile at the Aberdeen, MD Facility neutralized	100
Percentage of stockpile at the Tooele, UT Facility destroyed	88
Percentage of stockpile at the Johnston Island Facility destroyed	100
Percentage of stockpile at the Anniston, AL Facility destroyed	70
Percentage of stockpile at the Umatilla, OR Facility destroyed	43
Percentage of stockpile at the Pine Bluff, AR Facility destroyed	71
Percentage of stockpile a the Newport, IN Facility neutralized	100

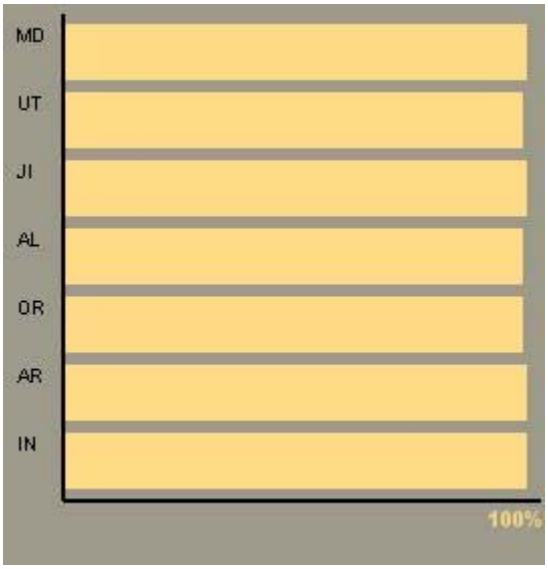
In 1985, the U.S. Congress passed Public Law 99-145, requiring the Department of Defense to dispose of its chemical weapons. As a result, the Army's Program Manager for Chemical Demilitarization was formed with the sole task of safely eliminating the entire stockpile. In 1997, the United States signed the International Chemical Weapons Convention (CWC) treaty. This agreement requires the US to destroy its chemical weapons stockpile by the year 2007. Although Pine Bluff fell short of the 2007 anticipated deadline, they continue to make huge strides in 2010 towards complete destruction of their agents. A host of other nations have also signed the treaty which calls for the destruction of all chemical weapons in the world, as well as prohibiting the use, stockpiling or production of chemical weapons.

For decades, the Army has studied numerous technologies for the destruction of these chemical warfare agents and determined that incineration is the most proven technology to safely eliminate the stockpile. It was determined that the construction and operation of extremely high temperature incineration facilities would safely and completely eliminate the agents and munitions in an environmentally safe manner, while ensuring the protection of the health and safety of workers and the community. In 1984, the incineration process was also recommended and endorsed by the independent National Research Council (NRC) as the safest process currently available to destroy the stockpile. In 1994, the NRC conducted a follow-up study and again recommended the incineration process as the safest technology to destroy the stockpile. This recommendation was further reinforced by the Centers for Disease Control.

In 1998, the Army awarded a $512-million contract to Raytheon Demilitarization Company (RDC) of Philadelphia, PA to construct, test, operate and close the Pine Bluff Chemical Agent Disposal Facility (PBCDF). Construction began January 19, 1999, after the State of Arkansas granted regulatory permits. The State Department of Environmental Quality awarded the permits after it thoroughly and carefully reviewed the Army's permit application and only after ensuring that the health and safety of the workers, the community and the environment were protected. The PBCDF site covers 26 acres and is located in the northeast corner of the Arsenal. Construction was completed in December 2002. After a 16-month prove-out phase, the plant will operate only 40 months. When operations are completed, the facility will be closed in accordance with state regulatory guidelines.

Eliminating the stockpile involves separating the components of the munitions — liquid agent, explosives, and metal parts — using a totally controlled and automated system. Each of the components is disposed of at extremely high temperatures in their own incinerator. Each incinerator has its own pollution abatement system, which thoroughly cleans emissions at levels stipulated by federal and state requirements. To ensure the protection, safety and health of the workers, the community and the environment operations are conducted using strict environmental controls with safeguards built upon safeguards.

Figure 4.2.11-4: Storage Risk Elimnated Information



STORAGE RISK ELIMINATED

(Information is current as of 3/25/2009)

Percentage of the storage risk at the Aberdeen, MD facility eliminated	100%
Percentage of the storage risk at the Tooele, UT facility eliminated	99%
Percentage of the storage risk at the Johnston Island facility eliminated	100%
Percentage of the storage risk at the Anniston, AL facility eliminated	99%
Percentage of the storage risk at the Umatilla, OR facility eliminated	99%
Percentage of the storage risk at the Pine Bluff, AR facility eliminated	100%
Percentage of the storage risk at the Newport, IN facility eliminated	100%

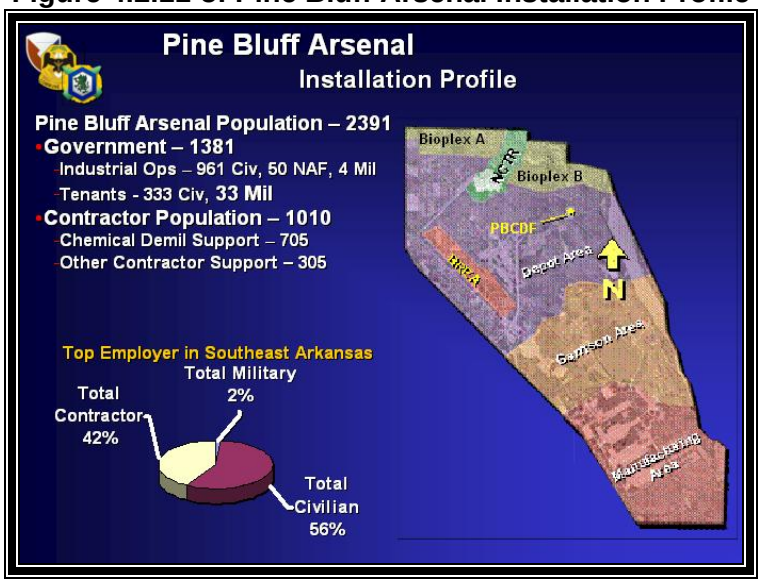
- While chemical weapons are stored under stringent safety and security conditions, the risk of an accident leading to fatalities from stored weapons is much greater than the risk from disposal of those weapons.

- Among the stored munitions, M55 rockets pose the greatest risk. As each type of chemical agent is destroyed, the rockets containing that agent are destroyed first, which reduces the storage risk more quickly.

- The percentages above indicate the storage risk that has been eliminated because of weapons disposal operations at each facility. The original storage risk is based on risk studies the Army conducted in the mid-1990s. These statistics refer to the risk of fatalities from acts of nature, equipment failure or human error during weapons storage.

Risk studies show that 3.3 years of disposal operations using incineration is much safer than the risk continued storage poses to the surrounding community. The CDC has found emissions from such incinerators are much cleaner than common urban air concentrations. Monitoring levels for nerve agents are roughly 21,000 times stricter than federal requirements, and emissions monitoring is about 210 times stricter than those required by many states. These facts, along with the Army's 20-plus years of experience with safe, proven and mature incineration technology, underline the Army's promise to provide the utmost protection to the safety and health of installation workers, the public and environment until the stockpile is completely eliminated. The 14,943-acre installation has 267 munitions storage igloos, and employs around 1,200 people.

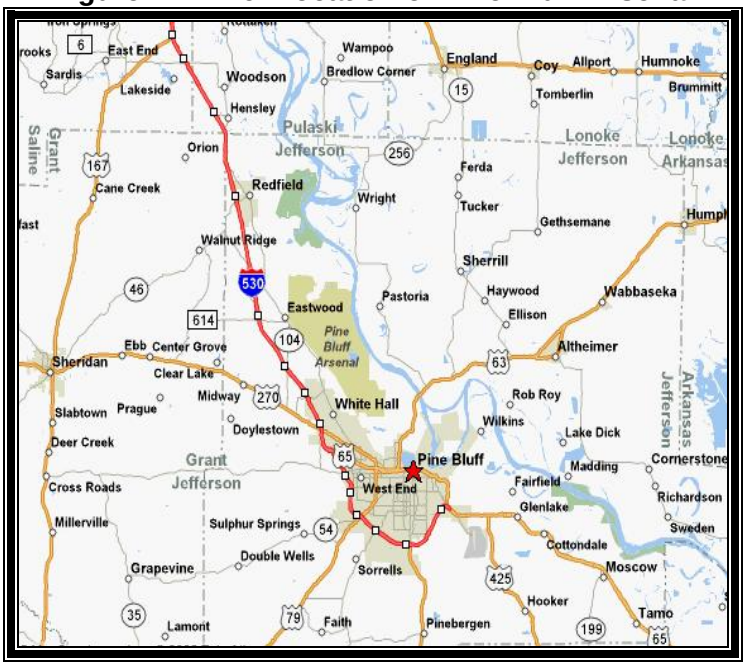
Figure 4.2.11-5: Pine Bluff Arsenal Installation Profile



Geographic Area Affected by Pine Bluff Arsenal

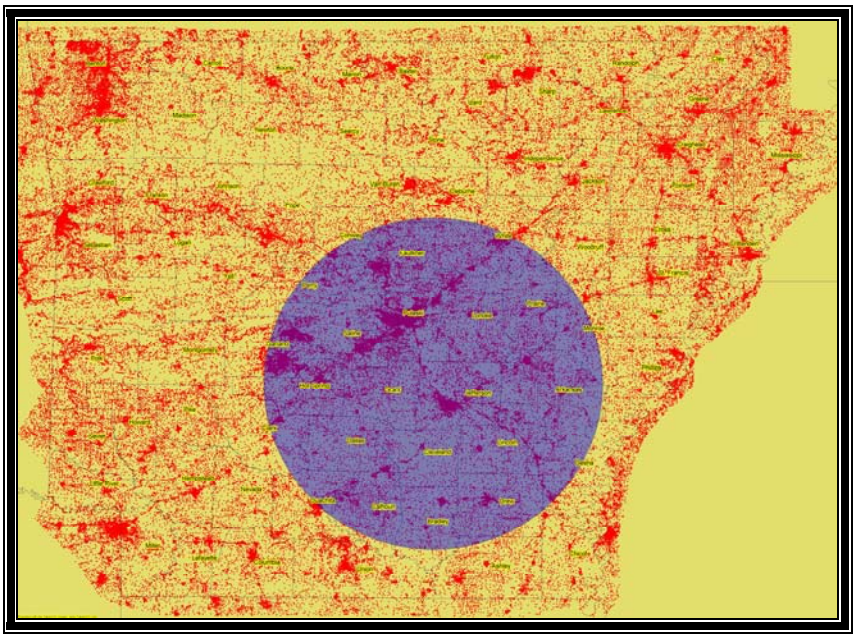
Pine Bluff Arsenal (PBA) is located in Jefferson County in southeastern Arkansas. It is 35 miles southeast of Little Rock and eight miles northwest of the city of Pine Bluff. PBA is bordered on the east by the McClellan-Kerr Arkansas River Navigation System and on the west by the Union Pacific Railroad and U.S. Highway 65, making it directly accessible by rail, road, or waterway. PBA is 8 1/2 miles long by 2 3/4 miles wide and covers 14,944 acres.

Figure 4.2.11-6: Location of Pine Bluff Arsenal



The area included in the CSEPP Emergency Planning Zone around the Pine Bluff Arsenal/Pine Bluff Chemical Activity is a circle of approximately 50 miles in diameter. Innermost and within 9.5 miles (15 kilometers) of the arsenal is the Immediate Response Zone. The IRZ is surrounded by the Protective Action Zone out to approximately 35 miles (22 Kilometers), which covers parts of eight counties in south central Arkansas. All areas within the EPZ are served by major highways within the state highway system or the federal highway system.

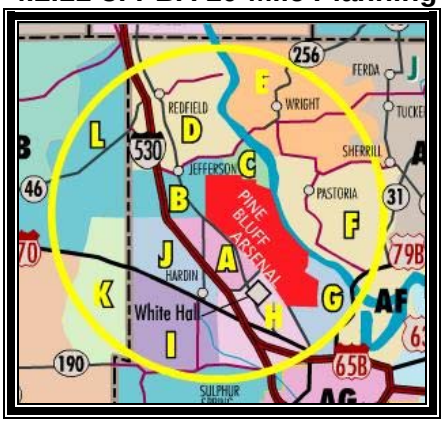
Figure 4.2.11-7: CSEPP 50 Mile Emergency Planning Zone and Population Census 2008



Source: CSEPP

The CSEPP area covers an area bounded on the north by the cities of Little Rock and North Little Rock in Pulaski County, on the east by portions of Lonoke, Arkansas and Prairie Counties, on the west by portions of Saline County, all of Grant County. The area is bordered on the south by portions of Cleveland, Dallas and Lincoln Counties.

Figure 4.2.11-8: PBA 10-Mile Planning Zones



The dominant features of the Pine Bluff Arsenal/Pine Bluff Chemical Activity area are the Arkansas River to the east and dense timber and vegetation that surrounds most of the arsenal compound. A secondary feature is an unnamed ridge approximately three to seven miles west of the arsenal. However, this ridge is not expected to exert much influence on the dispersion of agent in the event of a release.

In the event of a release, there are no topographical features near PBA that would function as barriers to contain the agent. For a ground-level release with little initial upward velocity or buoyancy during stable atmospheric conditions, the Arkansas River may tend to pool agent concentrations along the river, allowing the agent to move up or down the valley, and spill out along the river to the east. In other scenarios (e.g., higher winds, unstable atmosphere, buoyant release), the river valley will not serve as an effective barrier to limit dispersion. Even in these cases, however, the lethal downwind distance would be mitigated by the vegetation (heavily vegetated areas tend to increase dispersion reducing the lethal downwind distance and reducing toxic concentrations by absorbing agent).

Previous Pine Bluff Arsenal Occurrences

March 29, 2005: After years of planning, the Pine Bluff Arsenal began the incineration of its chemical weapons stockpile. The weapons that pose the greatest risk were slated to be destroyed first. The process consisted of GBM 55 rockets, which contain the nerve agent sarin. Officials called the start a historic day for the arsenal as the incineration process got underway. The project began Monday with the arrival of three separate metal containers, each carrying two pallets of the GB nerve rockets. Tuesday the rockets were unloaded and the disposal process began.

Around 11:00 Tuesday morning, the first rocket was destroyed. In a late afternoon press conference, officials did say there were a couple of minor problems that morning, including a small leak and that a “low agent” reading prompted employees to stop processing.

June 6, 2005: A warehouse fire occurred at Pine Bluff Arsenal. The fire, which was discovered through a routine security check, occurred in the early morning hours on June 6 in a vintage, World War II warehouse-storing canister of white phosphorus. White phosphorus or WP is a white or pale yellow, translucent waxy chemical solid used in ammunition by the military for dense white smoke screenings or signals. In the presence of oxygen, WP spontaneously ignites. Pine Bluff Arsenal is the Army’s sole producer of WP ammunition in the Western Hemisphere.

Since the fire and subsequent flare-ups, Arsenal fire department personnel have kept the site cooled through a system of sprinklers. “The fire department has been monitoring the site daily since the fire occurred. We’ve had no smoke, no flare ups,” said Tom Braumuller, PBA assistant fire chief. “The sprinklers are doing what they are designed to do. They are keeping the pile cool until cleanup starts.” Arsenal and fire investigators determined that a leaking WP canister caused the fire. According to the final investigation report, the WP leaked from the canister through a pinhole caused by oxidation. Heat generated by the exposed WP heated the nearby canisters, igniting the roof framing, and causing total loss of the structure.

Warehouse storing white phosphorus that was destroyed by Fire June 6, 2005

November 29, 2005: A control room operator at the Pine Bluff Chemical Agent Disposal Facility responded to a fire alarm in the explosive containment room at 11:36 AM. At the time of the event, rockets were not being processed. Rocket processing had been paused when a slide gate malfunctioned before a rocket, already drained of the nerve agent GB, was completely processed. The remaining portion of this rocket ignited at the shear machine, causing a small flame. The flame lasted less than a minute. All systems functioned as designed. There was no release or migration of chemical agents outside of engineering controls, and there was no danger to the PBCDF work force, the public or the environment.

June 2008: A simple message in white paint adorned the last VX nerve-agent land mine that rolled through a conveyor belt on its way to incineration at the Pine Bluff Arsenal - "LONG TIME COMING".

Probability of Future Pine Bluff Arsenal Events

Based on past events, and the frequency at which events occurred since the nerve agent disposal began, there is a moderate probability of future events occurring at the Pine Bluff Arsenal. However, as suggested in prior events, it is expected that any future occurrences would be minimal and not affect the surrounding populations.

Methamphetamine Lab Events Profile

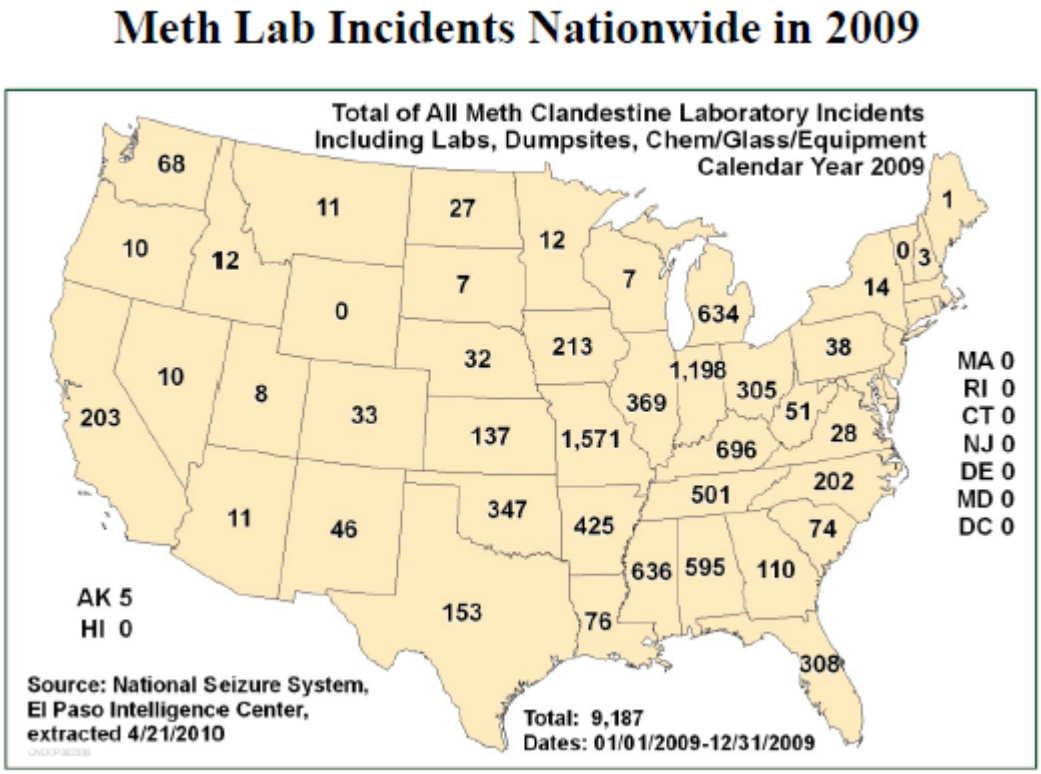
Meth labs present extreme dangers to residents of Arkansas from explosions and exposure to hazardous chemicals. Breathing the fumes and handling substances can cause injury and even death. Drug labs are considered hazardous waste sites and should only be entered by trained and equipped professionals.

A typical meth lab is a collection of chemical bottles, hoses and pressurized cylinders. The cylinders can take many forms, from modified propane tanks to fire extinguishers, scuba tanks and soda dispensers. The tanks contain anhydrous ammonia or hydrochloric acid – both highly poisonous and corrosive. Labs are frequently abandoned, and the potentially explosive and very toxic chemicals are left behind. Chemicals may also be burned or dumped in woods or along roads.

Arkansas State Police were involved in only six methamphetamine lab seizures statewide in 1994. The number jumped to 24 in 1995, 95 the next year, then rocketed to 242 in 1997. In 1998, the number shot to 434 labs and the numbers continue to climb.

DEA numbers suggest that over the past few years the number of meth lab incidents, such as law enforcement seizures, has diminished -- from 714 in Arkansas in 2004 to 240 in 2007. However, in 2006, 32.7% of the federal drug sentences originating in Arkansas were for methamphetamine, more than any other drug in the state. Figure 4.2.11-9 shows the 2010 latest information for recent meth lab incident reports for the U.S., published by the Drug Enforcement Agency.

Figure 4.2.11-9: US DEA Numbers of Meth Lab Incidents



Source: US DEA

In 2000, Congress didn't deem Arkansas worthy of federal grant money to clean up hazardous methamphetamine labs although the state led the nation in 1999 in the number of lab seizures per capita. As a result, federal and state officials were forced to scramble to find money to cover cleanup costs. The Federal Drug Enforcement Administration's top methamphetamine enforcement agent identified Arkansas as one of the top three methamphetamine-producing states in the nation, based on per-capita figures.

Pseudoephedrine is a key ingredient used in cooking meth, and is commonly found in cold medicines. In 2004 and 2005, laws were enacted in Oklahoma, Texas, and Arkansas to limit an individual's ability to buy large quantities of pseudoephedrine in an effort to curb the production of meth. Federal standards enacted in January 2006 also

restricted the amount of pseudoephedrine an individual may purchase in a designated time period and required such products be stored in a way to prevent theft.

Now, pseudoephedrine-containing products are kept behind pharmacy counters, and people are required to show picture identification and sign a ledger to purchase the products.

In the first three months since the changes in law, Arkansas saw a drop of about 50 percent in methamphetamine labs seizures. Although Arkansans had limited access to pseudoephedrine, Northwest Arkansas residents still traveled to Missouri to buy pseudoephedrine and other medicines containing the meth chemical. In July of 2005, Missouri followed suit with a law limiting the sale of pseudoephedrine in an effort to reduce meth production as well. The Missouri law further restricts Arkansans' access to pseudoephedrine and should reduce the number of local labs.

Meth can cause long-term health effects including cancer, brain damage, birth defects and miscarriages. It also can cause memory loss, heart problems, aggression and violence. Meth causes health problems not just for the users, but also for others who are unintentionally exposed to the chemical. People who enter a drug lab after the police, but before it has been properly cleaned and ventilated, may feel headaches, nausea, dizziness and fatigue. These symptoms usually go away after several hours. People who enter a lab during or immediately after a drug bust may experience shortness of breath, cough, chest pain, dizziness, lack of coordination, burns, and even death.

Team Assesses a Meth Lab Found in Arkansas

Meth production and distribution is different from other drugs because it is dangerous from start to finish. The reckless practices of the untrained people who manufacture it in clandestine labs result in explosions and fires that injure or kill not only the people and families involved, but also law enforcement officers or firemen who respond. Any number of solvents, precursors and hazardous agents are found in unmarked containers at these sites. These potent chemicals can enter the central nervous system and cause neural damage, effect the liver and kidneys, and burn or irritate the skin, eyes and nose. Environmental damage is another consequence of these reckless actions.

Each pound of meth produced leaves behind five or six pounds of toxic waste. Meth cooks often pour leftover chemicals and byproduct sludge down drains in nearby plumbing, storm drains, or directly onto the ground. Chlorinated solvents and other toxic by-products used to make meth pose long-term hazards because they can persist in soil and groundwater for years. Clean-up costs are exorbitant because solvent contaminated soil usually must be incinerated. The meth lab can be removed, but the area will remain toxic.

Geographic Area Affected by Meth Labs

All regions of Arkansas are considered to be areas affected by meth lab events. The meth production problem is growing and their locations are shifting from isolated, rural facilities to houses, trailers and apartments in more densely populated urban areas. Meth labs have been found in places as small as a bathroom and have been located within every county in Arkansas. The threat is so widespread that Arkansas is one of the leading states in methamphetamine production.

Past Meth Lab Event Occurrences

January 9, 2009: Officers noticed the light on after hours and walked into a funeral home through an open door. Inside, police said they found all the components necessary to build a meth lab. Officers arrested an employee at the funeral home, when he returned. The man faced charges of possession of drug paraphernalia with intent to manufacture, possession of drug paraphernalia with intent to use, manufacture of methamphetamine, and possession of pseudoephedrine with intent to manufacture.

July 31, 2006: A call to report a structure fire led Pulaski County officials to a burning meth lab. The fire happened on Russenberger Road in Little Rock just before 7:30 AM. A deputy driving through the area spotted heavy smoke and found a mobile home engulfed in flames. During a search of the property authorities discovered meth ingredients, a small amount of the finished product and several firearms, including four silencers and a sawed-off shotgun. Several suspects were arrested and no injuries were reported.

June 21, 2005: A Jonesboro man died after he suffered a concussion and breathed in toxic fumes during a methamphetamine lab explosion. Brian Markum, 32, died at the White River Medical Center in Batesville after a fire and explosion. The firefighters said they found the man after being sent to a suspicious fire in the woods. When firefighters found the meth lab, they called the Independence County Sheriff's office. Officers said they found evidence of a meth lab and then found Markum walking out of the woods, saying he had been bitten by a snake. Medical workers said there was no evidence of snakebite. Police said Markum's body was sent to the state crime lab for an autopsy.

Explosion Site from the Markum Event

April 2, 2005: In North Little Rock, three children were pulled out of a meth lab fire after an explosion. Officials responded to this blaze around 1:30 AM Saturday morning at 1624 West 16th Street in North Little Rock, Arkansas. Fire crews found a meth lab in the bedroom where the fire started. The children were taken to a local hospital where they were treated and released. 34-year-old, Wade Scott, of North Little Rock was charged with maintaining a meth lab, manufacturing and endangering the welfare of a minor. 31-year-old, Kristine Fisher, of North Little Rock was also charged with endangering the welfare of a minor.

March 25, 2005: On Friday, March 25th a house exploded in downtown Lonoke, AR. Investigators responded to a house fire on 1211 North Center Street in Lonoke after 9:30 PM. The heat from the fire was so intense that it slightly melted the wall of the Terminex business next door. Officials believe the meth lab was occupied by at least 4 people, including 2 children. No one was home by the time crews arrived on the scene. Friday night's explosion was felt as far as 3 blocks away. Authorities believe the meth lab was operating in the laundry room, which is just walking distance from a hot water heater. Because of its proximity to the meth lab, they believe the heat set off the explosion.

March, 2004: Five people were injured when a home on Taylor Loop in Little Rock exploded because of an active meth lab. Inside were a 4-year-old and a pregnant woman. The homeowners, Robert Bisbee and his pregnant wife, were taken to the hospital, along with the three others. Bisbee suffered burns on 87% of his body.

October 3, 2003: An explosion echoed through the Cherrywood addition in Sherwood, Arkansas at 3 AM, the result of a meth lab gone awry. The fire at 121 Greenwood was caused by the ignition of chemicals used in the manufacturing of methamphetamine, according to a press release from the Sherwood, Arkansas police department. No one was in the house when officials arrived. Shortly after the fire, the SPD received a call concerning a man on Marlar Avenue who was severely burned. The components of a meth lab were found in the man's car, which then ignited while parked on Marlar Avenue. Burned skin hung from the man, and the sight and sound indicated that it was a chemical burn. Because Hale's car contained meth chemicals, several houses on Marlar were evacuated until the chemicals were disposed of.

Probability of Future Methamphetamine Lab Events

Based on the high number of past occurrences and the continuing prevalence of this highly addictive substance, the probability for future events in considered **"Highly Likely"**.

DEA numbers suggest that over the past few years the number of meth lab incidents, such as law enforcement seizures, has diminished -- from 714 in Arkansas in 2004 to 425 in 2009. However, in 2006, 32.7% of the federal drug sentences originating in Arkansas were for methamphetamine, more than any other drug in the state. This is the latest information for 2010.

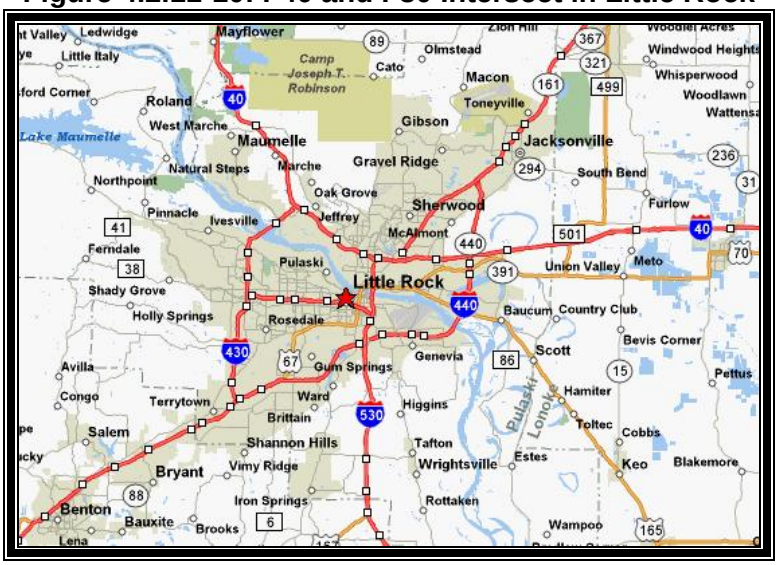
Highway Transportation HAZMAT Hazard Profile

For the past decade, government and hazardous materials industry officials have used an estimate of more than 500,000 daily shipments to characterize HAZMAT traffic in the US. This implies a level of risk to the transportation community and the general public. Because of growth in the HAZMAT sector, as well as in the overall US economy, along with changes in national and global distribution practices, research has been undertaken to evaluate and update current HAZMAT traffic levels. As detailed in the Hazardous Materials Shipments report, hazardous materials traffic levels in the US now exceed 800,000 shipments per day and result in the transport of more than 3.1 billion tons of hazardous materials annually. Types of hazardous materials range from relatively innocuous products, such as hair spray and perfumes, to bulk shipments of gasoline by highway cargo tanks, to transportation of poisonous, explosive, and radioactive materials.

The National Highway System is the system most often used to distribute Arkansas products to local, regional and national marketplaces. Industrial chemicals and food or kindred products are the major inbound commodities shipped by truck, followed by lumber or wood products, and primary metal products. Outbound freight shipments via the highways generally consist of redistributed freight. Lumber or wood products and food products are the chief outbound commodities on a tonnage basis followed by concrete and steel mill products. In addition to products shipped into and out of Arkansas, there are many shipments that simply pass through the state. These movements contribute to the large number of trucks on Arkansas highways.

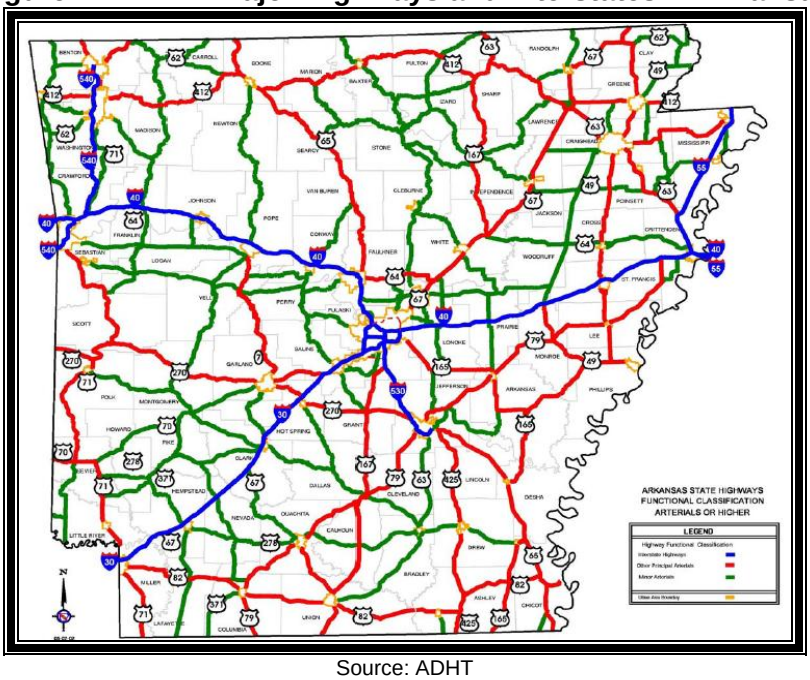
Arkansas has a high level of hazardous materials transported on its highways and interstates every day. Two major interstates flow through the Arkansas borders. Interstate 30 and Interstate 40 intersect Arkansas' largest city and state capital, Little Rock. The main corridor of Interstate 40 runs east and west across Arkansas. Interstate 40 connects the east and west coasts of the US starting in Wilmington, NC and ending in Los Angeles, CA. Intestate 30 runs from Little Rock south to Dallas, TX. Both Interstates are used heavily for hazardous materials transportation.

Figure 4.2.11-10: I-40 and I-30 Intersect in Little Rock



Source: ADHT

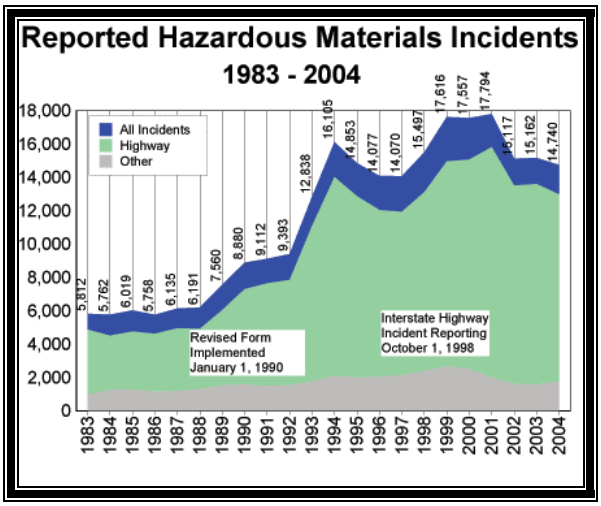
Figure 4.2.11-11: Major Highways and Interstates in Arkansas



Source: ADHT

Transportation of HAZMAT on highways, county roads and city streets, involves tanker trucks, trailers and certain types of specialized bulk-cargo vehicles. Because of the distances traveled, it is not surprising that trucks are responsible for the greatest number of HAZMAT events in Arkansas and the rest of the country. The graph below shows the frequency of highway-related HAZMAT events compared to all other modes of transportation. On a national scale, highway-related events over the past 20 years have occurred at a much higher rate than all other modes of transportation combined. The same statistic is true within the State of Arkansas.

Figure 4.2.11-12: Total HAZMAT Incidents Nationwide 1983-2004



Source: ADHT

The Arkansas Department of Environmental Quality-Hazardous Waste Division administers the transportation, storage and disposal of those wastes requiring the most stringent management because of their potential danger to human health and the environment. All hazardous wastes shipped in or through Arkansas must be properly contained and labeled, and transported only by permitted hazardous waste transporters. Arkansas Hazardous Waste Manifest forms must be used as shipping papers to document the shipment of hazardous wastes in or through Arkansas. Hazardous wastes may only be shipped to permitted hazardous waste treatment, storage and disposal facilities (TSDFs).

The transportation of hazardous wastes is regulated by federal regulatory agencies (U.S. Department of Transportation and U.S. Environmental Protection Agency) as well as Arkansas regulatory agencies (Arkansas Highway Police and ADEQ).

Wastes are defined as “hazardous” through laws and regulations. Some wastes are designated as hazardous because they exhibit dangerous characteristics: they are ignitable, corrosive, reactive or toxic. Any facility that generates, stores, transports, treats or disposes of these or other regulated hazardous wastes are subject to hazardous waste regulations.

Hazardous wastes are not uncommon. It’s estimated that at least 20,000 businesses generate hazardous waste. Printers, equipment repair shops, manufacturers, dry cleaners, automotive maintenance shops and funeral homes are some of the businesses that are generators of hazardous waste. Also regulated are treatment, storage and disposal facilities (TSDs) that manage hazardous waste.

Hazardous waste requires a more stringent level of labeling, packaging and processing for disposal than household and industrial municipal solid waste. Facilities are regulated according to the amount of hazardous waste they generate – the larger quantity of hazardous waste generated, the more stringent the regulation. Some facilities generate such a small amount of hazardous waste that they are exempt from federal Resource Conservation and Recovery (RCRA) regulations.

Facilities must investigate and remediate hazardous waste releases that occur at their site. These are done through voluntary actions, enforcement actions or by court order.

To protect the citizens and environment of Arkansas, hazardous waste must be transported only by transporters with appropriate hazardous waste expertise and training. In cooperation with the Department of Environmental Quality, the Arkansas Highway Police Department has developed an annual permitting process whereby transporters who are capable of safely transporting hazardous wastes are permitted to transport hazardous wastes in Arkansas. Only transporters that have a valid EPA Identification Number and hold a valid hazardous waste transportation permit from the Arkansas Highway Police are allowed to transport hazardous wastes in or through Arkansas.

The state requires that the shipment of hazardous waste from Arkansas and/or to Arkansas be documented on an approved Hazardous Waste Manifest form. If a person is shipping hazardous waste, they must use an Arkansas Hazardous Waste Manifest to document the shipment of waste from their facility to an Arkansas designated disposal facility. Waste shipments destined for another state must also possess the destination related information and a state-approved manifest form. Through the use of the manifest, the Department of Environmental Quality can track the movement of hazardous waste from the point of generation to the point of its ultimate treatment, storage or disposal.

Table 4.2.11-5: Highway Related HAZMAT Incidents and Damages 2002-2009

2009 Highway Related HAZMAT Incidents and Damages

10/05/2009 Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State
Highway Incidents
Calendar Year - 2009
2nd Quarter

Incident State	Incidents	INJURIES Hospitalized	Non-Hospitalized	Fatalities	Damages
Alabama	51	0	0	0	91,410
Alaska	2	0	0	0	0
Arizona	120	0	0	0	25,886
Arkansas	74	0	0	0	232,705
California	648	0	0	1	714,907

2008 Highway Related HAZMAT Incidents and Damages

10/01/2009 Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State FOR

Incident State	Incidents	INJURIES Hospitalized	Non-Hospitalized	Fatalities	Damages
Alabama	130	0	0	0	331,456
Alaska	3	0	0	0	15,000
Arizona	304	0	2	0	1,539,662
Arkansas	174	0	5	0	534,838
California	1,380	0	7	0	902,850

2007 Highway Related HAZMAT Incidents and Damages

10/01/2009 Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State FOR

		INJURIES			
Incident State	Incidents	Hospitalized	Non-Hospitalized	Fatalities	Damages
Alabama	198	0	0	0	948,141
Alaska	1	0	0	0	80,000
Arizona	315	2	3	0	1,967,143
Arkansas	186	0	0	0	694,059
California	1,598	2	16	0	1,868,597

2006 Highway Related HAZMAT Incidents and Damages

09/29/2009 Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State FOR

		INJURIES			
Incident State	Incidents	Hospitalized	Non-Hospitalized	Fatalities	Damages
Alabama	217	1	0	0	355,582
Alaska	4	0	0	0	160,043
Arizona	346	1	4	0	2,011,450
Arkansas	198	0	2	0	519,838
California	1,677	1	10	0	18,543,380

2005 Highway Related HAZMAT Incidents and Damages

09/29/2009 Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State FOR

		INJURIES			
Incident State	Incidents	Hospitalized	Non-Hospitalized	Fatalities	Damages
Alabama	195	1	0	1	770,869
Alaska	3	0	0	0	245,700
Arizona	256	0	0	1	542,094
Arkansas	180	0	2	0	950,667
California	1,123	5	11	1	2,914,345

2004 Highway Related HAZMAT Incidents and Damages

08/30/2005

U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
HAZARADOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY INCIDENT STATE FOR CALENDAR YEAR - 2004
HIGHWAY INCIDENTS

		Injuries			
Incident State	Incidents	Major	Minor	Fatalities	$ Damages
Alabama	149	0	1	0	1,002,232
Alaska	3	0	0	0	106,300
Arizona	204	0	0	0	556,698
Arkansas	131	0	0	0	388,976
California	1,082	4	7	0	3,591,977

2003 Highway Related HAZMAT Incidents and Damages

08/30/2005

U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
HAZARADOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY INCIDENT STATE FOR CALENDAR YEAR - 2003
HIGHWAY INCIDENTS

Incident State	Incidents	Injuries Major	Injuries Minor	Fatalities	$ Damages
Alabama	184	1	1	0	753,340
Arizona	210	2	2	2	1,062,388
Arkansas	135	0	0	0	1,364,804
California	1,043	0	4	1	1,754,759

2002 Highway Related HAZMAT Incidents and Damages

08/01/2005

U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
HAZARADOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY INCIDENT STATE FOR CALENDAR YEAR - 2002
HIGHWAY INCIDENTS

Incident State	Incidents	Injuries Major	Injuries Minor	Fatalities	$ Damages
Alabama	178	0	2	0	1,917,807
Alaska	3	0	0	0	45,650
Arizona	176	0	7	0	548,788
Arkansas	167	1	1	1	820,862
California	902	0	3	0	1,560,175

Source for the above: ADHT

Past Highway Related HAZMAT Occurrences

March 25, 2010: The North Little Rock Fire Department hazardous materials team removed unknown chemicals from a home where a body was discovered. Pulaski County Coroner said officials believe the resident - whose name has not been released - mixed the chemicals together and then inhaled them in an apparent suicide. A note left at the house advised authorities to call in the hazmat team. North Little Rock Fire Department spokesman said the property manager went inside after learning the resident had not been seen in some time. The manager reportedly discovered the body as well as a note that "alluded to the fact that the hazmat team was needed." The team then went in and found a bucket of unknown chemicals.Police blocked off the street to pedestrian and vehicle traffic and set up a taped perimeter around the house. Officials did not evacuate any nearby homes.

October 18, 2006: A tractor-trailer containing 22 tons of hot oil used to make asphalt had an accident in Pine Bluff, Arkansas which resulted in it leaking oil into a ditch and onto the road. No injuries were reported, but part of the street was closed for the cleanup.

Jeff Dumas of El Dorado was driving the truck and got off Highway 65-B to turn around. As he was turning, the right rear trailer wheels dropped into a ditch and part of the trailer rolled over, coming to rest against a railroad signal and blocking the railroad tracks. The trailer's discharge pipes were damaged and oil began to leak out.

August 26, 2006: An overturned tanker in North Little Rock caused a major fuel spill and backup on Interstate 440. The effects were still being felt on the roadways hours after the accident. It happened just after 10 AM when a truck overturned in the westbound lanes of 440 near Highway 70. Something caused the truck to overturn, unleashing nearly 7,500 gallons of fuel across the highway. Fire and HAZMAT crews were on the scene working to try to stop the spill, but were only able to reduce it.

October 23, 2005: A 59-year-old man died from injuries he sustained after his tank truck hauling gasoline went off a northwest Arkansas road and exploded. The man burned in the crash and died at a hospital from his injuries. The truck went off U.S. 62 in Carroll County and hit a utility pole near the border with Benton County. Walker was driving for Lindsey Petroleum Transport of Conway.

May 21, 2005: At 8:08 PM (EST), the National Response Center received a telephone report of a 1,000 gallon fuel spill from an overturned tractor trailer. The incident occurred at 9:00 AM (EST) on the morning of May 21, 2005 on Hwy. 62 in Pearidge, Arkansas. The driver was fatally injured and Hwy. 62 was closed. There were no further reports of any community impact. The source of the spill was secured, material contained, and cleanup completed.

November 14, 2003: The National Response Center received a report from Sugg Oil Company of a tanker truck rollover and fire in Garfield, Arkansas. The incident occurred at 2:00 PM (CST) while the tractor-trailer tanker truck was traveling west on Highway 62. The cause of the accident is unknown, but the tanker truck drove off the road near mile marker 23, flipped over, and eventually caught on fire. The tanker truck was carrying 2,000 gallons of gasoline and 6,000 gallons of diesel when the accident occurred. However, some good samaritans were able to pull the injured driver from the truck before flames consumed the entire vehicle. The fire was on-going and several local fire departments responded to the accident. The responders applied foam to the surrounding area but decided to let the fire continue and burn itself out. Contractors (HAZMAT) were on the scene and when the fire was extinguished they performed the cleanup. The incident occurred in a very rural area, therefore no evacuations were required and community impact was limited to a one-lane closure of Highway 62. Traffic was still able to get by. It is believed that no waterways will be impacted by this incident.

June 4, 2003: Hazardous material work crews cleaned up a toxic chemical spill in the 1700 block of East Ninth Street in Texarkana, Arkansas. Officials with Agriliance Ago Distribution called the National Emergency Response Center in Washington, D.C., shortly before 9 AM Wednesday after they noticed 45 concentrated gallons of a deadly pesticide known as Methyl Parathion leaking from two different areas in a tractor-trailer rig. The truck was delivering pesticide and insecticide supplies. The center in turn called the Arkansas Department of Emergency Management. The truck driver discovered this pesticide leaking after he opened the truck's back door. The liquid pesticide has an initial garlic scent that could be fatal if inhaled or absorbed through a person's skin in small quantities. The leakage occurred after something ruptured all three 15-gallon plastic drums containing the substance.

To avoid exposing the public to deadly vapors which collected within the tractor-trailer's rig, Arkansas Police and Fire Department personnel closed the entire length of East Ninth Street between its intersection with East Broad and Oats Street. Arkansas

firefighters had to cut through a wire fence in a wooded area bordering the site where the 18-wheeler was parked, so they could get through to the rig. Police kept all five lanes of East Ninth clear of traffic for about an hour before reopening the lanes. Work crews dressed in protective suits and oxygen masks opened the rig to air out the vapors.

Probability of Future Highway HAZMAT Events

Based on past occurrences of highway incidents in Arkansas involving hazardous materials, it is **"Highly Likely"** that future events will continue to occur within the state.

Railway Event Profile

The volume of HAZMAT moving by rail in the US has more than doubled since 1980, with approximately 1.7 million carloads now moving each year. In 2001, though, only 32 rail accidents resulted in a release of hazardous materials. An astounding 99.996 percent of rail HAZMAT shipments reached their final destinations without a release caused by an accident. Overall HAZMAT accident rates have fallen 87 percent since 1980 and 30 percent since 1990.

Based on data from the Research and Special Programs Administration (RSPA) of the U.S. Department of Transportation, the railroad rate of unintentional releases of hazardous materials — the vast majority of which are minor leaks from valves and fittings — has fallen by 65 percent since 1980 and 47 percent since 1990. In the ten years from 1992 to 2001, only three persons died because of exposure to hazardous materials in rail transportation, according to RSPA data. The RSPA data also show that trucks have 10 to 15 times as many hazardous material spills as do railroads despite having comparable hazardous materials ton-mileage.

Two types of HAZMAT releases from railroad events are of the most concern: 1) Collisions and derailments that result in large spills or discharges, or air releases during fires; and, 2) Releases from leaks in fittings, seals, or relief valves, and improper closure or defective equipment. These releases account for approximately 70 percent of all railroad-related incidents each year.

Tank cars used to transport hazardous materials must meet strict U.S. DOT specifications. For example, they must be equipped with pressure relief devices (to protect the tank in the event of fire) and double shelf couplers (designed to prevent tank punctures by a coupler). Commodities that pose a higher risk in transportation are transported in stronger tanks with thermal protection systems and steel “head shields” at each end of the car (providing further protection against puncture).

The alternative is to ship hazardous material by truck instead of rail, but rail is 16 times safer than truck. Based on the best information between 1981 and 2004, there were 10 deaths related to hazardous materials transported by rail, and 278 deaths involving hazardous materials transported by truck.

Railroads carry an estimated 22 percent of the chlorine that is produced in the US and 66 percent of the chlorine that is transported. Railroads carry about 1.7 million carloads of hazardous materials annually, including about 35,000 carloads of chlorine. Chlorine is used to purify more than half of the nation's water supplies and is found in 85 percent of all pharmaceuticals.

Federal Railroad Administration: The Federal Railroad Administration (FRA) was created by the Department of Transportation Act of 1966 (49 U.S.C. 103, Section 3(e)(1)). The purpose of FRA is to: promulgate and enforce rail safety regulations; administer railroad assistance programs; conduct research and development in support of improved railroad safety and national rail transportation policy; and consolidate government support of rail transportation activities. Today, the FRA is one of ten agencies within the U.S. Department of Transportation concerned with intermodal transportation. It operates through seven divisions under the offices of the administrator and deputy administrator.

The movement of hazardous materials throughout the railroad industry provides an excellent example of the dynamic interrelationship between shippers, carriers, freight car builders, maintenance and repair companies, and federal, state, and tribal governments. Under authority delegated by the secretary of transportation, the Federal Railroad Administration administers a safety program that oversees the movement of hazardous materials (including dangerous goods), such as petroleum, chemical, and nuclear products, throughout the nation's rail transportation system, including shipments transported to and from international organizations. The Federal Railroad Administration also has authority to oversee the movement of a package marked to indicate compliance with a federal or international hazardous materials standard, even if such a package

does not contain a hazardous material. Their current hazardous materials safety regulatory program includes the following items:

- Hazardous Materials Incident Reduction Program
- Tank Car Facility Conformity Assessment Program
- Tank Car Owner Maintenance Program Evaluations
- Spent Nuclear Fuel and High-Level Nuclear Waste Program
- Railroad Industrial Hygiene Program
- Rulemaking, Approvals, and Exemptions
- Partnerships in Domestic and International Standards-Related Organizations (e.g., AAR, ASME, TDG/CGSB)
- Education, Safety Assurance, and Accident Investigation

Arkansas Railways: Arkansas is served by over 25 railroad companies. There are three Class I railroads providing service with long-haul deliveries to national market areas and intermodal rail/truck service providers. The largest Class I railroad in Arkansas, in terms of miles of track, is the Union Pacific Railroad. The remaining 23 are Class III railroads, commonly referred to as short line railroads providing switching services, railcar spotting and feeder railcar services to the Class I railroads.

Table 4.2.11-6: Arkansas Railway Information

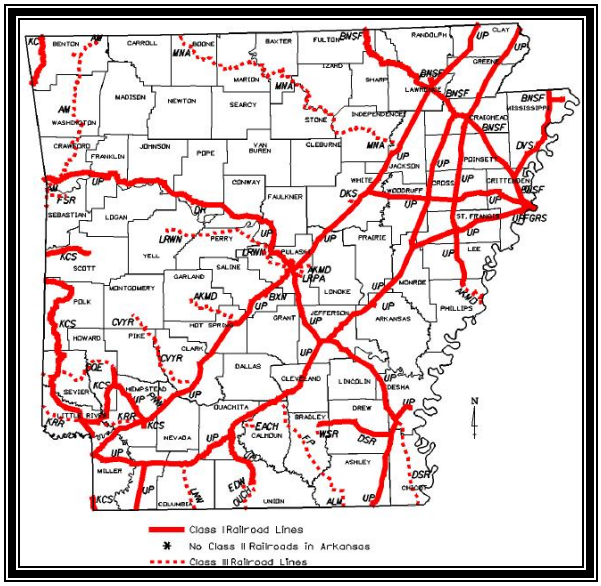
Type of railroad	Number of railroads		Miles operated[2] United States	Miles operated[2] Arkansas		
	United States	Arkansas		Excluding trackage rights	Including trackage rights	Percent of U.S. total
Total	562	25	172,101	2,761	3,674	2.1
Class I	8	3	120,597	1,864	2,714	2.3
Regional	35	1	20,978	182	182	0.9
Local	304	16	21,512	606	669	3.1
Switching and terminal	213	5	7,425	109	109	1.5
Canadian[1]	2	0	1,589	0	0	0.0

Railroad	Miles operated in Arkansas[1]
Class I railroads	2,714
Burlington Northern and Santa Fe Railway Company	1,045
Kansas City Southern Railway Company	217
Union Pacific Railroad Company	1,452
Regional railroads	182

Missouri & Northern Arkansas Railroad	182
Local railroads	669
Arkansas & Missouri Railroad	122
Arkansas, Louisiana & Mississippi Railroad	70
Arkansas Midland Railroad Company	69
Caddo Valley Railroad Company	53
De Queen & Eastern Railroad	45
Delta Southern Railroad	89
East Texas Central Railroad	53
Kiamichi Railroad Company	20
Little Rock & Western Railway, L.P.	79
Louisiana & North West Railroad Company	25

The majority of the rail freight shipped in Arkansas is considered bulk cargo, which consists of basic commodities in loose form and large quantities. The foremost inbound commodities by rail are coal and grain. Dominant outbound commodities transported by rail are stone, riprap and primary forest materials.

Figure 4.2.11-13: Class I, II, and III Rail Lines in Arkansas



Source: Union Pacific Railroad

Railroads are considered to be a safe way to transport hazardous materials (HAZMAT) throughout Arkansas. Thanks to massive infrastructure and equipment investments, safer operating procedures and improvements in tank car design, railroads keep improving their HAZMAT safety records. Railroads, tank car owners, tank car builders

and chemical companies engage in continuing cooperative programs to improve HAZMAT transportation safety.

The principal freight transportation services provided by Class I railroads are long-haul deliveries to national market areas, customer support services and freight exchanges at international ports of entry. They also arrange for overseas shipments and transportation of goods between Canada, Mexico and the United States.

Table 4.2.11-7: Class I Mainline Track Mileage

Class I Mainline Track Mileage		
Railroad	**Track Mileage**	**% of Total**
Union Pacific	1,464	77%
Kansas City Southern	221	12%
Burlington Northern and Santa Fe	208	11%

Union Pacific is Arkansas' largest railroad, serving the state's food processing, forest products and poultry industries. Major commodities hauled by UP in the state include soybeans, cotton, rice, bauxite, manganese and glass. The railroad is a vital link for western coal, used by Arkansas Power & Light electrical generating plants at Newark and White Bluff. In addition to Arkansas Power and Light, Union Pacific's customers in Arkansas include Minnesota Mining & Manufacturing Company, Unimin Corporation and Georgia Pacific. The chief service area for Union Pacific Railroad includes the states west of the Mississippi River with major destination points in the western states of California and Washington, and the Gulf states of Texas and Louisiana.

Figure 4.2.11-14: Union Pacific Routes

Source: Union Pacific Railroad

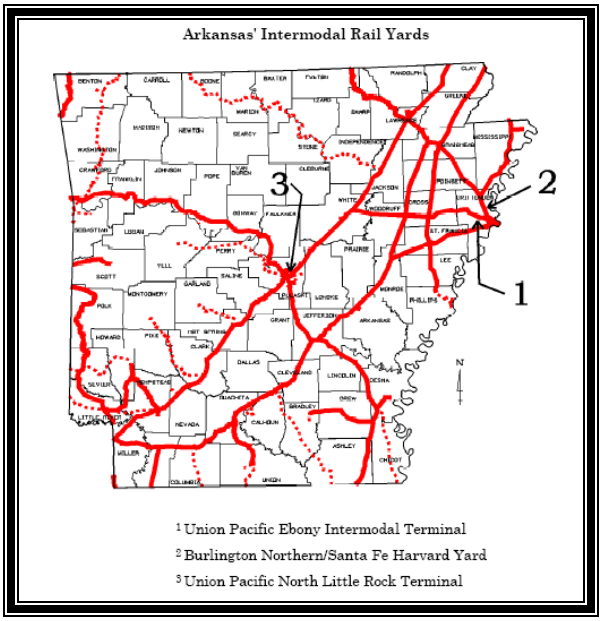
North Little Rock is the hub of Union Pacific's operations in Arkansas, where the railroad operates the $40 million Downing B. Jenks locomotive repair shop, the largest and most modern on the system. North Little Rock is also the site of the system's second largest freight car classification yard. In addition to Union Pacific's facilities in Little Rock, Union Pacific operates a $70 million state-of-the-art, 600-acre intermodal facility at Marion, 10 miles west of Memphis, and a classification yard at Pine Bluff. Amtrak operates passenger train service over Union Pacific's main line through the state, connecting St. Louis with Texas.

The North Little Rock locomotive overhaul and maintenance facilities are the largest of their kind on the Union Pacific Railroad (UPRR) and among the largest in the world. The Jenks Shop locomotive complex employs more than 1,100 skilled and dedicated workers, who perform heavy maintenance on a fleet of 7,000 locomotives that pull more than 2,000 trains each day throughout the western two-thirds of the United States.

The majority of the complex is dominated by the main Jenks Shop heavy locomotive repair facility, with more than 272,000 square feet of space, 227,000 of which is devoted to the main shop floor.

Three types of intermodal rail transportation services occur in Arkansas: TOFC (trailer-on-flatcar) shipments, COFC (container-on-flatcar) movements, and transload services. An example of an in-state trans-load shipment is finished lumber trucked to a warehouse for temporary storage, then loaded into a railcar for shipment to market. Three intermodal rail/truck yards are operated by Class I railroads in Arkansas. The map below shows the locations of these key intermodal rail yards in Arkansas.

Figure 4.2.11-15: Arkansas' Intermodal Rail Yards



Source: Union Pacific Railroad

Marion Intermodal Railport: The Marion Intermodal Railport in Marion, Arkansas is one of the largest railports in the world. The $70 million state-of-the-art intermodal facility opened July 13, 1998. The facility can handle more than 375,000 trailers or containers annually. Its ramp was designed to hold 326 railcars. Additionally, the terminal's storage facilities will store 748 railcars and its parking capacity will accommodate 2,600 trailers and containers. Over a decade, the railport will pump $1.8 billion into the local Arkansas economy.

Railports are where the rail systems meet trucking, water and pipeline transportation. Hazardous materials may be transported by several modes before reaching the rail portion of the trip. When it comes time to load materials from one mode to rail, it takes place at an intermodal yard. Containers of materials of all types are transferred from one mode to another. This transfer of modes increases the chances of a hazardous materials event occurring.

Intermodal Rail Yard in Marion

Below are annual reports from 2001-2007, released in 2010 by the US Department of Transportation detailing HAZMAT events by state. In these reports, Arkansas is shown to have regular HAZMAT events each year; however, the frequency and severity of rail events involving hazardous materials is considerably less than results in other states.

Table 4.2.11-8: Annual Reports of HAZMAT Events from 2001-2007

02/26/2010 — Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State FOR **2007**

Incident State	Incidents	INJURIES Hospitalized	INJURIES Non-Hospitalized	Fatalities	Damages
Alabama	20	0	4	0	344,375
Arizona	11	0	1	0	83,390
Arkansas	4	0	0	0	248,732
California	71	0	3	0	2,340,316

02/26/2010 Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State FOR 2006

Incident State	Incidents	INJURIES Hospitalized	Non-Hospitalized	Fatalities	Damages
Alabama	24	2	1	0	920,058
Arizona	12	0	1	0	58,436
Arkansas	7	0	0	0	198,443
California	70	0	0	0	310,253

03/02/2010 Page: 1

U . S. DEPARTMENT OF TRANSPORTAION
HAZARDOUS MATERIALS SAFETY
HAZARDOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY Incident State FOR 2005

Incident State	Incidents	INJURIES Hospitalized	Non-Hospitalized	Fatalities	Damages
Alabama	17	0	0	0	36,593
Arizona	10	0	1	0	28,158
Arkansas	11	20	2	1	282,196
California	61	0	1	0	417,799

08/30/2005

U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
HAZARADOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY INCIDENT STATE FOR CALENDAR YEAR - 2004
RAIL INCIDENTS

Incident State	Incidents	Injuries Major	Minor	Fatalities	$ Damages
Alabama	17	0	0	0	155,358
Arizona	19	0	4	0	251,772
Arkansas	10	0	0	0	8,309
California	70	0	0	0	119,086

08/30/2005

U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
HAZARADOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY INCIDENT STATE FOR CALENDAR YEAR - 2003
RAIL INCIDENTS

Incident State	Incidents	Injuries Major	Minor	Fatalities	$ Damages
Alabama	14	0	1	0	1,108,300
Alaska	1	0	0	0	50
Arizona	13	0	1	0	555
Arkansas	9	0	0	0	700
California	90	0	2	0	94,116

08/01/2005

U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
HAZARADOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY INCIDENT STATE FOR CALENDAR YEAR - 2002
RAIL INCIDENTS

Incident State	Incidents	Injuries Major	Minor	Fatalities	$ Damages
Alabama	14	0	0	0	125,015
Alaska	1	0	0	0	11,000
Arizona	18	0	0	0	19,550
Arkansas	10	0	0	0	0
California	120	0	2	0	49,588

08/01/2005

U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
HAZARADOUS MATERIALS INFORMATION SYSTEM
HAZMAT SUMMARY BY INCIDENT STATE FOR CALENDAR YEAR - 2001
RAIL INCIDENTS

Incident State	Incidents	Injuries Major	Injuries Minor	Fatalities	$ Damages
Alabama	24	0	0	0	463,310
Alaska	3	1	0	0	2,001
Arizona	12	0	0	0	293,293
Arkansas	9	0	0	0	53,605
California	133	0	5	0	228,387

Source for the above: ADHT

DHS has taken significant steps to enhance security for the shipment of hazardous materials and our nation's rail and mass transit systems. DHS has provided $150 million in grants to rail and transit operators, created a joint task force with the Department of Transportation to study issues regarding shipment tracking and the hardening of rail cars and conducted risk assessments of rail security in high-threat urban areas.

Table 4.2.11-9: Total Rail Accidents/Incidents: 2000

State	Accidents/ Incidents	Fatalities	Injuries
Alabama	257	20	143
Alaska	89	2	82
Arizona	222	27	147
Arkansas	**371**	**30**	**225**
California	1,133	101	808
Colorado	199	10	112

Previous Railway Event Occurrences

2007 to 2010: No major railway incidents reported

October 15, 2005: Texarkana, Arkansas, was the scene of a fiery rail accident that caused the evacuation of hundreds of homeowners. Seven empty train cars and a tanker containing a flammable gas derailed in a switchyard, exploding in a ball of fire. The rail car that exploded was carrying a tank of propylene gas and was hit by a Union Pacific freight train en route from Chicago. At least two homes were destroyed – including one where the victim died – and several vehicles were totaled in the quarter-mile area surrounding the accident. A plume of smoke covered the south end of the city, and at least seven people went to hospital emergency rooms with complaints of respiratory problems. Officers went door to door, urging thousands of people in a 2-by-5 mile area to move to the north side of town.

October 15th Rail Accident in Texarkana

***September 13, 2002* (TEXAS):** A 24,000-gallon-capacity railroad tank car, DBCX 9804, containing about 6,500 gallons of hazardous waste, catastrophically ruptured at a transfer station at the BASF Corporation chemical facility in Freeport, Texas. The tank car had been steam-heated to permit the transfer of the waste to a highway cargo tank for subsequent disposal. The waste was a combination of cyclohexanone oxime, water and cyclohexanone. As a result of the accident, 28 people received minor injuries, and residents living within 1 mile of the accident site had to shelter in place for 5 1/2 hours. The tank car, highway cargo tank and transfer station were destroyed. The force of the explosion propelled a 300-pound tank car dome housing about 1/3 mile away from the tank car. Two storage tanks near the transfer station were damaged; they released about 660 gallons of the hazardous material oleum (fuming sulfuric acid and sulfur trioxide).

***February 18, 1999* (INDIANA):** A railroad tank car, unloading rack at the Essroc Cement Corporation (Essroc) Logansport cement plant near Clymers, Indiana, sustained a sudden and catastrophic rupture that propelled the tank of the tank car an estimated 750 feet and over multi-story storage tanks. The 20,000-gallon tank car initially contained about 161,700 pounds (14,185 gallons) of a toxic and flammable hazardous waste that was used as a fuel for the plant's kilns. There were no injuries or fatalities. Total damages, including property damage and costs from lost production, were estimated at nearly $8.2million.

1995: Twenty-one cars derailed in Corning, AR causing the temporary evacuation of approximately 400 residents. The derailment caused a rupture in one of the train's tank cars and its contents of liquefied petroleum gas were allowed to burn completely before the residents could return home. The derailment was blamed on tracks warped by the summer's heat.

June 9, 1985: A derailment of a St. Louis Southwestern Railway Company freight train resulted in the release of hazardous materials near Pine Bluff, Arkansas.

October 3, 1982: A side collision of two Missouri Pacific Railroad Company freight trains occurred at Glasie Junction, near Possum Grape, Arkansas.

July 9, 1982: An automobile and Missouri Pacific Railroad Freight Train collided on Woodland Drive in Lake View, Arkansas.

March 29, 1978: A St. Louis Southwestern Railway Company freight train derailed and ruptured its contents of vinyl chloride near Lewisville, Arkansas.

Probability of Future Railway Events

There is significant mileage of rail throughout the state and an increasing amount of traffic. The industry is continually taking steps to improve the safety of the entire system, but a small number of incidents is **"Highly Likely"** to occur annually.

Pipeline Hazard Profile

There are over 40,000 miles of hazardous liquid and natural gas pipelines in Arkansas. That figure compares with a national average of 51,765 miles per state. These pipelines include large-diameter lines carrying energy products to population centers, as well as small-diameter lines that may deliver natural gas to businesses and households into suburban neighborhoods. The energy products carried in pipelines fuel lives and livelihoods. They heat homes and schools, power industrial bases and enable daily commutes.

Pipelines are considered by many to be the safest method for transporting energy products. Nevertheless, they can and sometimes do rupture, posing serious risks. The Arkansas Department of Emergency Management encourages everyone in Arkansas to learn about pipelines and the products they carry, as well as a few simple steps that can be taken to help ensure pipeline safety in the community.

The nation's pipelines are a transportation system that enables the safe movement of extraordinary quantities of energy products to industry and consumers, literally fueling our economy and way of life. The arteries of the nation's energy infrastructure, as well as the safest and least costly ways to transport energy products, our oil and gas pipelines provide the resources needed for national defense, heat and cool our homes, generate power for business and fuel an unparalleled transportation system.

Pipelines carrying gas, oil and other liquids provide the heat for our homes and power for the economy throughout our state and nation. Compared to other modes of transportation, the nation's pipelines have a remarkable safety record. Part of the reason for that success is the attention focused by the pipelines on issues of safety, maintenance and damage prevention.

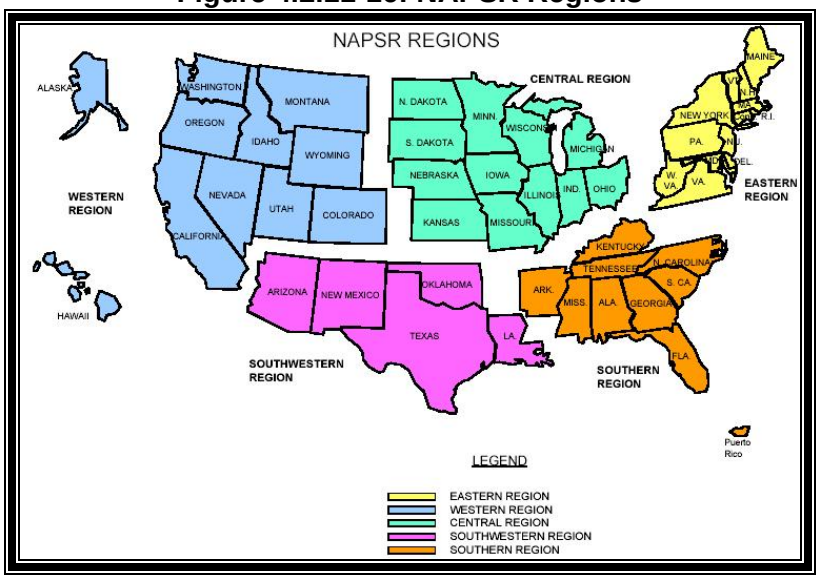
According to the U.S. Department of Transportation, pipelines are by far the safest way to transport petroleum products and are recognized as the most economical way of distributing vast quantities of oil from production fields to refineries and from refineries to consumers.

Arkansas Pipeline Safety Office: Pipeline safety laws fall under federal authority in Title 49, United States Code. Chapter 601 of Title 49 establishes the framework for promoting pipeline safety via federal authority for regulation of inter-state pipeline facilities and federal delegation to the state for all or part of the responsibility for intra-state pipeline facilities under an annual certification or agreement. Arkansas statute §23-15-204 empowers the Arkansas Public Service Commission to obtain a certification with the federal government to regulate gas pipeline safety of intra-state natural gas operators. This responsibility is carried out within the Commission's General Staff by the Gas and Water Section's Pipeline Safety Office. The Pipeline Safety Office utilizes a staff of six inspectors under the direction of the Chief, Pipeline Safety to enforce pipeline safety rules. The pipeline safety rules are contained in the Arkansas Gas Pipeline Code.

The Pipeline Safety Office inspects three natural gas distribution utilities, twenty-two intra-state natural gas operators and 357 master meter gas systems (mobile home parks, apartment complexes, housing authorities, etc.) for operating safety, gas leakage, and the control of corrosion. The inspections ensure that gas operators are in compliance with the Arkansas Gas Pipeline Code. The Pipeline Safety Office is responsible for 2,081 miles of intra-state gas transmission and gathering pipelines, 17,692 miles of gas distribution mains, and 641,830 gas service lines. During 2003, the Pipeline Safety Office's inspectors spent 648 inspection days (excluding report preparation time) in the field conducting 191 inspections.

The Pipeline Safety Office works closely with the Federal Office of Pipeline Safety (OPS). OPS is directly responsible for inter-state gas and liquid hydrocarbon pipelines in the state. Headquartered in Washington, D.C., the OPS is organized into five distinct regions. Each state pipeline safety office is assigned to one of OPS's regional offices.

Figure 4.2.11-16: NAPSR Regions



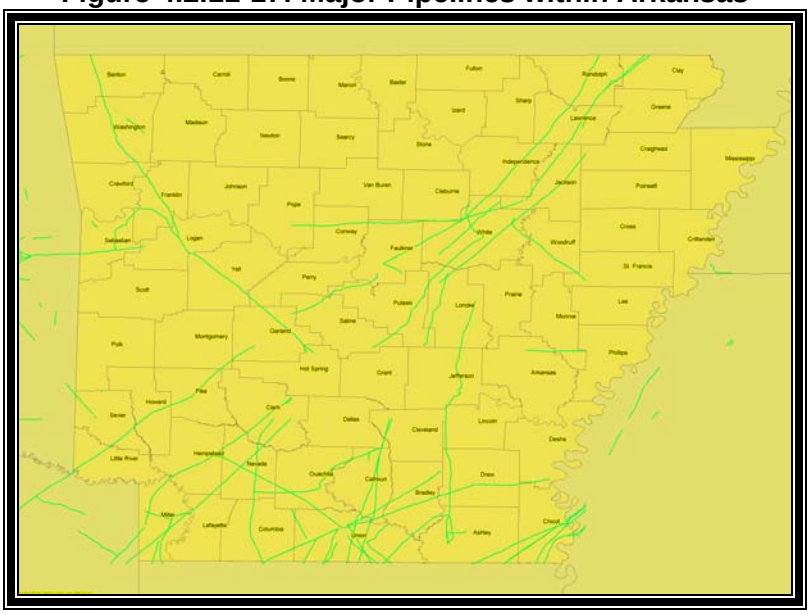
Source: OPS

Arkansas is in OPS's Southern Region located in Atlanta, GA. Other states in the Southern Region include Mississippi, Tennessee, Alabama, Georgia, Florida, North Carolina, South Carolina, Kentucky and the U.S. Territory of Puerto Rico. Each year, OPS evaluates the Pipeline Safety Office's program for compliance with federal certification requirements. The Pipeline Safety Office consistently receives the highest evaluations in the nation highlighted by a perfect score during the most recent evaluation. Federal pipeline safety regulations require pipeline operators to conduct continuing educational programs to educate a wide variety of stakeholders -- including the public, government agencies, local officials and excavators -- on pipeline safety issues.

Geographic Area Affected by Pipelines

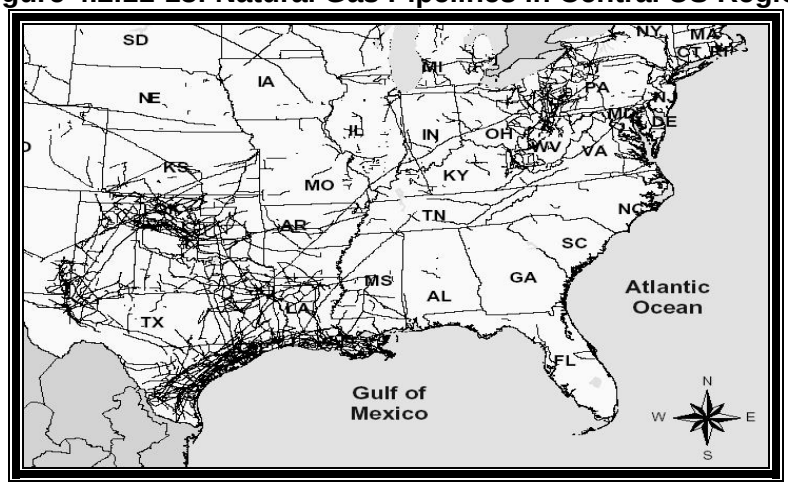
Over 65% of the counties within Arkansas have a considerable level of threat to a pipeline incident whether accidental or human caused. The map below shows the locations of these major pipelines within Arkansas. The data used to develop this map was provided by GeoSTOR.

Figure 4.2.11-17: Major Pipelines within Arkansas



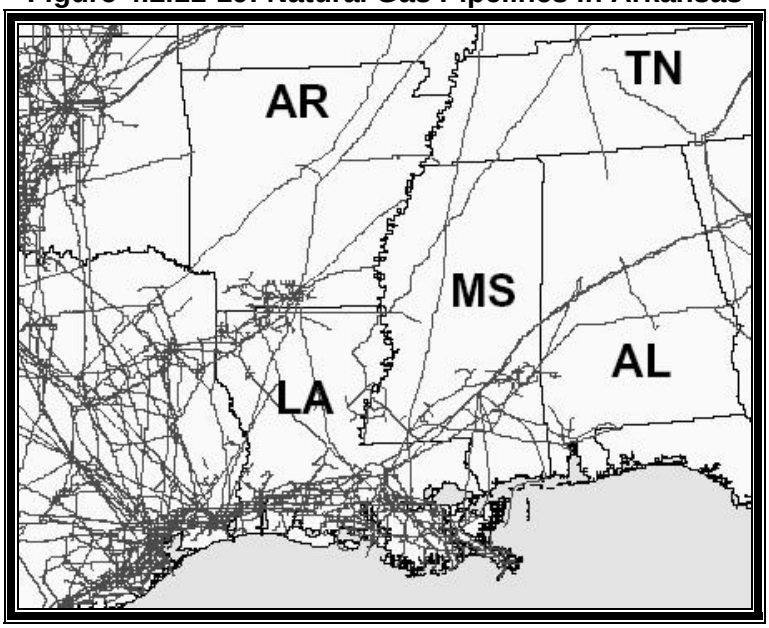
Source: OPS

Figure 4.2.11-18: Natural Gas Pipelines in Central US Region



Source: OPS

Figure 4.2.11-19: Natural Gas Pipelines in Arkansas



Source: OPS

Table 4.2.11-10: Arkansas Hazardous Liquid Pipeline Incidents 1995-2000

	1995	1996	1997	1998	1999	2000
Arkansas						
Number of incidents	2	4	3	1	2	3
Number of fatalities	0	0	0	0	0	0
Number of injuries	0	0	0	0	0	0
Property damage ($ thousands)	265	61	152	45	34	40
United States, total						
Number of incidents	188	193	171	153	168	147
Number of fatalities	3	5	0	2	4	1
Number of injuries	11	13	5	6	20	4
Property damage ($ thousands)	32,519	81,083	42,811	62,865	43,109	115,704

Previous Pipeline Event Occurrences

Past Pipeline Accidents within the State of Arkansas as reported by the NTSB

November 1, 2007: At 10:35:02 a.m. CDT, a 12-inch-diameter pipeline segment operated by Dixie Pipeline Company was transporting liquid propane at about 1,405 pounds per square inch, gauge, when it ruptured in a rural area near Carmichael, Mississippi. The resulting gas cloud expanded over nearby homes and ignited, creating a large fireball that was heard and seen from miles away. About 10,253 barrels (430,626 gallons) of propane were released. As a result of the ensuing fire, two people were killed and seven people sustained minor injuries. Four houses were destroyed, and several others were damaged. About 71.4 acres of grassland and woodland were burned. Dixie Pipeline Company reported that property damages resulting from the accident, including the loss of product, were $3,377,247.

October 12, 2006: A spill at a pipeline facility in Rogers, Arkansas resulted in 67,000 gallons of gasoline being spilled into the surrounding soil. Residents near the terminal were told to monitor their water wells for contamination.

Much of the gasoline was in the soil in a containment area around a tank that overflowed at the site. The soil had to be removed to get rid of the spilled fuel.

October 19, 2005: More than 500 gallons of oil from a Lion Oil Company pipeline leaked south of Magnolia, Arkansas. Belle Rios lived on the property where the oil spilled and says she was notified of the leak and the problem by the El Dorado-based company. Rios says the oil was running through a creek and contaminating her property. John Warren, Vice President of Operations at Lion Oil, says a temporary repair was made on Wednesday, the 19th to stop the leak. A large portion of the oil was cleaned up by the end of the week. Lion Oil had reported that the leak was equivalent to about 13 42-gallon barrels of oil. The leak, reported Wednesday, occurred in lines transporting oil into Lion Oil lines from other areas. The Environmental Protection Agency and the Arkansas Department of Environmental Quality were notified.

March 13, 2004: At 11:36 PM (EST), the National Response Center received notification that a 20-inch underground distribution pipeline had discharged up to 300 barrels of gasoline 5 miles northwest of Richmond, AR. The cause of the spill was determined to be corrosion on a blow down valve. The leak was discovered on the 12th of March; however, the quantity could not be determined as the pipeline was underground. The majority of the product entered an unnamed dry ditch leading to Hurricane Creek. No evidence of chemicals, however, was observed on the water. One private citizen was evacuated by the local sheriff due to the vapors and has since been returned. No water supply was contaminated.

January 31, 2003: At approximately 12:00 PM a 4-inch above-ground gathering pipeline ruptured and released approximately 50 barrels of crude oil into an unnamed tributary that flows into Brushee Creek. The release occurred two miles north of Louanne, Arkansas in Ouachita County. Two sets of booms were deployed on Brushee Creek and two vacuum trucks were on site to assist in cleanup operations.

August 19, 2000: An explosion occurred on one of three adjacent large natural gas pipelines near Carlsbad, New Mexico. El Paso Natural Gas Company operates the pipeline system and supply consumers and electric utilities in Arizona and southern California. Twelve people, including five children, died as a result of the explosion. The explosion left an 86-foot long crater.

June 10, 1999: The Olympic Pipeline, which carries gasoline, diesel and jet fuel from refineries near Ferndale to locations down the I-5 corridor as far south as Portland (including all the jet fuel for Seattle-Tacoma International Airport), ruptured in Bellingham at Whatcom Falls Park near Whatcom Creek, leaking 237,000 US gallons of gasoline into the creek. An explosion was set off and burned over a mile of the creek bed and sent a black smoke cloud over 30,000 feet into the air. Due to road closures and evacuations around the creek, fatalities were limited to three, although some buildings were destroyed. The explosion resulted in over $45 million in property damage. Families of the pipeline victims settled with the pipeline company for more than $100 million in damages, which they pledge to use to help support pipeline safety and provide legal representation for pipeline accident victims across the nation.

October 1, 1982: Mississippi River Transmission Corp. Natural Gas Flash Fire, Pine Bluff, Arkansas.

Figure 4.2.11-20: Major Pipeline Events outside the State of Arkansas as Reported by the NTSB

Source: OPS

The National Transportation Safety Board (NTSB) and the Office of Pipeline Safety (OPS) investigators at the accident site observed internal corrosion in the section of the pipe that failed. The ruptured section of pipe was taken to an NTSB metallurgy lab for examination.

Pipeline Explosion in Bellingham, WA

Probability of Future Pipeline Events

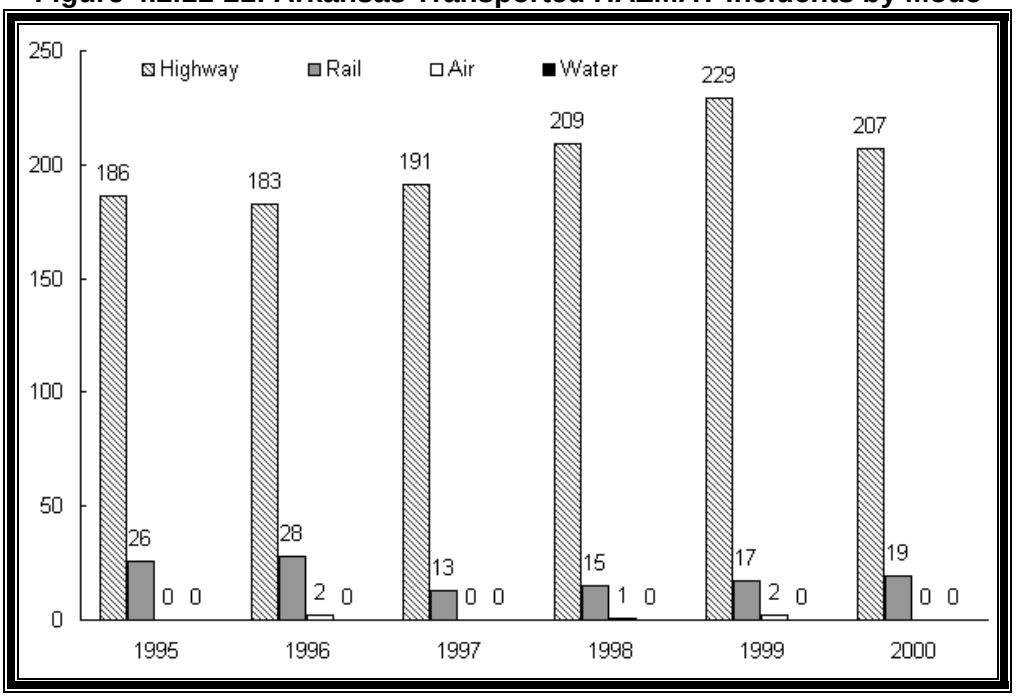
There are a large number of pipelines crisscrossing the state carrying a variety of substances. These pipelines are maintained and safety is an important issue for the pipeline owners and the surrounding areas. There is a high probability that small pipeline events will occur, however the chances of a large scale disaster occurring are relatively small, therefore the states overall probability rating is considered **"Possible"** for future pipeline events to occur.

Water Transported HAZMAT Hazard Profile

The Sub-Committee views water transported HAZMAT events as an extremely low priority to the state in comparison with other HAZMAT related hazards. The HMP Sub-Committee has decided not to include a detailed section of water transported HAZMAT events in the mitigation planning efforts at this time. The reason for this decision is that the Sub-Committee recognizes that historically, Arkansas has virtually no major water transported HAZMAT events on record. No accounts have been found of significant loss of life or property. A HAZMAT event by water does not pose a risk of vulnerability or impact on the State of Arkansas at this time. In the future, should the Sub-Committee find otherwise, a section on water transported HAZMAT events will be added.

To further illustrate the findings of the HMP Sub-Committee, the graph below provided by the U.S. Department of Transportation illustrates the low occurrence of HAZMAT events by water within Arkansas dating back to 1995.

Figure 4.2.11-21: Arkansas Transported HAZMAT Incidents by Mode



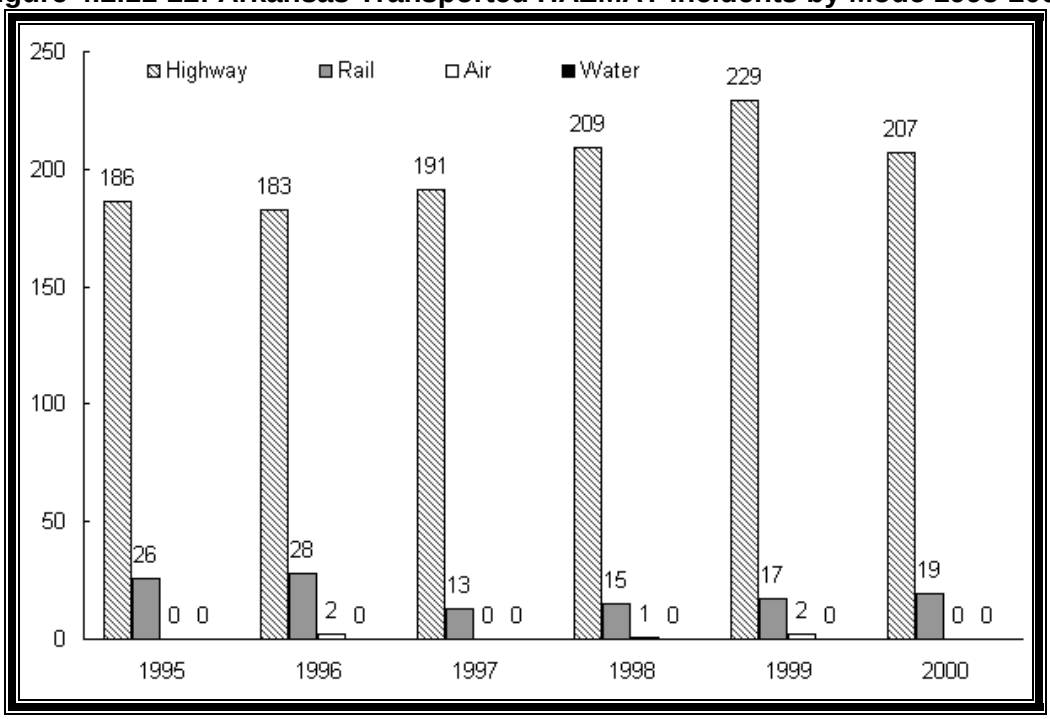
Source: *Data provided by the US Dept of Transportation – Bureau of Statistics*

Air Transported HAZMAT Hazard Profile

The HMP Sub-Committee views air transported HAZMAT events as the lowest priority to the State of Arkansas in comparison to other HAZMAT related hazards. The Sub-Committee has decided not to include a detailed section of air transported HAZMAT events in the mitigation planning efforts at this time. The reason for this decision is that the Sub-Committee recognizes that historically, Arkansas has virtually no major air transported HAZMAT events on record. No accounts have been found of significant loss of life or property. A HAZMAT event by air does not pose a risk of vulnerability or impact on the State of Arkansas at this time. In the future, should the Sub-Committee find otherwise, a section on air transported HAZMAT events will be added.

To further illustrate the findings of the sub-committee, the graph below provided by the U.S. Department of Transportation illustrates the low occurrence of HAZMAT events by air within Arkansas dating back to 1995.

Figure 4.2.11-22: Arkansas Transported HAZMAT Incidents by Mode 1995-2000



Data provided by the US Dept of Transportation – Bureau of Statistics

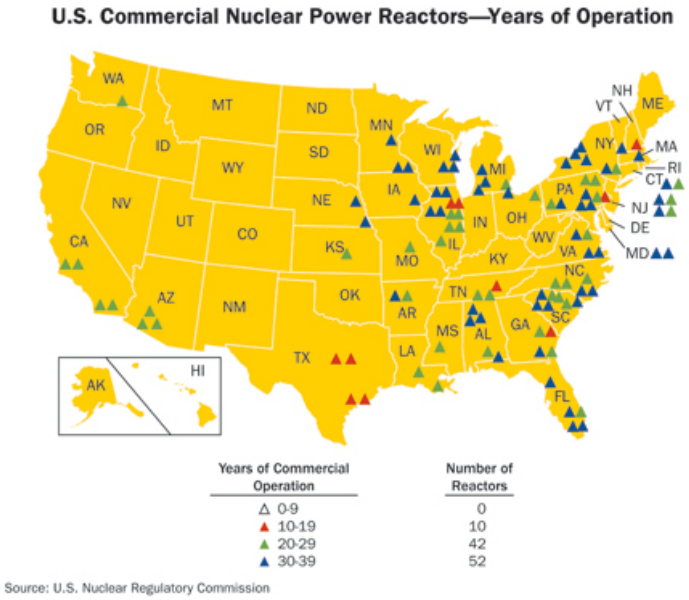
4.2.12 Nuclear Event Hazard Profile

A nuclear reactor is a device in which nuclear chain reactions are initiated, controlled and sustained at a steady rate. Nuclear reactors are used for many purposes, but the most significant current uses are for the generation of electrical power and, in rare cases, for the production of plutonium for use in nuclear weapons. Currently all commercial nuclear reactors are based on nuclear fission, and are considered problematic by some for their safety and health risks. Conversely, some consider nuclear power to be a safe and pollution-free method of generating electricity. Fusion power is an experimental technology based on nuclear fusion instead of fission. There are other devices in which nuclear reactions occur in a controlled fashion, including radioisotope thermoelectric generators, which generate heat and power by passive radioactive decay, and Farnsworth-Hirsch fusors, in which controlled nuclear fusion is used to produce neutron radiation.

Since 1980, each utility that owns a commercial nuclear power plant in the United States has been required to have both an onsite and offsite emergency response plan as a condition of obtaining and maintaining a license to operate that plant. Onsite emergency response plans are approved by the Nuclear Regulatory Commission (NRC). Offsite plans (which are closely coordinated with the utility's onsite emergency response plan) are evaluated by the Federal Emergency Management Agency (FEMA) and provided to the NRC, which must consider the FEMA findings when issuing or maintaining a license.

Federal law establishes the criteria for determining the adequacy of offsite planning and preparedness, i.e.: "Plans and preparedness must be determined to adequately protect

the public health and safety by providing reasonable assurance that appropriate measures can be taken offsite in the event of a radiological emergency."



Although construction and operation of nuclear power plants are closely monitored and regulated by the NRC, an accident, though unlikely, is possible. The potential danger from an accident at a nuclear power plant is exposure to radiation. This exposure could come from the release of radioactive material from the plant into the environment, usually characterized by a plume (cloud-like) formation. The area the radioactive release may affect is determined by the amount released from the plant, wind direction and speed and weather conditions (i.e., rain, snow, etc.) which would quickly drive the radioactive material to the ground, hence causing increased deposition of radionuclides.

If a release of radiation occurs, the levels of radioactivity will be monitored by authorities from federal and state governments and the utility, to determine the potential danger in order to protect the public.

Nuclear Sites in Arkansas

The history of nuclear reactors found within the State of Arkansas dates back to the 1960s. During the late 60s, construction of the only two reactor sites found within the State of Arkansas began, the Southwest Experimental Fast Oxide Reactor (SEFOR) and Arkansas Nuclear One (ANO). The SEFOR facility still exists today and is controlled by the University of Arkansas. However, the SEFOR facility ceased operation during the 70s leaving ANO as the only active nuclear reactor within the State of Arkansas.

Southwest Experimental Fast Oxide Reactor (SEFOR): The Southwest Experimental Fast Oxide Reactor (SEFOR) was constructed for the U.S. Atomic Energy Commission's (AEC) Division of Reactor Development and Technology in the late 1960s. It was built and managed by a consortium of energy and engineering firms to test the viability and safety of the fission process of "breeder reactors." The AEC and the consortium conducted experiments at SEFOR from 1969-1972. This research focused on containing the by-product of the breeder reactor's fission process.

SEFOR Construction in 1969

The fissile material used in these experiments was plutonium (*Pu*). The nuclear core contained roughly 800 pounds of *Pu* as oxide. The blanket was comprised of Uranium 238 (*U238*). The plutonium for SEFOR was supplied by the AEC's Hanford facility, and was combined or "doped" with about 10% *Pu240* to make the plutonium unsuitable for use in a bomb. The sole purpose for the Hanford reactors in the mid 1960s was for military needs. The reactors were designed to produce plutonium for weapons. The Hanford Reactors were part of the defense side of the AEC and supplied the fissile material for SEFOR experiments. The AEC contracted with General Electric (through contract number AT (04-3)-540) to run SEFOR experiments. General Electric then paid the associates for construction and experiments. The results of these experiments were published in a March 1970 AEC Research and Development Report (GEAP-13588), *Results of SEFOR Zero Power Experiments*.

In 1975 the Southwest Atomic Energy Associates handed SEFOR over to the University of Arkansas through a quitclaim deed. Prior to the handover, all of the fissionable material was removed from the SEFOR site. For a very short time the site was used by the university as a low-level calibration facility due to the major shielding provided by the structure. After the ownership had been transferred to the university, several potential hazards from the site were recognized and all operations were ceased. None of the university's use of SEFOR ever involved a functioning reactor. In preparation for shutting down the facility, the large chamber that once housed the radioactive materials was filled with concrete. Since closure, the SEFOR facility has deteriorated significantly and now poses a serious risk to surrounding populations.

SEFOR in 2005

Geographic Area Affected by Southwest Experimental Fast Oxide Reactor (SEFOR): SEFOR is located one mile east of Strickler, Arkansas in a rural part of the northwest corner of the state. The University of Arkansas and the city of Fayetteville are located 17 miles to the northeast. Interstate 540 (I-540), a major travel corridor, is located within 10 miles of the SEFOR facility.

Figure 4.2.12-1: SEFOR Location

Source: Department of Energy

There are three major hazards created by the existence of the SEFOR facility today:

- There is the risk of explosion due to the significant volume of residual sodium entombed within SEFOR.
- There is a significant amount of asbestos that surrounds the cooling system.
- The facility has residual radioactivity within the structure as a result of the previously contained nuclear fuel.

The biggest concern at SEFOR is the possibility of an explosion due to sodium residue. The residue is a result of the sodium metal that was used as the reactor's coolant. Sodium, when combined with water, produces hydrogen which is highly combustible. As the facility and its current encapsulation system deteriorate, the potential for moisture to seep in leads to the possibility of a massive explosion. Such an explosion would likely

disperse significant amounts of asbestos, radioactive materials, and trace amounts of mercury and other hazardous chemicals throughout the area. A similar explosion occurred in France in the mid-1990s at the Rhapsodie reactor site, a nuclear facility modeled after SEFOR.

In the event of emergency, the University of Arkansas Police Department is the on-call unit. The University Police will involve Washington County officials as necessary in an event at SEFOR. Fire protection for SEFOR is provided by the Strickler Volunteer Fire Department which is located less than 4 miles from SEFOR. The University of Arkansas pays annual dues for that protection.

Previous Southwest Experimental Fast Oxide Reactor (SEFOR) Occurrences

There have been no previous major events recorded at the SEFOR site. However, there are two trespassing events on record. The Sub-Committee acknowledges that a credible threat exists due to sabotage by trespassers.

There have been two trespassing incidences during the last 15 years at the SEFOR facility site. The first incident resulted in no apparent damage to the site, but as a precaution, steel slabs were welded over the doors and windows to prevent future attempts. The second incident involved a person entering the facility through a roof vent. Again, iron mesh was welded over all roof vent openings. In neither case was the core containment facility area entered.

Probability of Future SEFOR Events

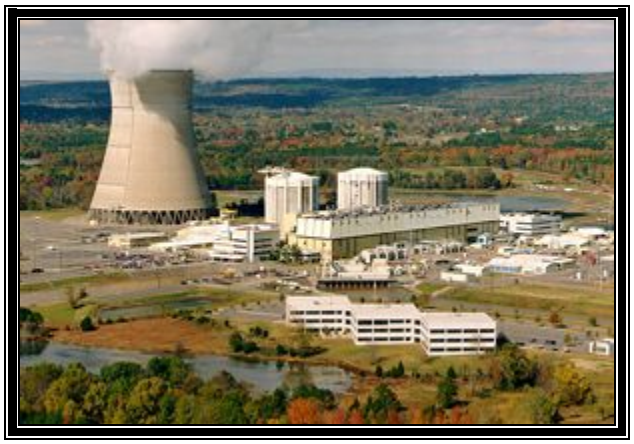
Although the SEFOR site is not operational, a sizeable danger still remains that an event might occur. The continued deterioration of the encapsulation system remains the most likely scenario. Once moisture penetrates the encapsulated materials, the potential for a violent explosion increases greatly. An explosion could disperse radioactive materials for several miles into surrounding areas. Based on past occurrences the probability of an event at the SEFOR facility is **“Unlikely”**.

In 2009, it was announced that the University of Arkansas would get the $1.9 million from the U.S. Department of Energy for a "characterization study" to determine what would be required for cleaning up the site. On November 16, eight professionals from EnergySolutions, an international nuclear services company based in Salt Lake City and one of four companies that bid on the project visited the SEFOR the first stages of planning for a complete cleanup. The plan was supposed to be completed in 2010. At that point the university would be able to apply for the estimated $20 million from the federal government for a complete clean up.

Arkansas Nuclear One (ANO): The facility site of Arkansas Nuclear One is the only active nuclear reactor that remains in the State of Arkansas. Arkansas Nuclear One is a two-unit pressurized water reactor nuclear power plant located in Russellville, Arkansas. It is owned and operated by Entergy Nuclear. Arkansas Nuclear One (ANO) has been a boon to the Arkansas economy for over 30 years.

Construction of the nuclear power plant began in 1969, and took 4 years to complete. During the time the plant was being built, developers decided that a second reactor would be built at the same location. The first reactor was named Unit 1, and the second reactor was named Unit 2. Together, they have a combined output of about 1,800,000 kilowatt-hours of electricity. The total cost of the entire project was approximately $901,500,000. Unit 1 started to produce electricity on December 19, 1974. Unit 1 alone produces 850 kilowatt-hours. Unit 2 started producing electricity on March 25, 1980, and Unit 2 alone produces nearly 1000 KWH. To put these numbers into perspective, 1,800 KWH would meet the needs of 2,572 homes or 600 commercial customers for one solid month.

Nuclear Reactor at Arkansas Nuclear One



Each nuclear unit at ANO can generate enough energy to meet the electricity needs of the entire city of Little Rock during peak demand periods common in the summer months. Unit 1 uses water from Lake Dardanelle for cooling, and is of no harm to the environment. Unit 1 uses and returns 760,000 gallons of water per minute from Lake Dardanelle, enough to fill 294 bathtubs every second. Nuclear energy derived from ANO supplies 26.7 percent of Arkansas' electricity.

Table 4.2.12-1: Nuclear System Informations

Unit 1 Nuclear System					
Capacity Net MW(e)	**Generation in 2003 Megawatt hours**	**Capacity Factor**	**Type**	**Online Date**	**License Expiration Date**
846	6,779,485	91.2 %	PWR	May 21, 1974	May 20, 2014
Unit 2 Nuclear System					
Capacity Net MW(e)	**Generation in 2003 Megawatt hours**	**Capacity Factor**	**Type**	**Online Date**	**License Expiration Date**
930	7,921,241	97 %	PWR	Sept. 1,1978	July 17, 2018

Threats from Nuclear Power Plant Events

The biggest threat to residents around a nuclear power plant is the possibility of coming in contact with radiation. Radiation is any form of energy propagated as rays, waves or energetic particles that travel through the air or a material medium.

Radioactive materials are composed of atoms that are unstable. An unstable atom gives off its excess energy until it becomes stable. The energy emitted is radiation. The process by which an atom changes from an unstable state to a more stable state by emitting radiation is called radioactive decay or radioactivity.

People receive some natural or background radiation exposure each day from the sun, radioactive elements in the soil and rocks, household appliances (like television sets and microwave ovens), and medical and dental x-rays. Even the human body itself emits radiation. These levels of natural and background radiation are normal. The average American receives 360 millirems of radiation each year, 300 from natural sources and 60 from man-made activities. (A rem is a unit of radiation exposure.)

Radioactive materials must be handled properly, or radiation may accidentally be released into the environment. This can be dangerous because of the harmful effects of certain types of radiation on the body. The longer a person is exposed to radiation and the closer the person is to the radiation, the greater the risk.

Although radiation cannot be detected by the senses (sight, smell, etc.), it is easily detected by scientists with sophisticated instruments that can detect even the smallest levels of radiation.

Three Ways to Minimize Radiation Exposure

There are three factors that minimize radiation exposure to a body: Time, Distance and Shielding.

Time: Most radioactivity loses its strength fairly quickly. Limiting the time spent near the source of radiation reduces the amount of radiation exposure received. Following an accident, local authorities will monitor any release of radiation and determine the level of protective actions, and when the threat has passed.

Distance: The more distance between a person and the source of the radiation, the less radiation they will receive. In the most serious nuclear power plant accident, local officials will likely call for an evacuation, thereby increasing the distance between a person and the radiation.

Shielding: Like distance, the heavier and denser the materials between the person and the source of the radiation, the better. This is why local officials could advise people to remain indoors if an accident occurs. In some cases, the walls in homes or workplaces would be sufficient shielding to protect people for a short period of time.

Populations Affected by Radiation Sickness

Radiation sickness may be defined by several responses to exposure from ionizing radiation caused by depletion of immature parenchymal stem cells in specific tissues. If the patient knows that he/she has definitely been exposed to a radiation source, the history of the exposure and the time of onset and severity of symptoms should be documented. Treatment focuses on repeat complete blood counts (CBC), with attention to lymphocyte count, every 2 to 3 hours for the first 8 to 12 hours following exposure. Focus should be placed on prevention and treatment of infections.

Mild Radiation Sickness

(Onset of initial symptoms 1 hour to 2 days after exposure)

A hematopoietic syndrome characterized by decrease in white blood cells, platelets, neutrophils, bleeding, anemia and infections. These findings separate radiation exposure from colds, flu and food poisoning.

Moderate Radiation Sickness

(Onset of initial symptoms within 2 hours of exposure)

In addition to the above; a gastrointestinal syndrome characterized by loss of appetite, nausea, vomiting, diarrhea, cramps, fluid and electrolyte loss, fatigue and anorexia.

Severe Radiation Sickness

(Onset of initial symptoms within minutes of exposure)

High-level radiation exposure presents itself as a Cerebrovascular/CNS syndrome characterized by vomiting and bloody diarrhea within minutes of exposure, disorientation, abnormally low blood pressure and high fever. These signs and symptoms are generally associated with fatal outcomes.

Preparing For a Nuclear Emergency

Federal, state and local officials work together to develop site-specific emergency response plans for an ANO plant accident. These plans are tested through exercises that include protective actions for schools and nursing homes.

The plans also delineate evacuation routes, reception centers for those seeking radiological monitoring and locations of care centers for temporary lodging.

The State of Arkansas and local governments, with support from the federal government and utilities, develop plans that include a plume emergency planning zone with a radius of 10 miles from ANO, and an ingestion-planning zone within a radius of 50 miles from the plant.

Residents within the 10-mile emergency planning zone to ANO are regularly disseminated emergency information materials (via brochures, the phone book, calendars, utility bills, etc.). These materials contain educational information on radiation, instructions for evacuation and sheltering, special arrangements for the handicapped, contacts for additional information, etc. Residents should be familiar with these emergency information materials.

Radiological emergency plans call for a prompt Alert and Notification System. If needed, this prompt Alert and Notification System will be activated quickly to inform the public of any potential threat from natural or man-made events. This system uses sirens, tone alert radios, route alerting (the "Paul Revere" method), or a combination of these to notify the public to receive a message from an Emergency Alert System (EAS) station through their radios and televisions.

The EAS stations will provide information and emergency instructions for the public. If people are alerted, they should tune to their local EAS station which includes radio stations, television stations, NOAA weather radio and the cable TV system.

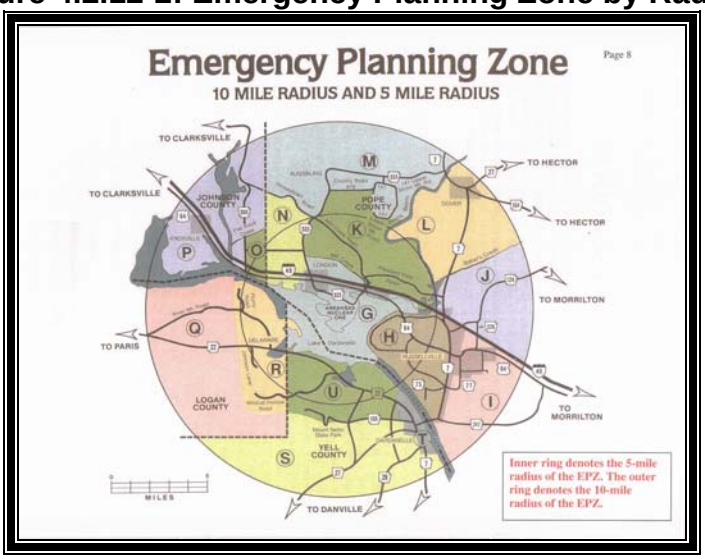
Special plans must be made to assist and care for persons who are medically disabled or handicapped. If a person lives within ten miles of a nuclear facility, they should notify and register with their local emergency management agency. Adequate assistance will be provided during an emergency.

In the most serious case, evacuations will be recommended based on particular plant conditions rather than waiting for the situation to deteriorate and an actual release of radionuclides to occur.

Geographic Area Affected by Arkansas Nuclear One (ANO)

Arkansas Nuclear One, a two-unit plant, sits at the base of the Ozark Mountains on Lake Dardanelle. It is located northwest of Little Rock, about five miles west of Russellville. The plant is located on a 1,100-acre site in Pope County. The Dardanelle Reservoir, a lake covering 34,300 acres, is used for the plant's cooling system. The counties of Pope Johnson, Logan and Yell are all found within the ANO 10 Mile EPZ. The towns of London, AR and Russellville, AR are the closest jurisdictions to the plant.

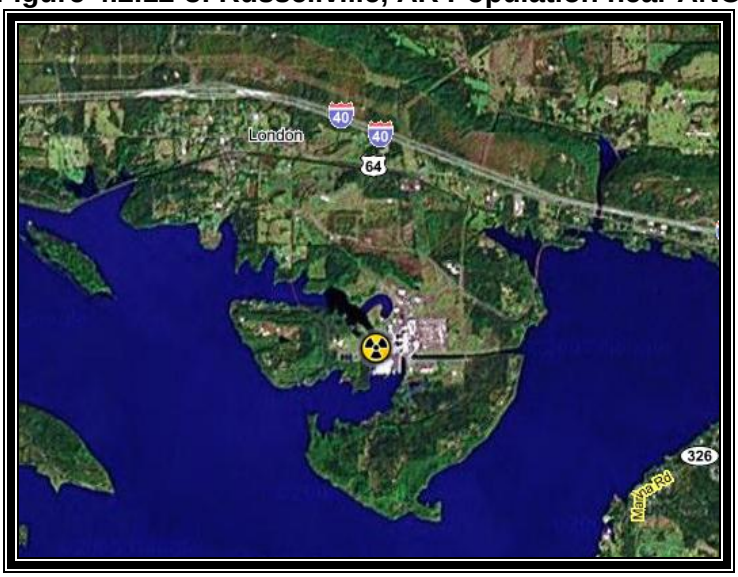
Figure 4.2.12-2: Emergency Planning Zone by Radius



Source: ANO

Based on the 2004 census, there are 23,682 people, 9,241 households, and 6,006 families residing in the city of Russellville, AR. Based on the 2004 census, there are 46,842 residents who live within 10 miles of ANO, 100,384 residents who live within 25 miles, and 265,719 within 50 miles.

Figure 4.2.12-3: Russellville, AR Population near ANO



Source: US Census

Previous Arkansas Nuclear One (ANO) Occurrences

There have been no previous major events recorded at Arkansas Nuclear One. However, there have been two major nuclear reactor events in other parts of the United States and the world which should be noted.

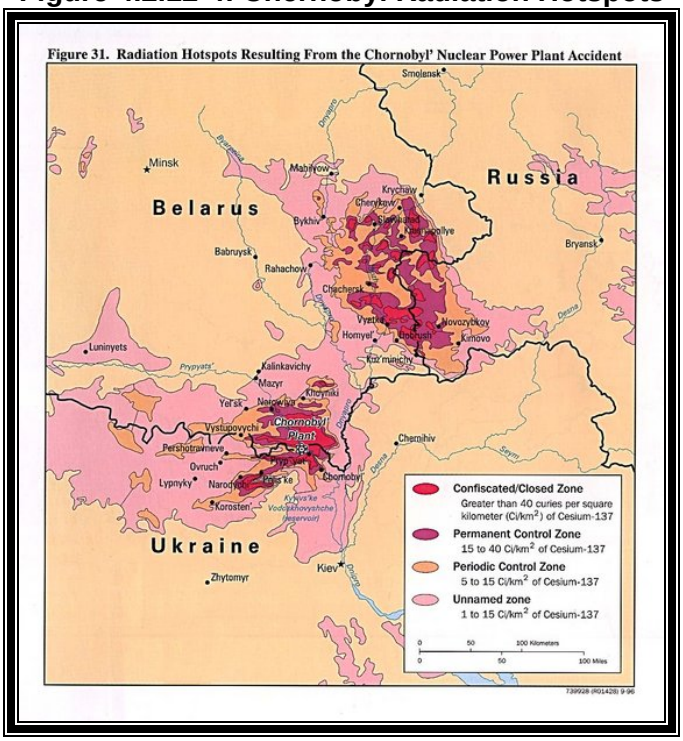
April 26, 1986: On Saturday, April 26, 1986, at 1:23:58 AM local time, the fourth reactor of the Chernobyl power plant—known as Chernobyl-4—suffered a catastrophic steam explosion that resulted in a fire, a series of additional explosions, and a nuclear meltdown.

The Chernobyl accident occurred at the Chernobyl in Ukraine (then part of the Soviet Union). It is regarded as the worst nuclear accident in the history of nuclear power, producing a plume of radioactive debris that drifted over parts of the western Soviet Union, Eastern Europe, Scandinavia, UK, and eastern USA. Large areas of Ukraine, Belarus and Russia were badly contaminated, resulting in the evacuation and resettlement of roughly 200,000 people.

About 60% of the radioactive fallout landed in Belarus. 203 people were hospitalized immediately, of whom 31 died (28 of them died from acute radiation exposure). Most of these were fire and rescue workers trying to bring the accident under control, who were not fully aware of how dangerous the radiation exposure (from the smoke) was. 135,000 people were evacuated from the area, including 50,000 from the nearby town of Pripyat. Health officials have predicted that over the next 70 years there will be a 2% increase in cancer rates in much of the population that was exposed to the radioactive

contamination released from the reactor. An additional 10 individuals have already died of cancer as a result of the accident.

Figure 4.2.12-4: Chernobyl Radiation Hotspots



Source: World Nuclear Association

The accident raised international concerns about the safety of the Soviet nuclear power industry, and forced the Soviet government to become less secretive. The now-separate countries of Russia, Ukraine and Belarus have been burdened with continued and substantial costs for decontamination and health care because of the Chernobyl accident. It is difficult to accurately tally the number of deaths caused by the events at Chernobyl, as most of the expected deaths from cancer have not yet actually occurred, and are difficult to attribute specifically to the accident. A 2005 UN report attributes 56 deaths until that point—47 accident workers and 9 children with thyroid cancer—and estimates that around 4,000 people will ultimately die from accident-related illnesses.

March 28, 1979: Three Mile Island is the location of a US nuclear power station that, on March 28, 1979, suffered a partial core meltdown. The Three Mile Island Nuclear Generating Station sits on the island in the Susquehanna River in Dauphin County, Pennsylvania, near Harrisburg, an area of 3.29 km² (814 acres).

The accident unfolded over the course of five tense days, as a number of agencies at the federal, state, and local levels attempted to diagnose the problem (the full details of the accident were not discovered until much later), and decide whether or not the on-going accident required a full evacuation of the population. In the end, the reactor was brought under control. No identifiable injuries due to radiation occurred (a government report concluded that "the projected number of excess fatal cancers due to the accident is approximately one."), but the accident had serious economic and public relations consequences, and the cleanup process was slow and costly. It also furthered a serious

decline in the public popularity of nuclear power, exemplifying for many the worst fears of nuclear technology. Until the Chernobyl accident seven years later, this was considered the world's worst civilian nuclear accident.

Three Mile Island Nuclear Reactors

The accident had a number of primary causes related to both technical malfunction and human error. The accident in the TMI-2 reactor (the plant had two reactors; TMI-1 was down for refueling at the time) began when the plant's main feedwater pumps in the secondary non-nuclear cooling system failed at about 4:00 AM on March 28, 1979. This failure was due to either a mechanical or an electrical failure in the condensate system and caused a reduction in feedwater flow which prevented the steam generators from removing heat. The auxiliary (backup) feedwater system had been inadvertently left valved-out after an earlier maintenance activity. First the turbine, then the nuclear reactor automatically shut down. Immediately, the pressure in the primary system (the nuclear portion of the plant) began to increase. In order to prevent that pressure from becoming excessive, the pressurizer relief valve (a valve located at the top of the pressurizer) opened. The valve should have re-closed when the pressure decreased by a small amount, but did not. The only signals available to the operators showed the valve as being closed, but in fact only the signal to close the valve was sent; the system did not check that the valve was actually closed. The "positive feedback" lamp in the control room indicating the true position of the valve (a Pressure Operated Relief Valve, or PORV) was eliminated in the original construction to save time and has been back-fitted to all other similar plants. As a result of this error in the design, this stuck-open valve caused the pressure to continue to decrease in the system.

Probability of Future Arkansas Nuclear One (ANO) Events

The probability of future events at ANO is rated as **"Unlikely"**. This is based on the low rate of nuclear site events that have occurred over time. The firm regulations upheld by the NRC, Entergy and staff at ANO, as well as the Nuclear Regulatory Commission's approach to risk analysis for nuclear reactors and their findings at ANO, ensure its safe operation. For assessing public safety and developing regulations for nuclear reactors

and materials, the NRC traditionally used a deterministic approach that asked "What can go wrong?" and "What are the consequences?" Now, new information for assessing risks also allows NRC to ask "How likely is it that something will go wrong?"

New techniques for measuring, analyzing and ranking public health risks make it possible for the NRC to incorporate “risk insights” into its regulations. By incorporating “risk insights” into its regulations and regulatory processes, NRC can focus the attention of its licensees on those design and operational issues most important to safety. This also allows them to move away from prescriptive regulations based on conservative engineering judgments toward regulations focused on issues that significantly contribute to safety.

Current NRC regulations are based largely on deterministic analyses developed without the benefit of quantitative or measurable estimates of risk. Most NRC regulatory requirements were developed in the early stages of reactor technology development and thus, were based on limited experience, testing programs, and expert judgment in conjunction with conservative design margins and the principle of defense-in-depth to protect public health and safety. The deterministic approach asks two questions: "What can go wrong?" and "What are the consequences?" This approach assumes that adverse conditions can occur and requires plant designs to include safety systems capable of preventing or minimizing accident consequences.

Although the deterministic approach has been successful in protecting public health and safety, probabilistic risk analysis (PRA) considers these questions in a more comprehensive manner by examining a more broad spectrum of initiating events and their frequency and now asks, "How likely is it that something will go wrong?" PRA then analyzes the consequences of the scenarios and ranks the consequences by their frequency, giving a measure of risk. Below are excerpts from NRC’s Strategic Plan, specifically Nuclear Reactor Safety Performance Goal Bullets 3 and 4 that talk about how they begin the evaluation of reaching the PRA.

- Evaluate operating experience and the results of risk assessments for safety implications.

We will evaluate the risk significance of operational events and trends in data in conjunction with risk assessments so that safety vulnerabilities can be identified, prioritized, communicated, and resolved on a timely basis. Operational experience will also be used by the staff to improve our regulatory activities including licensing, inspection and risk assessments. We will also review operating experience of foreign plants for safety insights. We will monitor for potential adverse effects on nuclear safety from the economic deregulation and restructuring of the electric power industry.

- Identify, evaluate, and resolve safety issues, including age-related degradation, and ensure that an independent technical basis exists to review licensee submittals to ensure that safety is maintained.

We will conduct research to improve our knowledge in areas where uncertainties in our knowledge exist and may be significant to risk and where safety margins are not well characterized. Priorities for these activities will consider risk significance and cost/benefit analyses. For example, we will evaluate potential degradation of plant systems as they

age and ensure that data and methods, including international lessons learned, are available to evaluate this degradation and the effectiveness of corrective strategies. We will continue our international efforts to collect and evaluate information that contributes to the efficient resolution of domestic safety issues. We will conduct research in cooperation with domestic and international entities to ensure that an adequate independent technical basis, as well as related codes, standards and methods exists to review and approve licensee or industry proposals. This will be especially important as new technologies are introduced. For complex technical issues, we will develop a better understanding of existing safety margins, resulting in more informed regulatory decisions. We will maintain our program for generic safety issue prioritization based on consideration of potential risk reduction and cost.

The amount of radioactivity released by a nuclear power plant is monitored continuously to be sure it doesn't go above allowed levels. The same sophisticated monitoring equipment provides exact information about any accidental release. The risk to the public from radioactivity released from nuclear power plants is much smaller than the risk we receive naturally every day. Nuclear plants add less than one percent of our total background radiation exposure.

4.2.13 Terrorism Event Hazard Profile

Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." It is the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Terrorists often use threats to create fear among the public, to try to convince citizens that their government is powerless to prevent terrorism, and to get immediate publicity for their causes.

When terrorism strikes, communities may receive assistance from both state and federal agencies under the existing Integrated Emergency Management System, the Department of Homeland Security is the lead federal agency for supporting state and local response to the consequences of terrorist attacks.

Terrorism is often categorized as "domestic" or "international."

Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction.

International terrorism involves groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside the United States or whose activities transcend national boundaries.

This distinction refers not to where the terrorist act takes place but rather to the origin of the individuals or groups responsible for it. For example, the 1995 bombing of the Murrah Federal Building in Oklahoma City was an act of domestic terrorism, but the attacks of September 2001 were international in nature. For the purposes of consequence management, the origin of the perpetrator(s) is of less importance than the impacts of the attack on life and property; thus, the distinction between domestic and international terrorism is less relevant for the purposes of mitigation, preparedness, response, and recovery than understanding the capabilities of terrorist groups and how to respond to the impacts they can generate.

In the United States, most terrorist incidents have involved small extremist groups who use terrorism to achieve a designated objective. Local, state and federal law enforcement officials monitor suspected terrorist groups and try to prevent or protect against a suspected attack. Additionally, the US government works with other countries to limit the sources of support for terrorism.

Before the September 11, 2001 attacks in New York and the Pentagon, most terrorist incidents in the United States have been bombing attacks, involving detonated and un-detonated explosive devices, tear gas, and pipe and fire bombs. The effects of terrorism can vary significantly from loss of life and injuries to property damage and disruptions in services such as electricity, water supply, public transportation and communications. One way governments attempt to reduce our vulnerability to terrorist incidents is by increasing security at airports and other public facilities.

While we can never predict what target a terrorist will choose, we do know some of the factors they use when selecting a target. Terrorists want to achieve one or more of the following:

- Produce a large number of victims
- Attack places that have a symbolic value
- Get the greatest possible media attention
- Produce mass panic

Terrorists also select targets best suited for the type of material being used. For example, some biological agents are not effective in sunlight. Most chemical agents are more effective indoors with limited airflow. A radioactive material will be most effective where large numbers of people will pass close by without detecting it. Terrorists are likely to target heavily populated, enclosed areas like stadiums, government buildings, sporting events, airport terminals, subways, shopping malls and industrial manufacturing facilities. For this reason, it is critical that employers and local government agencies have some type of anti-terrorism plan in place should a terrorist act occur.

A terrorist attack can take several forms, depending on the technological means available to the terrorist, the nature of the political issue motivating the attack, and the

points of weakness of the terrorist's target. Bombings have been the most frequently used terrorist method in the United States. Other possibilities include an attack at transportation facilities, an attack against utilities or other public services or an incident involving chemical or biological agents.

Terrorist incidents in this country prior to the September 11, 2001 attack have included bombings of the World Trade Center in New York City, the United States Capitol Building in Washington, D.C. and Mobil Oil corporate headquarters in New York City.

U.S. Counterterrorism Policy

Make no concessions to terrorists and strike no deals;

1. Bring terrorists to justice for their crimes;
2. Isolate and apply pressure on states that sponsor terrorism to force them to change their behavior; and
3. Bolster the counterterrorism capabilities of those countries that work with the US and require assistance.

Terrorism in Arkansas

Although Arkansas may seem remote from sites of recent terror in New York and Washington D.C., Arkansas is considered equally vulnerable, as are other areas of the homeland because the chief objective of the terrorist is to spread fear and create economic damage. The state realizes that there is appropriate concern that a Weapons of Mass Destruction (WMD)/Terrorist event is possible. The open availability of basic shelf-type chemicals and mail order biological research materials, coupled with access to even the crudest laboratory facilities, could enable the individual extremist or an organized terrorist faction to manufacture proven highly lethal substances or to fashion less sophisticated weapons of mass destruction. The use of such weapons could result in mass casualties and long-term contamination, and could wreak havoc to both the state and national economies. A terrorist attack could come in many forms including explosives, infectious diseases, organisms that create toxins, chemical releases or radiological releases.

Unlike natural disasters, there is no method to predict the time or place of a WMD/Terrorist event. This fact negates the "watch" and "warning" time phases. The action phases for a WMD/Terrorist event will be Mitigation, Response, and Recovery.

1. **Mitigation Phase**
    a. The actions during this phase are those that require time to carry out. They include mitigation, training, planning, public awareness and any activities that require long-term programs to accomplish their objectives.
    b. These pre-disaster activities take place in the normal living and working environments of the participants.

2. **Response Phase**
    a. The actions during this phase are those emergency response activities taken during the first 72 hours to a few weeks after the incident.
    b. These actions are those taken immediately after an incident with the major goal of saving lives, alleviating suffering and preventing further disaster.
    c. When responding to disaster events, the National Incident Management System (NIMS) will be used by trained /qualified staff to manage the response actions.
3. **Recovery Phase**
    a. The actions during this phase are those taken during the first one to two months after the incident.
    b. These actions that begin immediately after the emergency response operations have the goal of returning the state and citizens to normal conditions.
    c. The emphasis will pass from life-saving to cleanup of the affected areas and returning people to normal activities.

The bombing of the Murrah Federal Building in Oklahoma City made it clear that the risk of terrorism in Arkansas is a viable one. Since Arkansas is primarily rural, terrorists could very well gather materials, make plans and carry out those plans undetected. Additionally, the people of Arkansas are, by nature, friendly and trusting. This particular type of atmosphere could be viewed by a terrorist as an invitation to violence. And it isn't hard for anyone to get the necessary materials needed to carry out a terrorist attack. The know-how to assemble weapons and deliver them is easily found – often on the Internet. And a laboratory isn't needed – they can be made in a kitchen often in a vessel the size of a mayonnaise jar.

There are several locations in Arkansas that could be very attractive targets to a terrorist. The state has a nuclear power plant, a chemical weapons storage facility, numerous railroad bridges and trestles and ocean-bound river traffic on the Mississippi, Ouachita, White and Arkansas Rivers. Commercial trucks haul toxic chemicals throughout Arkansas. Furthermore, the state has a number of large arenas that could be targets of a terror attack.

The Arkansas Department of Emergency Management and Homeland Security have identified 14 critical infrastructure and key resource (CI/KR) locations within the state which they determine to be credible targets for terrorist events. The data and details of these 14 structures cannot be provided within the mitigation plan due to the sensitivity of the data. Structures selected to the CI/KR list are eligible for additional government grant funding to increase their security against a terrorist event. One example of funding that CI/KR sites qualify for is the Buffer Zone Protection Program (BZPP). IN FY05, Arkansas received $700,000 in allocated BZPP grant funding.

Buffer Zone Protection Program

The Protective Security Division (PSD) is responsible for supporting the efforts of the U.S. Department of Homeland Security (DHS) to reduce the nation's vulnerability to terrorism and deny the use of U.S. critical infrastructure and key resources (CI/KR) as a weapon. In support of this objective, PSD is developing, coordinating, integrating and implementing plans and programs that identify, catalog, prioritize, and protect CI/KR in cooperation with all levels of government and partners in the private sector. The purpose of PSD's Buffer Zone Protection Plan (BZPP) Program is to make it more difficult for terrorists to conduct planning activities or successfully launch attacks from the immediate vicinity of CI/KR targets. The program is based on the premise that local law enforcement (LLE) agencies and first preventers are on the front lines preventing, defending against, preparing for, and mitigating the impacts of terrorist attacks against our nation. To this end, the BZPP Program is designed to increase the general protective capacity and preparedness of LLE and first preventers in communities surrounding CI/KR facilities by: 1) Establishing buffer zones around individual assets, 2) Developing Vulnerability Reduction Purchasing Plans (VRPPs) that identify equipment needed by LLE to protect these assets effectively, 3) Providing LLE with the financial resources necessary to execute approved VRPPs, and 4) Verifying and validating that equipment purchases are adequately mitigating vulnerabilities identified in the individual Buffer Zone Protection Plans (BZPPs).

During the period from 2002-2005, the current funding formula brought almost $70 million to Arkansas. In 2003, the state received almost $10 per person, $3 above the national average and twice as much per person as California or New York. Arkansas strictly followed federal guidelines on how first-responder money could be spent.

The BZPP allocated $577,000 to Arkansas in 2007, this number decreased to $400,000 in 2009.

Weapons of Mass Destruction (WMD)
Nuclear, Biological and Chemical

Weapons of mass destruction are defined as (1) Any destructive device as defined in 18 U.S.C., Section 2332a, that includes any explosive, incendiary, or poison gas, bomb, grenade, rocket having a propellant charge of more than four ounces, missile having an explosive or incendiary charge of more than one quarter ounce, mine or device similar to the above; (2) Poison gas; (3) Any weapon involving a disease organism; or (4) Any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.

Although bombs are still the weapon of choice for most terrorists, many are beginning to use nuclear, biological and chemical weapons for their terrorist acts. The ways they spread these contaminants varies on the type used. They may use spraying devices like fire extinguishers or spray bottles. For an attack on a wider area, terrorists may use crop dusting techniques or introduce the agent into the heat and air conditioning system of a building. They may use an explosive device, breaking device or fan. Terrorists may even sabotage a rail car or truck carrying toxic chemicals. They may contaminate food or water supplies. The terrorist wants to figure out how to reach the maximum number of people with the minimum amount of nuclear, biological or chemical materials.

WMD-Nuclear

Nuclear materials are those that produce radiation. Radiation is all around us, both natural and man-made. Natural radiation comes from the sun, soil and even the human body. Man-made radiation comes from medical devices, like x-ray machines, and also from nuclear power plants. We all are exposed to low levels of radiation at one time or another, but the danger in a nuclear terrorist attack comes with the amount and type of radiation given off.

Effects

The effects of a nuclear attack depend on how much radiation is received, how long someone is exposed to the radiation and how the radiation entered the body. For example, there would be a difference in the effects if someone drank radiation-contaminated water or if they were in the path of a nuclear explosion.

How radiation enters the body:

- Breathing it in.
- Swallowing contaminated food or water.
- Absorbed through the skin.
- Penetrating radiation that affects organs and blood.

Symptoms

Signs and symptoms of radiation exposure depend on the amount of radiation received and the length of exposure. Victims exposed to deadly or extremely high doses of radiation in a short period of time – seconds to minutes – will display symptoms that can be recognize.

- Burned, reddened skin.
- Nausea, vomiting, diarrhea.
- Hair loss.
- Convulsions and unconsciousness.

Exposure to non-deadly doses may produce similar symptoms, but take longer to show up. Exposure to low doses of radiation will take 15 – 20 years for the medical effects such as vision loss and cancer to appear. Radiation also affects people differently depending on their age, gender and overall health. Other health effects include:

- Brain swelling.
- Blood chemistry changes.
- Internal organ and tissue damage.

Indicators of a Nuclear Attack

Nuclear attacks are very dangerous because radiation is invisible and odorless and requires special devices for detection. Unless signs saying “Radioactive” are visible or a person witnesses a nuclear explosion, it is almost impossible to know that radiation is present or that people may have been exposed. Victims of this type of attack can often

survive provided they are quickly decontaminated (washed or cleaned off) and medically treated as soon as possible.

WMD-Biological

Biological agents are actually living organisms or the products of living organisms and they can be deadly. Biological agents can go undetected for hours to days. Signs and symptoms might initially look like a bad cold, flu or other common illness. Some agents can be extremely lethal in very small quantities. Biological weapons fall into three categories: bacteria, viruses and toxins with bacteria and viruses causing diseases whereas toxins are poison. All three types can potentially be deadly.

Effects

Bacteria and viruses cause diseases such as anthrax, smallpox and cholera. Toxins are poisonous products of living organisms. Examples include snake and scorpion venom and food poisoning that are caused by a bacteria-produced toxin.
How biological agents enter the body:

- Breathing it in.
- Breaks in the skin.
- Injection.
- Eating or drinking.

Symptoms

Signs and symptoms are different for each agent and each agent will affect people differently. Young children, elderly and chronically ill victims are more likely to be severely affected by these agents. Some common general symptoms may include:

- Coughing, flu-like symptoms.
- Shortness of breath.
- Weakness or fatigue.
- Vomiting.
- Diarrhea.

Indicators of a Biological Attack

Biological agents can take hours or days to produce an effect and make people sick. If the agent is contagious and the victims are experiencing flu symptoms, those people could infect others without even knowing they had been exposed. Victims can survive in most cases as long as they are identified in time and medically treated.

WMD-Chemical

Chemical warfare agents are substances specifically designed to kill, seriously injure or disable people. They can be similar to many household chemicals such as insect killer, but are hundreds of times more hazardous. In general, terrorists use chemical agents

because they are relatively easy and cheap to make. They work very fast – within minutes and will cause mass injury, panic and death using very small amounts.

These agents were originally designed for the military as weapons of war. Their use in World War I and other combat situations proved their effectiveness. This effectiveness is what attracts terrorists.

Effects

Most chemical agents, depending on their type, concentration and length of exposure, can be deadly. Some attack the central nervous system like nerve gas and incapacitating agents. Some, such as blood and choking agents, attack the respiratory system. Blistering agents and riot control agents affect the skin, eyes and mucous membranes by direct contact. Blister and riot control agents such as tear gas, mace and pepper sprays can also affect the respiratory system.

Some of these chemical agents, with slight modification, have industrial or commercial applications. For example the same chlorine we use to disinfect swimming pools was the first chemical warfare agent used in World War I as a choking agent.
How chemical agents enter the body:

- Breathing it in.
- Direct contact with skin and eyes.
- By eating or drinking.

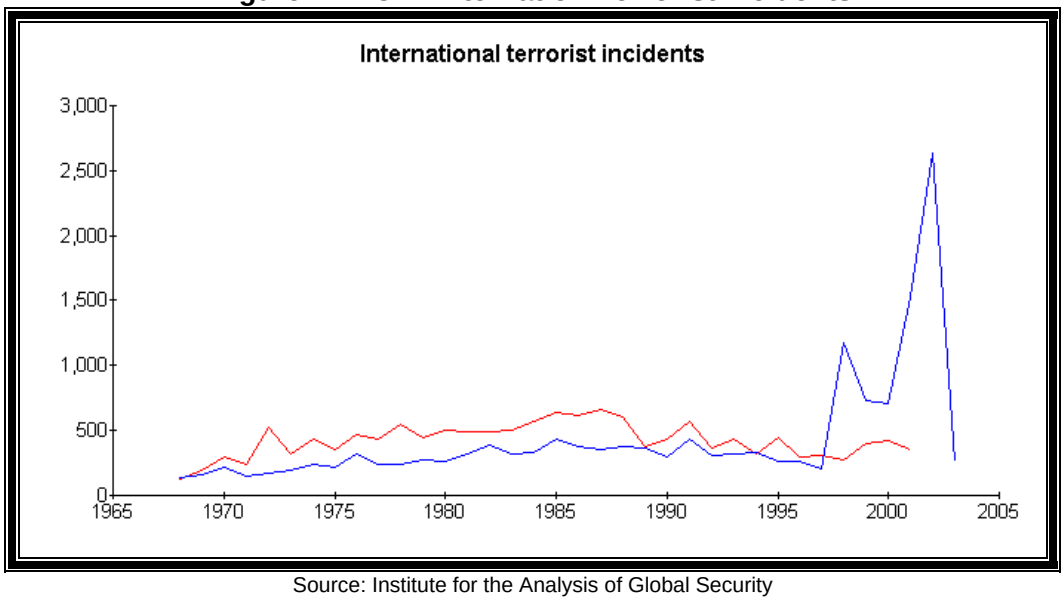
Symptoms

Each chemical agent has different effects on people depending on the amount and duration of exposure, how it gets into the body, and its concentration. However, in general, people exposed to these chemical agents will share common physical signs and symptoms.

- Red or irritated eyes and skin.
- Choking and coughing.
- Shortness of breath or tightening of the chest.
- Vomiting and nausea.
- Runny nose.
- Dizziness or loss of consciousness.
- Convulsions or seizures.
- Pinpointed pupils and dimness of vision.

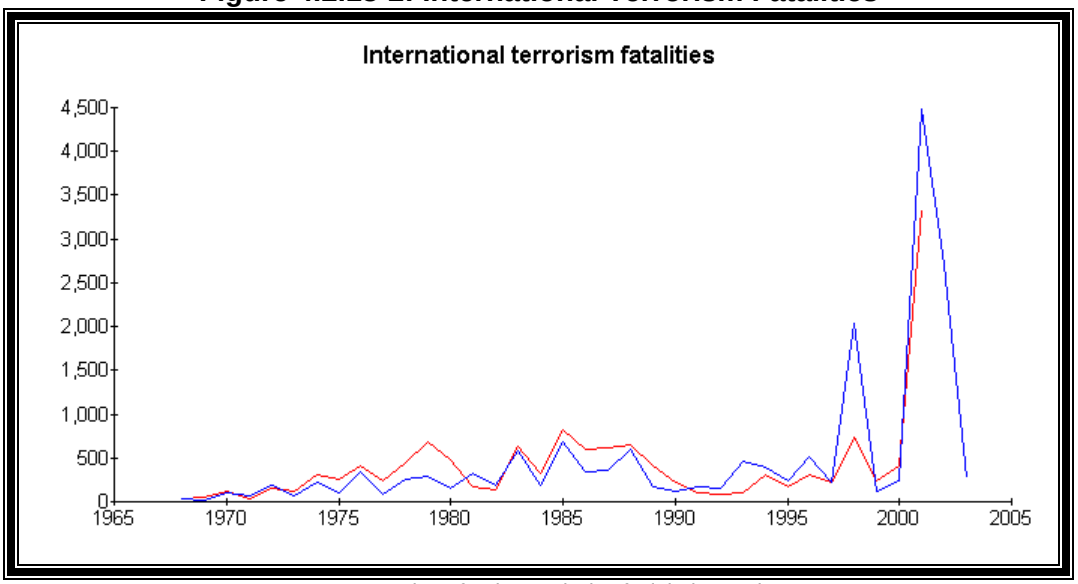
Unlike nuclear and biological materials, some chemical agents tend to cause symptoms in people in seconds to minutes. Some of these symptoms are similar to a heart attack or other illness. However, if there are several people in an area with the same signs and symptoms, it is highly unlikely that they are all having a heart attack. It is possible they have been exposed to a chemical agent.

Figure 4.2.13-1: Internation Terrorist Incidents



Source: Institute for the Analysis of Global Security

Figure 4.2.13-2: International Terrorism Fatalities



Source: Institute for the Analysis of Global Security

Red indicates U.S. Department of State data
Blue indicates National Memorial Institute for the Prevention of Terrorism data

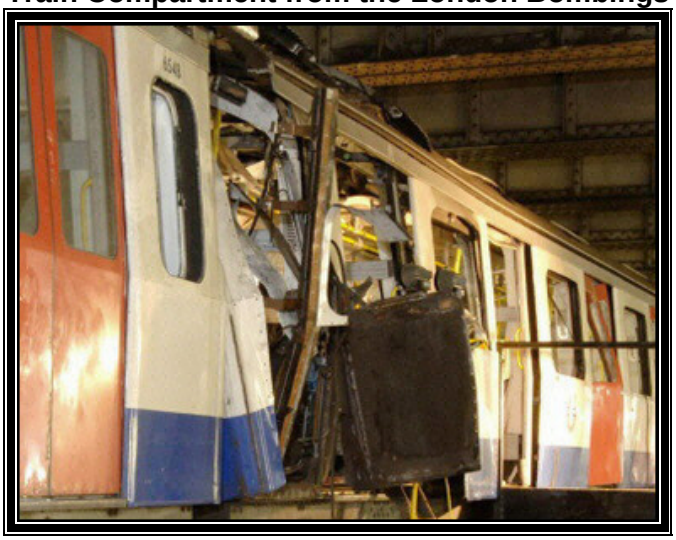
Previous Terrorism Occurrences

December 25, 2009 (International Terrorism): A man, later identified as having ties to al Qaeda, boarded a plane with a small bomb stitched into his underwear. The man spent a rather long time in the restroom and when he returned to his seat he covered himself in a blanket. Shortly after, the blanket and the wall of the plane caught on fire.

After being subdued by other passengers, the man was asked what he had in his pocket to which he responded “explosive device.” Luckily the explosives were never detonated.

***July 7, 2005 (International Terrorism)*:** On Thursday, July 7, 2005 a series of four suicide bombings struck London's public transport system during the morning rush hour. At 8:50 AM (BST, UTC+1), three bombs exploded within 50 seconds of each other on three London Underground trains. A fourth bomb exploded on a bus at 9:47 AM in Tavistock Square. The bombings led to a severe, day-long disruption of the city's transport and mobile telecommunications infrastructure.

Train Compartment from the London Bombings



Fifty-six people were killed in the attacks, including the four suspected bombers, with 700 injured. The incident was the deadliest single act of terrorism in the United Kingdom since the 1988 bombing of Pan Am Flight 103 (which killed 270), and the deadliest bombing in London since the Second World War.

***December 22, 2001 (International Terrorism)*:** On December 22, 2001, passengers on Flight 63 complained of a smoke smell in the cabin shortly after a meal service. One flight attendant, thinking she smelled a burnt match, walked the aisles of the plane, trying to assess the source. A passenger pointed to another passenger, who was sitting alone near a window and attempting to light a match. The flight attendant warned him that smoking was not allowed on the airplane. The man then promised to stop. A few minutes later, the attendant found the passenger leaned over in his seat. Her attempts to get his attention failed. After asking "What are you doing?" the man grabbed at her, revealing one shoe in his lap, a fuse which led into the shoe, and a lit match. She tried grabbing him twice, but he pushed her to the floor each time, she yelled for help, and then ran to get water. When another flight attendant arrived to try to subdue him, he fought her, bit her thumb and one attendant threw water in his face. The 6 foot 4 inch (193 cm) tall, 200+ pound passenger was next subdued by several passengers on the airliner, and then bound up using plastic handcuffs, seatbelt extensions, and headphone cords. A physician on board the airliner administered to him a tranquilizer that he found in the

emergency medical kit of the airliner. This flight was immediately diverted to the Logan International Airport in Boston, Massachusetts, a closer airport than its destination.

The explosive apparently did not detonate due to the one-day delay in the take-off of the mans flight. He had worn his shoes for more than one day, and his accumulated foot perspiration caused the fuse to be too damp to ignite.

October/November, 2001 (Domestic Terrorism): Two waves of threat letters signed by the Army of God and claiming to contain anthrax were sent to abortion clinics and women's health centers. The first wave was sent through the US Postal Service; the second wave was sent by Federal Express. To date, the FBI Laboratory has received over 200 of these letters. Chemistry Unit personnel examined the powders and determined them to be flour and chalk dust. None tested positive for anthrax.

September 11, 2001 (International Terrorism): The September 11 attacks were a series of coordinated suicide attacks upon the United States of America in which hijackers simultaneously took control of four US domestic commercial airliners. The hijackers crashed two planes into the World Trade Center in Manhattan, New York City — one into each of the two tallest towers, about 18 minutes apart — shortly after which both towers collapsed. The hijackers crashed the third aircraft into the U.S. Department of Defense headquarters, the Pentagon, in Arlington County, Virginia. The fourth plane crashed into a rural field in Somerset County, Pennsylvania, 80 miles (129 km) east of Pittsburgh, following passenger resistance. The official count records 2,986 deaths in the attacks including the hijackers.

Smoke billows across the New York skyline on 9/11

July 27, 1996 (Domestic Terrorism): At the 1996 Olympics, a homemade bomb detonated at about 1:25 AM, sending shrapnel flying into the crowd. The incident occurred at Centennial Olympic Park, where thousands of visitors had gathered on the ninth day of the 1996 Summer Olympics. The bomb, placed near the main stage in the park, injured more than 100 people, many of them permanently, and killed Alice Hawthorne, a mother who had traveled to Atlanta with her daughter to see the Olympics. A Turkish cameraman, Melih Uzunyol, died of a heart attack responding to the blast.

April 19, 1995 (Domestic Terrorism): The Alfred P. Murrah Federal Building, a United States Government complex located in downtown Oklahoma City, Oklahoma on 200 N.W. 5th Street, was the target of the Oklahoma City bombing in 1995. On the morning of April 19, 1995, Timothy McVeigh parked a rented Ryder truck with explosives in front

of the complex and, at 9:02 AM. CDT (14:02 UTC), a massive explosion occurred which sheared the entire north side of the building, killing 168 people. The bombing was the most destructive incident of terrorism on American soil until the September 11, 2001 terrorist attacks in New York, Washington, D.C., and Pennsylvania. It still remains the deadliest domestic terrorist attack in American history.

Murrah Federal Building in Oklahoma City

March 20, 1995 (International Terrorism): On March 20, 1995 the Tokyo Subway sarin gas attack occurred killing nearly a dozen people and incapacitating or injuring approximately 5000 others. The incident involved six devices disguised as a soft drink can, a briefcase, a white plastic bag, and a gas can wrapped in newspaper. These were set to go off on five different subway cars on three different lines; Marunouchi, Hibiya, and Chiyoda, all of which were en route to Tokyo's government center Kasumigaseki, where the national police headquarters is located. The group most likely responsible for the incident was Aum Shinrikyo, a religious cult headed by Shoko Asahara.

***February 26, 1993 (International Terrorism*)**: There was an attack in the garage of the New York City World Trade Center on February 26, 1993. A car bomb was planted by Islamist terrorists in the underground parking garage below Tower One. It killed six, injured over 1,000 and presaged the September 11, 2001 attacks on the same buildings. The goal of the attack was to devastate the foundation of the north tower in such a way in that it would collapse onto its twin.

Underground Garage of the WTC after the Bombing

December 21, 1998 (International Terrorism): Pan Am Flight 103 was Pan American World Airway's second daily regularly scheduled transatlantic flight from London's Heathrow International Airport to New York's John F. Kennedy International Airport. On December 21, 1988, the aircraft flying this route, a Boeing 747-100 registered N739PA and named "Clipper Maid of the Seas," was blown up as it flew over Lockerbie, Dumfries and Galloway, Scotland.

Pan Am Flight 103 Wreckage

Twelve to 16 ounces (340 to 450 g) of plastic explosive was detonated in its forward cargo hold, triggering a sequence of events that led to the rapid destruction of the aircraft, winds of 100 knots (190 km/h) scattered passengers and debris along a 130 km (81 mile) corridor over an area of 845 square miles (2189 km^2). Two hundred and seventy people from 21 countries died, including 11 people on the ground.

After a three-year joint investigation by the Scottish Dumfries and Galloway Constabulary and the U.S. Federal Bureau of Investigation, during which 15,000 witness statements were taken, indictments for murder were issued on November 13, 1991, against Abdelbaset Ali Mohmed Al Megrahi, a Libyan intelligence officer and the head of security for Libyan Arab Airlines (LAA), and Al Amin Khalifa Fhimah, the LAA station manager in Luqa Airport, Malta.

August, 1984 (Domestic Terrorism): A white supremacist group attached a bomb to a pipeline in Arkansas in an attempt to blow it up. The bomb was secured incorrectly and

caused no damage to the pipeline. The blast from the bomb blew outward away from the pipeline rather than inward.

Probability of Future Terrorism Events

There is no sure way to predict future terrorism events. The probability of a major terrorist event in the State of Arkansas is very low, however planning must be done as part of the larger national Homeland Security initiatives. The probablitly for this hazard based on past occurrences is considered **"Unlikely"**.

4.2.14 Biological Risk Assessment

This Biological Risk profile was not a part of the original natural hazard plan developed in 2004. This profile was added during the 2006 revision in order to meet the EMAP standards for man-made and technological hazards. The HMP Sub-Committee reviewed this profile again as part of the 2007 revision, and again for the 2010 revision for FEMA's three-year review. The committee has updated this section and added new information when relevant. This hazard profile and the subsequent vulnerability analysis are the primary tools for the determination of the state's mitigation strategy with respect to biological events.

Biological Risk Profile

Biological hazards have always been a real and present danger for human civilizations. A large number of diseases have occurred throughout history with devastating effects on populations, economies and cultures. The following list summarizes some of the worst biologically related pandemics on record throughout human history.

430 BC, the plague of Athens: Resulted from 200,000 inhabitants and villagers fleeing into Athens when threatened by the Spartans. An unidentified infectious agent, from Ethiopia via Egypt, killed one third of this population and ended the Golden Age of Athens.

166 AD, the Antonine plague: Was brought to Rome from Syria by returning Roman troops. The plague had been introduced to Syria from India by the marauding Huns. The plague (probably small pox, bubonic plague, and measles) devastated the Roman Empire, killing 4–7 million people throughout Europe. The resulting social and political upheaval led to the collapse of the Roman Empire.

Circa 160 AD, ***bubonic plague*** **("Barbarian boils"):** Carried by invaders from the north, led to the collapse of the Han Empire in China.

1346 to 1350, bubonic plague: The pandemic started in China and moved along the trade routes through South Russia to the Crimea, which was besieged at the time. This bubonic plague killed more than one third of the population of Europe.

1492, influenza, small pox, tuberculosis and gonorrhea: Began when Columbus went to the Caribbean. The local inhabitants did not have immunity to these endemic European infections, and as a consequence, the 8 million people on the island of Hispaniola (where Columbus first set foot in the New World) died. Replacement of the population by African slaves introduced African infectious diseases such as malaria and

yellow fever into the Caribbean and Americas, which, in turn, killed many European settlers.

1542, bubonic plague: Started in Egypt, killed 40% of the population of Constantinople, and spread all over Europe.

Early trading period, "blackwater" fever (malaria), yellow fever, bloody flux (dysentery), and worm infestations: Trading with the continent of Africa was made difficult by a large number of these ”new” diseases. The impact on travelers and soldiers was so severe that Africa was called “the white man’s grave.”

16th-century: Similarly devastating epidemics with European and then African infections--introduced by the Spanish into Central and South America. After the Spanish invasion, the population of Mexico decreased by 33% in 10 years and by 95% in 75 years.

As trade journeys lengthened: Chronic infections such as tuberculosis and venereal diseases--introduced by European sailors to the Pacific islands, which lost 95% of their population as a result.

Present time: Lyme disease and Rocky Mountain spotted fever (in the United States), and AIDS, genital herpes, and Chlamydia (worldwide)--even during the past few decades, there has been a resurgence of epidemics.

Now in modern times, this threat is still very prevalent and has also magnified due to the interconnectedness of humanity through improved transportation. The Arkansas Hazard Mitigation Planning Sub-Committee considers biological hazards to be a real concern for the state and has elected to conduct a full risk assessment and vulnerability/impact analysis related to this threat for inclusion in the State’s Hazard Mitigation Plan.

Biological Hazard Working Group

The Hazard Mitigation Planning Sub-Committee, formed largely from the existing Arkansas Pre-Disaster Mitigation Advisory Council, was established in December of 2002 with the goal of assisting in the development of a DMA 2000 compliant State Hazard Mitigation Plan approved by FEMA. This Hazard Mitigation Planning Sub-Committee has added a number of new members to the team to assist with the ranking and assessment of the various biological hazards. These subject matter experts have provided information about biological threats in general and the specifics related directly to the State of Arkansas. By working with these experts the HMP Sub-Committee has been able to fully address this hazard and develop a viable and comprehensive mitigation strategy for responding and recovering from epidemics. The following lists the members of this working group:

Table 4.2.14-1: Hazard Mitigation Planning Sub-Committee

Aaron Adams	Training and Exercise Coordinator	501-730-9856
Dr. George Badley	State Veterinarian	501-907-2400
Bruce Thomasson	Hospital Grants Coordinator	501-280-4827
Jo Ann Bolick	Health Workforce Development Coordinator	501-661-2747
Karen Gray	Data Processing – Livestock and Poultry Commission	501- 907-2411
Frank Jones	Director of the University of Arkansas - Center for Excellence for Poultry Science	479-575-5443

Specific objectives of the committee include:

- Performance of statewide risk assessments for the purpose of identifying biological hazards and their potential for damage.
- Establishment of vulnerability in terms of jurisdictions most threatened by the various biological hazards.
- An overview of potential losses.
- Development of a comprehensive mitigation strategy that provides for the identification, evaluation, and prioritization of cost-effective measures. These must be environmentally sound, technically feasible, and reduce the losses associated with each identified bio-hazard.
- Technical assistance on sound mitigation techniques and policy.
- Providing a method for monitoring, evaluating and updating the State Mitigation Plan.
- Evaluation and improvement of state laws, regulations, policies and programs related to biological mitigation activities in the state.

Types of Biological Hazards

The HMP Sub-committee has identified and ranked all the various biological-related hazards that may potentially affect the state. A variety of factors have been considered including the following:

- Methods of transmission.
- Naturally occurring and human-caused.
- Human diseases and animal-related illnesses.

Methods for Transmission

There are two major types of infectious diseases that can develop into epidemics: common source and host-to-host. Common source epidemics arise from a contaminated source, such as water or food, while host-to-host infections are transmitted from one infected individual to another via various, perhaps indirect, routes. Each of these different types of infection has factors that affect the response, surveillance, quarantine and treatment. The following chart lists some of the most common infectious diseases and their typing for transmission.

Table 4.2.14-2: Commom Source Epidemic Diseases

Common Source Epidemic Diseases			
Disease	**Causative Agent**	**Infection Sources**	**Reservoirs**
Anthrax	*Bacillus anthracis* (B)	Milk or meat from infected animals	Cattle, swine, goats, sheep, horses
Bacillary Dysentery	*Shigella dysenteriae* (B)	Fecal contamination of food and water	Humans
Botulism	*Clostridium botulinum* (B)	Soil-contaminated food	Soil
Brucellosis	*Brucella melitensis* (B)	Milk or meat from infected animals	Cattle, swine, goats, sheep, horses
Cholera	*Vibrio cholerae* (B)	Fecal contamination of food and water	Humans
Giardiasis	*Giardia* spp. (P)	Fecal contamination of water	Wild mammals
Hepatitis	Hepatitis A,B,C,D,E (V)	Infected humans	Humans
Paratyphoid	*Salmonella paratyphi* (B)	Fecal contamination of food and water	Humans
Typhoid Fever	*Salmonella typhi* (B)	Fecal contamination of food and water	Humans

Table 4.2.14-3: Host to Host Epidemics

Host-to-host Epidemics			
Disease	**Causative Agent**	**Infection Sources**	**Reservoirs**
Respiratory Diseases			
Diphtheria	*Corynebacterium diphtheriae* (B)	Human cases and carriers; infected food	Humans
Hantavirus Pulmonary Syndrome	Hantavirus (V)	Inhalation of contaminated fecal material	Rodents
Meningicoccal meningitis	*Neisseria eningitides* (B)	Human cases and carriers	Humans
Pneumonococcal Pneumonia	*Streptococcus*	Human carriers	Humans

	pneumoniae (B)		
Tuberculosis	*Mycobacterium tuberculosis* (B)	Sputum from human cases; contaminated milk	Humans, cattle
Whooping Cough	*Bordetella pertussis* (B)	Human cases	Humans
German Measles	Rubella virus (V)	Human cases	Humans
Influenza	Influenza virus (V)	Human cases	Humans, animals
Measles	Measles virus (V)	Human cases	Humans
Sexually transmitted diseases			
HIV-Disease	HIV (V)	Infected body fluids, blood, semen, etc.	Humans
Chlamydia	*Chlamydia trachomatis* (B)	Urethral, vaginal, and anal secretions	Humans
Gonorrhea	*Neisseria gonorrheae* (B)	Urethral and vaginal secretions	Humans
Syphilis	*Treponema pallidum* (B)	Infected exudate or blood	Humans
Trichomoniasis	*Trichomonas vaginalis* (P)	Urethral, vaginal, prostate secretions	Humans
Vector-borne diseases			
Epidemic Typhus	*Rickettsia prowazekii* (B)	Bite by infected louse	Humans, lice
Lyme Disease	*Borrelia burgdorferi* (B)	Bite from infected tick	Rodents, deer, ticks
Malaria	*Plasmodium* spp. (P)	Bite from infected Anopheles mosquito	Humans, mosquitoes
Plague	*Yersinia pestis* (B)	Bite by infected flea	Wild rodents
Rocky Mountain Spotted Fever	*Rickettsia rickettsii* (B)	Bite by infected tick	Ticks, rabbits, mice

Direct-contact diseases			
Psittacosis	*Chlamydia psittaci* (B)	Contact with birds or bird excrement	Wild and domestic birds
Rabies	Rabies virus (V)	Bite by carnivore	Wild and domestic carnivores
Tularemia	*Franciscella tularensis* (B)	Contact with rabbits	Rabbits

This list does not include all of the potential threats but it gives a good idea of the number of diseases that can affect the human and animal population and their methods for transmission. Based on the characteristics of the disease, the risk assessment changes and different mitigation strategies are required.

Natural and Human-Caused Events

The HMP Sub-Committee has researched biological hazards that may affect the State of Arkansas and has further divided the threat into the following two distinct categories.

Naturally Occurring Biological Events: There are many viruses, contagions and other organisms that naturally cause sickness, disease and epidemics to occur throughout the world. Some naturally occurring events are simple and every day, such as the common cold, strep throat and the flu. Others are rare and very deadly such as the plague, and Mad Cow disease.

Human-Caused Events: Human civilization has reached a high level of advancement and many naturally occurring bio-substances are now collected, stored and studied. The new technology relating to viruses, diseases and epidemics now makes it possible for intentional and accidentally releases of these substances into the population at-large.

When assessing the biological risks for the State of Arkansas, the HMP Sub-Committee is considering both natural and human-related causes with the focus on human-caused bio-terrorism events. It is important to make this distinction between these two categories when examining the sources of outbreaks and the law-enforcement implications. However it is also important to note that in most cases the response, vulnerability and mitigation strategies will not significantly change for natural versus human-caused events. In the case of intentional releases of bio-agents, there will be a strong law-enforcement element as part of the investigation along with the health-related investigation and response activities. For the purposes of this planning process, the HMP Sub-Committee is considering this distinction related to the original source of the outbreak.

Humans and Animals

Viruses and other living organisms tend to be specialized and affect only limited species. Diseases such as Mad Cow, Avian Flu, Exotic Newcastle Disease, Foot and Mouth

Disease, Swine Flu and others are only dangerous to specific species and generally not to humans. Likewise, some diseases only affect humans and not animals. Some of the dangers related to this factor involve viruses that mutate and become able to move between species. This risk assessment will consider certain biological hazards that impact the human population as well as risks to the animal populations in Arkansas, particularly beef cattle and poultry.

Hazard Identification and Ranking

The HMP Sub-Committee has discussed all of the various factors that relate to biological hazards and has selected the ones of most concern to the state. Other biological agents may potentially affect Arkansas but the planning team has chosen the following list to specifically analyze. This list is sorted with human related risks first and then animal related risks. Each is analyzed separately for profiling. Arkansas considers animal related disease to be a very high priority due to the health and economic issues relating to the cattle and poultry industries.

Table 4.2.14-4: Ranking of Human Related Diseases

Disease	Transmission	Natural or Human-caused	Human or Animal
Influenza	Host-to-host	Natural	Human
Anthrax	Common-source	Human-caused	Human
West Nile Virus	Host-to-host	Natural	Human
Small Pox	Host-to-host	Human-caused	Human
Swine Flu (H1N1)	Host-to-host	Natural	Animal
Avian Flu (H5N1)	Host-to-host	Natural	Animal
Foot and Mouth Disease	Host-to-host	Natural/Human-caused	Animal
Mad Cow Disease	Host-to-host	Natural	Animal

The HMP Sub-Committee has prioritized the bio-hazards as follows: due to the recent outbreaks of the Swine Flu, the national priority on this issue and the extremely high economic value of the poultry industry for the state, the team has listed the Swine Flu as the highest priority. Influenza is listed second due to the number of illnesses and deaths each year during the flu season. The team then considered the human related diseases Anthrax, West Nile and Small Pox as the next highest priorities. Finally the animal-related diseases were prioritized.

Table 4.2.14-5: Ranking of Animal Related Diseases

Priority	Disease	Natural or Human-caused	Human or Animal
1	Swine Flu (H1N1)	Natural	Human
2	Avian Flu (H5N1)	Natural	Animal
3	Influenza	Natural	Human
4	Anthrax	Human-caused	Human
5	West Nile Virus	Natural	Human
6	Small Pox	Human-caused	Human
7	Foot and Mouth Disease	Natural / Human-caused	Animal

8	Mad Cow Disease	Natural	Animal

2010 Update

The HMP Sub-Committee updated this Biological Risk Assessment in 2007, and again in 2010 as part of the three-year FEMA review process. The group agreed not to modify the bio-hazards being profiled or to change the existing prioritization. However the HMP Sub-Committee noted two recent events that need to be mentioned in this overall risk assessment. These two events were both unintentional and both were human-caused. Both events had widespread economic and social ramifications for a relatively short period of time. Information about these two biological events will be summarized here and then discussed as necessary throughout this risk assessment. These two cases are very real examples of the types of biological issues that face the State of Arkansas, the USA and the world in the early 21st century.

- September 2006 - *E. coli* O157 Infections in the spinach industry. Throughout the month, spinach contaminated with E. coli entered the US supermarket distribution chain that ultimately resulted in 111 reported cases in 21 states. The Food and Drug Administration (FDA) issued various warnings and a nationwide recall was implemented for multiple brands.
- March 2007 – Pet Food Contamination and Recall – The FDA learned that certain pet foods containing vegetable proteins imported into the United States from China were sickening and killing cats and dogs. A portion of the tainted pet food was used to produce farm animal feed and fish feed. The FDA and the U.S. Department of Agriculture discovered that some animals that ate the tainted feed had been processed into human food. Government scientists determined a very low risk to human health from consuming food from animals that ate tainted feed. All tainted pet food, animal and fish feed, and vegetable proteins were recalled and destroyed.

Bioterrorism Agents

In addition to the list of hazards that is being specifically profiled and discussed above, the HMP Sub-Committee has included the following listing from the Center for Disease Control (CDC). This listing details all of the categories and agents considered for use in bio-terrorism. Due to the national importance of homeland security related to potential terrorism acts, this list has been included in this plan but these diseases are not specifically profiled. However, the HMP Sub-Committee feels that the mitigation strategies identified for the seven highest priority bio-hazards will all assist in dealing with any specific disease related to bio-terrorism.

Table 4.2.14-6: Critical Biological Agent Categories for Public Health Preparedness

Biological agent(s)	Disease
Category A	
Variola major	Smallpox
Bacillus anthracis	Anthrax
Yersinia pestis	Plague
Clostridium botulinum (botulinum toxins)	Botulism
Francisella tularensis	Tularemia
Filoviruses and Arenaviruses (e.g., *Ebola virus, Lassa virus*)	Viral hemorrhagic fevers

Category B	
Coxiella burnetii	Q fever
Brucella spp.	Brucellosis
Burkholderia mallei	Glanders
Burkholderia pseudomallei	Melioidosis
Alphaviruses (VEE, EEE, WEE[a])	Encephalitis
Rickettsia prowazekii	Typhus fever
Toxins (e.g., Ricin, Staphylococcal enterotoxin B)	Toxic syndromes
Chlamydia psittaci	Psittacosis
Food safety threats (e.g., *Salmonella spp*., *Escherichia coli* O157:H7)	
Water safety threats (e.g., *Vibrio cholerae*, Cryptosporidium parvum)	
Category C	
Emerging threat agents (e.g., *Nipah virus*, hantavirus)	

[a]Venezuelan equine (VEE), eastern equine (EEE), and western equine encephalomyelitis (WEE) viruses

Profiling of Bio-Hazard Events

The HMP Sub-Committee has identified seven biological agents to be profiled and considered in the overall vulnerability analysis. Each of these has the potential to seriously affect the overall public health and the economy of Arkansas.

Avian Flu (H5N1) Profile

Avian Influenza is an infection caused by avian (bird) influenza (flu) viruses. These influenza viruses occur naturally among birds. Wild birds worldwide carry the viruses in their intestines, but usually do not get sick from them. However, Avian Influenza is very contagious among birds and can make some domesticated birds, including chickens, ducks, and turkeys, very sick and die.

Infected birds shed influenza virus in their saliva, nasal secretions, and feces. Susceptible birds become infected when they have contact with contaminated secretions or excretions or with surfaces that are contaminated with secretions or excretions from infected birds. Domesticated birds may become infected with Avian Influenza virus through direct contact with infected waterfowl or other infected poultry, or through contact with surfaces (such as dirt or cages) or materials (such as water or feed) that have been contaminated with the virus.

The highly pathogenic form can spread very rapidly through flocks of poultry. This form may cause disease that affects multiple internal organs and has a mortality rate that can reach 90-100% often within 48 hours.

The risk from Avian Influenza is generally low to most people because the viruses occur mainly among birds and do not usually infect humans. However, more than 100 human cases of Avian Influenza infection have been reported since 1997. Most cases of Avian Influenza infection in humans have resulted from contact with infected poultry (e.g., domesticated chicken, ducks, and turkeys) or surfaces contaminated with secretion/excretions from infected birds. The spread of Avian Influenza viruses from one ill person to another has been reported very rarely, and transmission has not been observed to continue beyond one person.

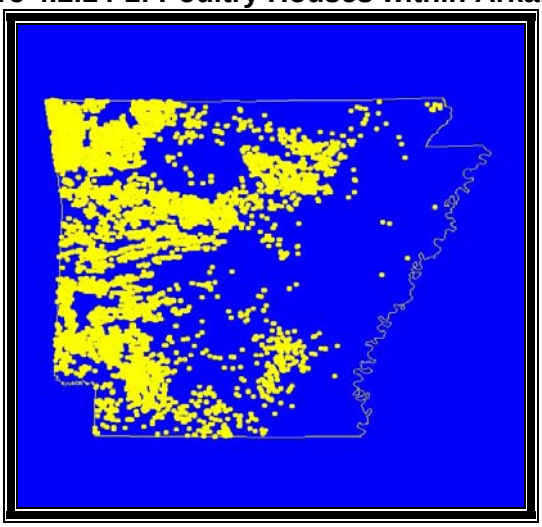
During an outbreak of Avian Influenza among poultry, there is a possible risk to people who have contact with infected birds or surfaces that have been contaminated with secretions or excretions from infected birds. Symptoms of Avian Influenza in humans have ranged from typical human influenza-like symptoms (e.g., fever, cough, sore throat, and muscle aches) to eye infections, pneumonia, severe respiratory diseases (such as acute respiratory distress), and other severe and life-threatening complications.

Geographic Area Affected

The entire state is at-risk for the Avian Flu for it is transmitted by migratory birds and through domesticated birds. However the real risk in Arkansas is not to the human population but rather to the larger number of poultry birds raised throughout the state for commercial purposes. The Arkansas poultry industry is approximately a $3.2 billion business for the state and accounts for approximately 50% of the state's agriculture. Therefore, the areas with the largest concentration of chicken and turkey farms are the most at-risk to this hazard.

The northwest corner of the state has the largest poultry industry and infrastructure so this area is considered the most likely to be affected.

Figure 4.2.14-1: Poultry Houses within Arkansas



Source: The Poultry Federation

The top counties for poultry production are listed below as the most likely locations to have a pandemic with devastating consequences to the state:

- Washington County
- Howard County
- Hempstead County
- Carroll County
- Benton County
- Sevier County

Previous Occurrences

Outbreaks of Avian Influenza H5N1 occurred among poultry in eight countries in Asia (Cambodia, China, Indonesia, Japan, Laos, South Korea, Thailand, and Vietnam) during late 2003 and early 2004. At that time, more than 100 million birds in the affected countries either died from the disease or were killed in order to try to control the outbreaks. By March 2004, the outbreak was reported to be under control. Since late June 2004, however, new outbreaks of Influenza H5N1 among poultry were reported by several countries in Asia (Cambodia, China [Tibet], Indonesia, Kazakhstan, Malaysia, Mongolia, Russia [Siberia], Thailand, and Vietnam). It is believed that these outbreaks are ongoing. Influenza H5N1 infection also has been reported among poultry in Turkey and Romania and among wild migratory birds in Croatia.

H5N1 virus does not usually infect people, but more than 100 human cases have been reported since December 2003. Most of these cases have occurred as a result of people having direct or close contact with infected poultry or contaminated surfaces; however, a few cases of human-to-human spread of H5N1 have occurred.

Outbreaks of highly pathogenic avian influenza A (H5N1) associated with illness and death in humans occurred in Asia in late 2003 and 2004. Listed below are some statistics on Avian Flu from the World Health Organization related to human cases since 1997.

Table 4.2.14-7: Cumulative Number of Confirmed Human Cases of Avian Influenza A (H5N1) Reported to the World Health Organization (WHO*)*
29 November 2005

World Health Organization

Date of onset	Indonesia		Viet Nam		Thailand		Cambodia		China		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
26.12.03-10.03.04	0	0	23	16	12	8	0	0	0	0	35	24
19.07.04-08.10.04	0	0	4	4	5	4	0	0	0	0	9	8
16.12.04-to date	12	7	66	22	4	1	4	4	3	2	89	36
Total	12	7	93	42	21	13	4	4	3	2	133	68

Total number of cases includes number of deaths.
WHO reports only laboratory-confirmed cases.

H5N1, Hong Kong, Special Administrative Region, 1997: Highly pathogenic avian influenza A (H5N1) infections occurred in both poultry and humans. This was the first time an avian influenza A virus transmission directly from birds to humans had been found. During this outbreak, 18 people were hospitalized and six of them died. To control the outbreak, authorities killed about 1.5 million chickens to remove the source of the virus. Scientists determined that the virus spread primarily from birds to humans, though rare person-to-person infection was noted.

H9N2, China and Hong Kong, Special Administrative Region, 1999: Low pathogenic avian influenza A (H9N2) virus infection was confirmed in two children and resulted in uncomplicated influenza-like illness. Both patients recovered, and no additional cases were confirmed. The source is unknown, but the evidence suggested that poultry was the source of infection and the main mode of transmission was from bird to human. However, the possibility of person-to-person transmission could not be ruled out. Several additional human H9N2 infections were reported from China in 1998-99.

H7N2, Virginia, 2002: Following an outbreak of H7N2 among poultry in the Shenandoah Valley poultry production area, one person was found to have serologic evidence of infection with H7N2.

H5N1, China and Hong Kong, Special Administrative Region, 2003: Two cases of highly pathogenic avian influenza A (H5N1) infection occurred among members of a Hong Kong family that had traveled to China. One person recovered, the other died. How or where these two family members were infected was not determined. Another family member died of a respiratory illness in China, but no testing was done.

H7N7, Netherlands, 2003: The Netherlands reported outbreaks of influenza A (H7N7) in poultry on several farms. Later, infections were reported among pigs and humans. In total, 89 people were confirmed to have H7N7 influenza virus infection associated with this poultry outbreak. These cases occurred mostly among poultry workers. H7N7-associated illness included 78 cases of conjunctivitis (eye infections) only; 5 cases of conjunctivitis and influenza-like illnesses with cough, fever, and muscle aches; 2 cases of influenza-like illness only; and 4 cases that were classified as “other.” There was one death among the 89 total cases. It occurred in a veterinarian who visited one of the affected farms and developed acute respiratory distress syndrome and complications related to H7N7 infection. The majority of these cases occurred as a result of direct contact with infected poultry; however, Dutch authorities reported three possible instances of transmission from poultry workers to family members. Since then, no other instances of H7N7 infection among humans have been reported.

H9N2, Hong Kong, 2003**:** Low pathogenic avian influenza A (H9N2) infection was confirmed in a child in Hong Kong. The child was hospitalized and recovered.

H7N2, New York, 2003: In November 2003, a patient with serious underlying medical conditions was admitted to a hospital in New York with respiratory symptoms. One of the initial laboratory tests identified influenza A virus that was thought to be H1N1. The patient recovered and went home after a few weeks. Subsequent confirmatory tests conducted in March 2004 showed that the patient had been infected with avian influenza A (H7N2) virus.

H7N3 in Canada, 2004: In February 2004, human infections of highly pathogenic avian influenza A (H7N3) among poultry workers were associated with an H7N3 outbreak among poultry. The H7N3-associated mild illnesses consisted of eye infections.

***H5N1, Thailand and Vietnam, 2004,* and other outbreaks in Asia during 2004 and 2005:** In January 2004, outbreaks of highly pathogenic influenza A (H5N1) in Asia were first reported by the World Health Organization. Visit the Avian Influenza section of the World Health Organization website for more information and updates.

There is no evidence that Avian Flu currently exists in the United States based on extensive and regular testing of U.S. poultry flocks. Historically, there have been three outbreaks in poultry in this country--in 1924, 1983 and 2004. No significant human illness resulted from these outbreaks.

The 1924 H7 HPAI outbreak was detected and eradicated in east coast live bird markets.

The 1983-84 H5N2 HPAI bird outbreaks resulted in the destruction of approximately 17 million chickens, turkeys, and guinea fowl in the northeastern United States to contain and eradicate the disease.

In 2004, USDA confirmed an H5N2 HPAI outbreak in chickens in the southern United States. The disease was quickly eradicated thanks to close coordination and cooperation among USDA, state, local, and industry leaders. Because of the quick response, the disease was limited to one flock.

H1N1 Influenza 2009: As of September 10, 2009 the Centers for Disease Control and Prevention (CDC) reported that nationally there have been 593 deaths and just over 9,000 hospitalizations from the 2009 H1N1 virus with 5 of these deaths in Arkansas. The CDC and the World Health Organization (WHO) have both halted attempts to count each reported case of the 2009 H1N1 Pandemic Influenza but give estimates of cases from April – December of 2009 as follows:

- CDC estimates that between 39 million and 80 million cases of 2009 H1N1 occurred between April and December 12, 2009. The mid-level in this range is about 55 million people infected with 2009 H1N1.
- CDC estimates that between about 173,000 and 362,000 2009 H1N1-related hospitalizations occurred between April and December 12, 2009. The mid-level in this range is about 246,000 H1N1-related hospitalizations.
- CDC estimates that between about 7,880 and 16,460 2009 H1N1-related deaths occurred between April and December 12, 2009. The mid-level in this range is about 11,160 2009 H1N1-related deaths.

2010 Update

The World Health Organization has published the statistics on Table 4.2.14-8 regarding the confirmed human cases of H5N1 Virus. It is important to note that the number of cases is increasing year by year as well as the number of associated deaths. This situation is not under control as the virus continues to affect poultry flocks around the world. Recent reports from countries as diverse as China, Egypt, Indonesia, Thailand, and others point to the continuing spread of this disease. There have still been no reported cases of H5N1 in the USA as of March 2010.

Table 4.2.14-8: Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO (March 30,2010)

Country	2003		2004		2005		2006		2007		2008		2009		2010		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	0	0	0	0	0	0	8	5	0	0	0	0	0	0	0	0	8	5
Bangladesh	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Cambodia	0	0	0	0	4	4	2	2	1	1	1	0	1	0	0	0	9	7
China	1	1	0	0	8	5	13	8	5	3	4	4	7	4	0	0	38	25
Djibouti	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Egypt	0	0	0	0	0	0	18	10	25	9	8	4	39	4	18	6	108	33
Indonesia	0	0	0	0	20	13	55	45	42	37	24	20	21	19	1	1	163	135
Iraq	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	3	2
Lao People's Democratic Republic	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	2	2
Myanmar	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Nigeria	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1
Pakistan	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	3	1
Thailand	0	0	17	12	5	2	3	3	0	0	0	0	0	0	0	0	25	17
Turkey	0	0	0	0	0	0	12	4	0	0	0	0	0	0	0	0	12	4
Viet Nam	3	3	29	20	61	19	0	0	8	5	6	5	5	5	5	2	117	59
Total	4	4	46	32	98	43	115	79	88	59	44	33	73	32	24	9	492	291

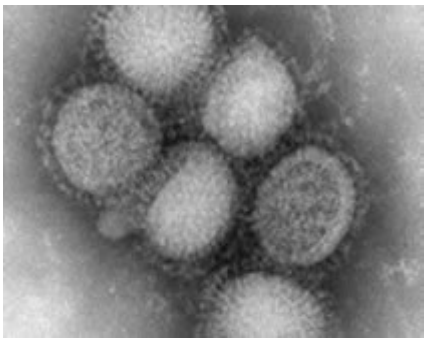
Probability of Future Events

The Avian Flu is currently spreading in Asia, Africa and even into parts of Europe and is a national priority. President Bush has recently announced initiatives to protect the United States from the Avian Flu. The US is secure and efforts to prevent a severe Avian Flu pandemic are underway. The State of Arkansas is very concerned about Avian Flu due to the very large poultry industry in the area. The probability of an epidemic is relatively low; however the magnitude of the potential impact cannot be ignored.

The HMP Sub-Committee has studied this disease and the current international situation, and considers this an **Unlikely** probability for the future but a high priority.

Swine Flu (2009 H1N1) Profile

The novel H1N1 Influenza A is a new flu virus causing illness in people and was called the "swine flu". This new virus was first found in people in the United States in April 2009. Other countries, including Mexico and Canada, have reported people sick with this new virus, which spreads from person-to-person in much the same way as regular seasonal flu spreads.



In the beginning, this virus was thought to be similar to flu viruses that normally occur in pigs in North America and was referred to as the swine flu. However, further study has shown that this virus is actually different from what normally circulates in North American pigs and is made up of two genes from viruses found in pigs in Europe and Asia, plus a gene from a bird and a human.

The symptoms of H1N1 flu in people are much like the symptoms of the regular seasonal flu and include fever over 100 degrees, cough, sore throat, body aches, headache, chills and tiredness. Some people have reported diarrhea and vomiting related to the H1N1 flu. Like seasonal flu, H1N1 flu may cause already existing chronic medical conditions to get worse.

Geographic Area Affected

The entire state is at-risk for the 2009 H1N1 Flu due to the fact that it is transmitted from person-to-person, and can affect people in any part of Arkansas. Any county in Arkansas can be affected by the 2009 H1N1 Pandemic Influenza, but the urban areas within the state would be at more of a risk due to greater populations in these areas.

Probability of Future Events

The Swine Flu (H1N1) is currently spreading in the United States and even into parts of Europe and is a national priority. The CDC has recently announced initiatives to reduce or stop the spread of the virus in the United States from the H1N1 virus; however, the spread of the virus is hard to contain since it spreads person to person. The US believes that the efforts to control the current pandemic are making great strides; however, it will not be certain until the next flu season returns. The State of Arkansas is very concerned about Swine Flu since the virus highly contagious, multiplies at a fast rate, and is spread

by human to human contact. The probability of an epidemic returning for this virus is very high and the magnitude of the potential impact could be detrimental to the state and the communities.

The HMP Sub-Committee has studied this disease and the current international situation, and considers this a **“Highly Likely”** probability and priority for the future.

Influenza Profile

Influenza, commonly called "the flu," is caused by the influenza virus, which infects the respiratory tract (nose, throat, lungs). Unlike many other viral respiratory infections, such as the common cold, the flu causes severe illness and life-threatening complications in many people. Influenza is a respiratory illness. Symptoms of flu include fever, headache, extreme tiredness, dry cough, sore throat, runny or stuffy nose, and muscle aches. Children can have additional gastrointestinal symptoms, such as nausea, vomiting, and diarrhea, but these symptoms are uncommon in adults.

In the United States, the peak of flu season can occur anywhere from late December through March. The overall health impacts including infections, hospitalizations, and deaths during a flu season vary from year to year.

The main way that influenza viruses are spread is from person to person in respiratory droplets of coughs and sneezes. (This is called "droplet spread.") This can happen when droplets from a cough or sneeze of an infected person are propelled (generally up to 3 feet) through the air and deposited on the mouth or nose of people nearby. Though much less frequent, the viruses also can be spread when a person touches respiratory droplets on another person or an object and then touches their own mouth or nose (or someone else’s mouth or nose) before washing their hands.

Each flu season is unique, but it is estimated that, on average, approximately 5% to 20% of US residents get the flu, and more than 200,000 persons are hospitalized for flu-related complications each year. About 36,000 Americans die on average per year from the complications of flu.

The single best way to prevent the flu is to get a flu vaccination each fall. There are two types of vaccines:

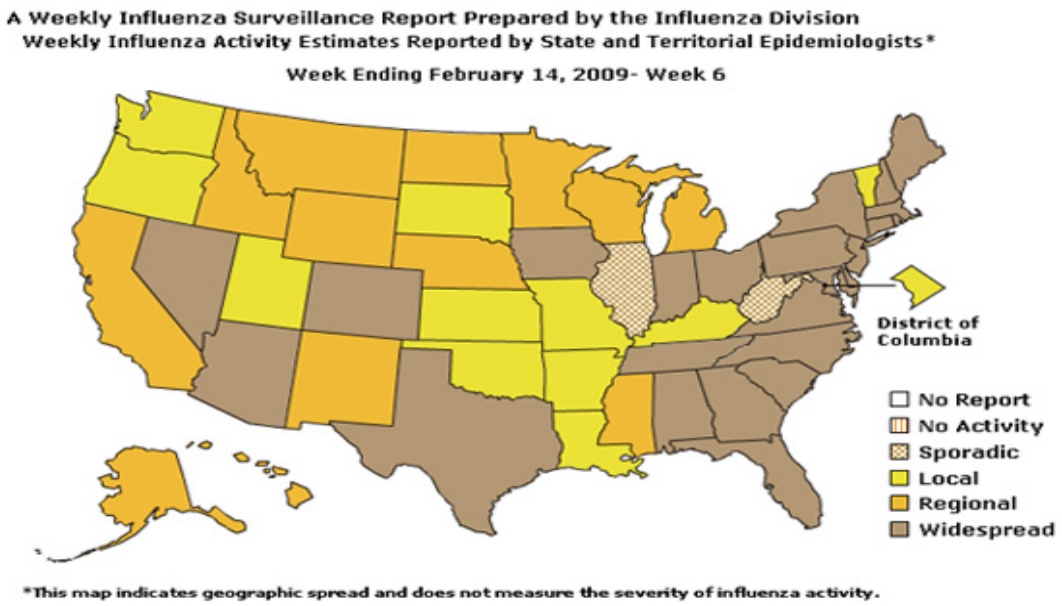
- The "flu shot" – an inactivated vaccine (containing killed virus) that is given with a needle. The flu shot is approved for use in people older than 6 months, including healthy people and people with chronic medical conditions.
- The nasal-spray flu vaccine – a vaccine made with live, weakened flu viruses that do not cause the flu (sometimes called LAIV for “Live Attenuated Influenza Vaccine”). LAIV is approved for use in healthy people 5 years to 49 years of age who are not pregnant.

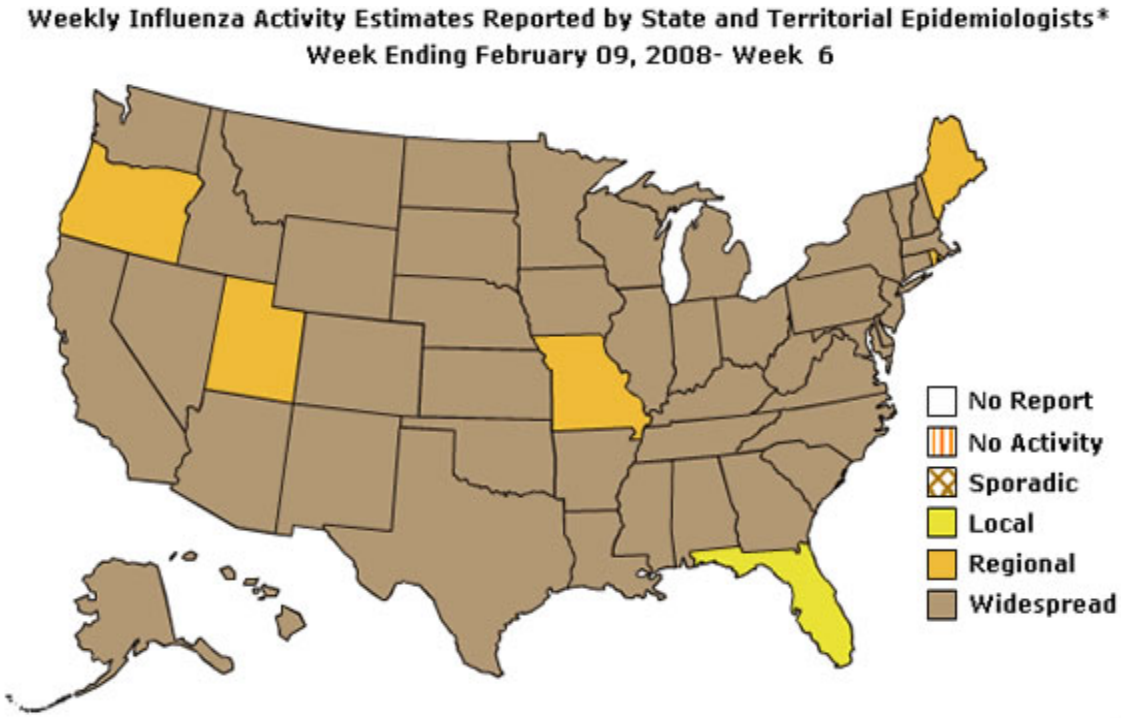
About two weeks after vaccination, antibodies develop that protect against influenza virus infection. Flu vaccines will not protect against influenza-like illnesses caused by other viruses.

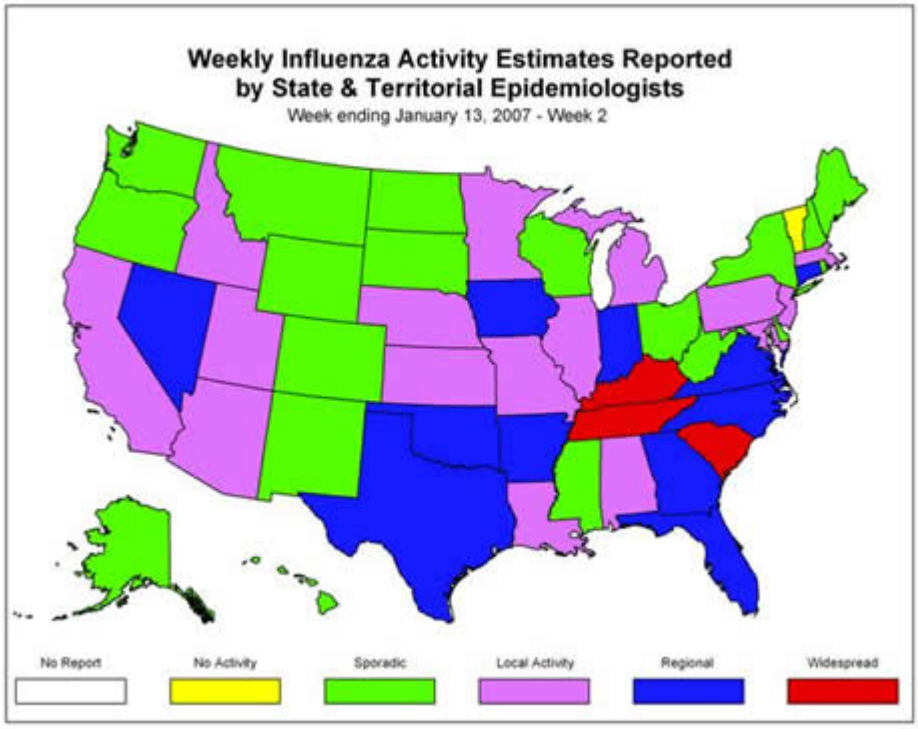
Geographic Area Affected

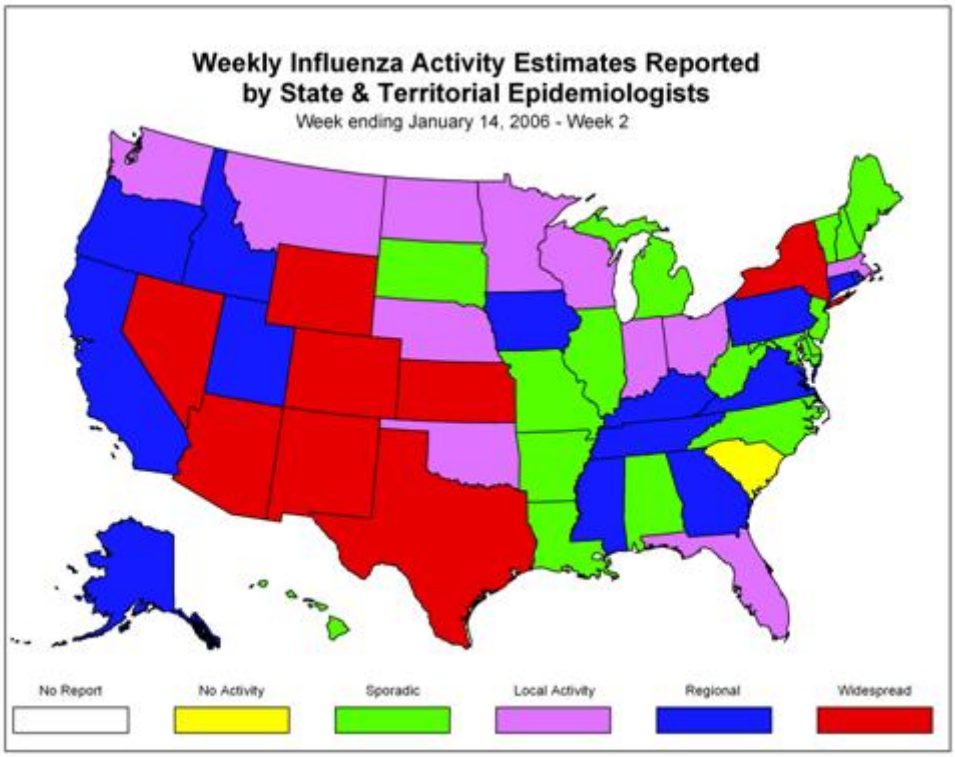
The following map shows flu activity in the US over the past five years. In 2007 and 2005, Arkansas had widespread activity along with most of the south and the mid-west.

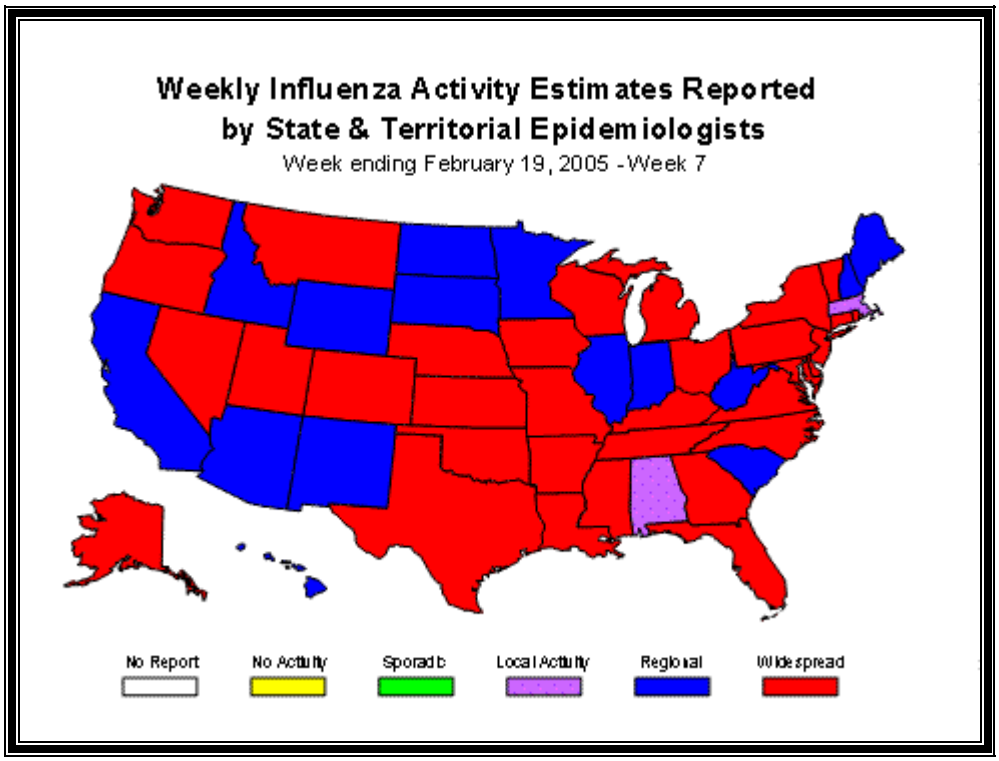
Figure 4.2.14-2: Weekly Influenza Maps (2003-2009)

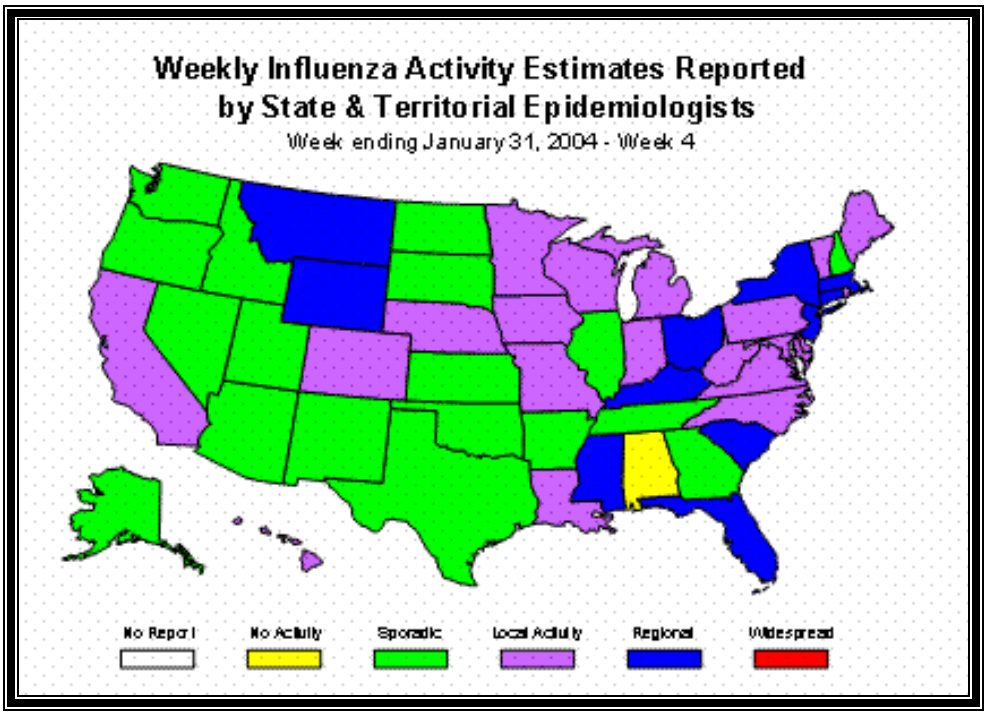


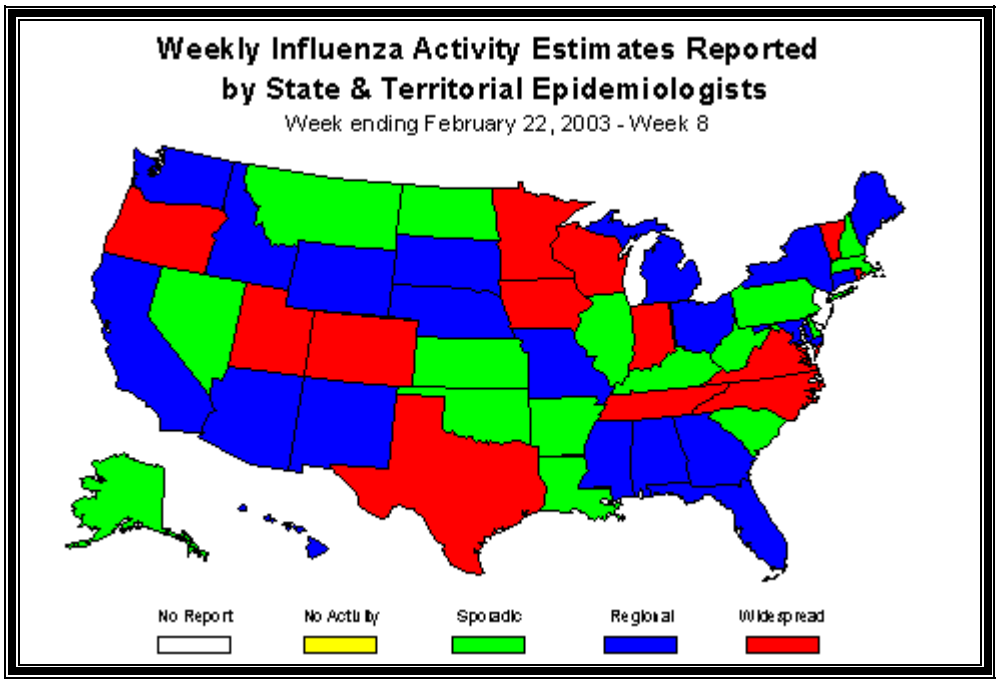



Weekly Influenza Activity Estimates Reported
by State & Territorial Epidemiologists
Week ending January 13, 2007 - Week 2
No Report
No Activity
Sporadic
Local Activity
Regional
Widespread


Weekly Influenza Activity Estimates Reported
by State & Territorial Epidemiologists
Week ending January 14, 2006 - Week 2
No Report
No Activity
Sporadic
Local Activity
Regional
Widespread


Weekly Influenza Activity Estimates Reported
by State & Territorial Epidemiologists
Week ending February 19, 2005 -Week 7
No Report
No Activity
Sporadic
Local Activity
Regional
Widespread


Weekly Influenza Activity Estimates Reported
by State & Territorial Epidemiologists
Week ending January 31, 2004 - Week 4
No Report
No Activity
Sporadic
Local Activity
Regional
Widespread



Source for the above: Center for Disease Control and Prevention

The entire state is subject to influenza outbreaks. Due to the larger populations in Little Rock and the other urban areas, these regions tend to have higher levels of infections. Also, people in more rural areas tend to consult their physicians less and therefore more cases go unreported. For the purpose of this planning effort, the HMP Sub-Committee has designated the entire state at risk for this biological hazard.

Previous Occurrences

The CDC releases the final collated statistics for national deaths each year. The cause of death is categorized in 358 causes and the data is divided into 5-year age groups, race and sex: The data is for the entire United States for 2005 and 2006 and is also divided by state. As of the 2010 HMP revision the CDC had not yet published the statistics for 2008 or 2009. The complete reports for 2007, 2006 and 2005 can be found at the following web addresses.

http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_14.pdf

http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_08.pdf

http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf

There are always a number of deaths associated with influenza every season, particularly among the elderly. See the following statistics for the US and for the State of Arkansas.

2006 - Cause of Death - Influenza (J10-J11)

United States
All races, both sexes..... 849
Male..... 362
Female..... 487

Arkansas
All races, both sexes.....3
Male.....0
Female.....3

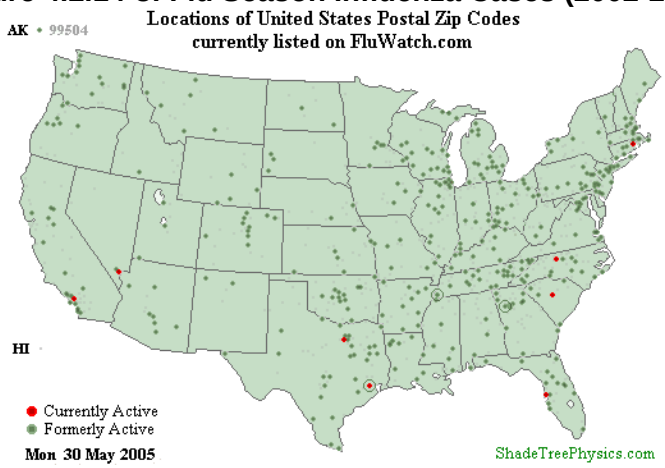
2005 - Cause of Death - Influenza (J10-J11)

United States
All races, both sexes..... 727
Male..... 289
Female..... 438

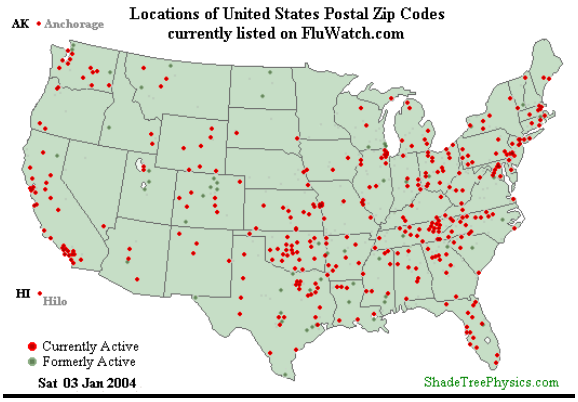
Arkansas
All races, both sexes.....26
Male.....12
Female.....14

The following map shows the influenza cases for the 2004-2005 flu seasons. Note that there are a number of formerly active cases in the state based on May 2005 data. For the 2010 revision, the HMP Sub-Committee attempted to locate more current maps however; these maps remain the most up to date maps at the time of this revision.

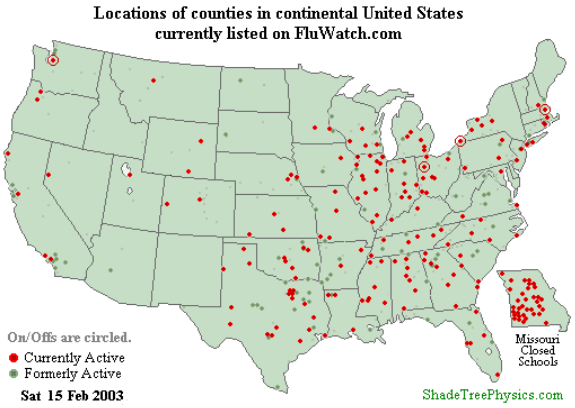
Figure 4.2.14-3: Flu Season Influenza Cases (2002-2005)



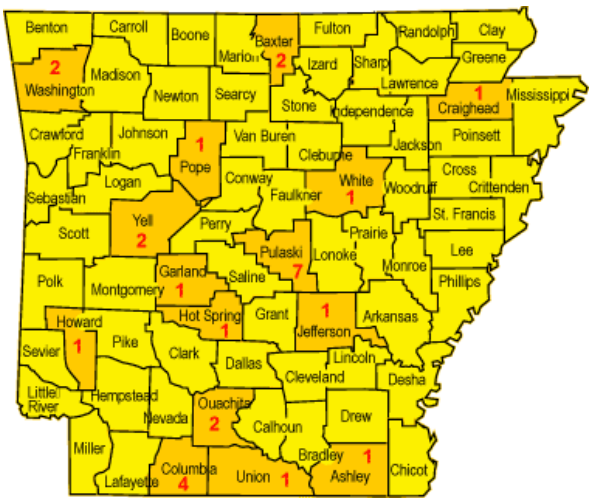
The map below shows the cases during the height of flu season 2003-2004.



The following map shows the peak of flu season for 2002-2003.



The following map is for the State of Arkansas only and shows the cases from the 2003 flu season. The Arkansas Department of Health did not continue the process of developing this map each year.Arkansas Counties Reporting Influenza-Like Illness (Type A) as of 12/09/03 (All Counties)



+A Cultures

Positive Influenza Reports

Age	less than 21	21 and older
Deaths	1	17

Probability of Future Events

Based on historical data and on the characteristics of the flu virus, there is a high probability of future cases in the State of Arkansas. Every flu season, a large number of Americans are affected by this illness. However the fear is related to a major pandemic that affects a significant portion of the population. The probability of a major pandemic occurring is much less likely than the standard dispersion during an average season.

The HMP Sub-Committee's final conclusion is that every year the state experiences a flu season like the rest of the county. This illness invariably infects a number of citizens and usually results in a small number of deaths. It is a virtual certainty that this biohazard will continue to occur regularly in the future. However, major or pandemic events occur far less often therefore the planning team considered the probability to be **"Possible"**.

Anthrax Profile

Anthrax is a serious disease caused by Bacillus anthracis, a bacterium that forms spores that may come to life under the right conditions.

There are three types of anthrax:

Skin (cutaneous): The first symptom is a small sore that develops into a blister. The blister then develops into a skin ulcer with a black area in the center. The sore, blister and ulcer do not hurt. In most cases, early treatment with antibiotics can cure cutaneous anthrax. Even if untreated, 80 percent of people who become infected with cutaneous anthrax do not die.

Lungs (inhalation): The first symptoms of inhalation anthrax are like cold or flu symptoms and can include a sore throat, mild fever and muscle aches. Later symptoms include cough, chest discomfort and shortness of breath, tiredness and muscle aches. Inhalation anthrax is much more severe. In 2001, about half of the cases of inhalation anthrax ended in death.

Digestive (gastrointestinal): The first symptoms are nausea, loss of appetite, bloody diarrhea, and fever, followed by bad stomach pain. Gastrointestinal anthrax is very serious because between one-fourth and more than half of cases lead to death.

Anthrax is not known to spread from one person to another. Humans can become infected with anthrax by handling products from infected animals or by breathing in anthrax spores from infected animal products (like wool, for example). People also can become infected with gastrointestinal anthrax by eating undercooked meat from infected animals.

Antibiotics are used to treat all three types of anthrax. Early identification and treatment are important.

Prevention after exposure: Treatment is different for a person who is exposed to anthrax, but is not yet sick. Health-care providers will use antibiotics (such as ciprofloxacin, levofloxacin, doxycycline, or penicillin) combined with the anthrax vaccine to prevent anthrax infection.

Treatment after infectio: Treatment is usually a 60-day course of antibiotics. Success depends on the type of anthrax and how soon treatment begins.

Vaccination: There is a vaccine to prevent anthrax, but it is not yet available for the general public. Anyone who may be exposed to anthrax, including certain members of the U.S. armed forces, laboratory workers, and workers who may enter or re-enter contaminated areas, may get the vaccine. Also, in the event of an attack using anthrax as a weapon, people exposed would get the vaccine.

Anthrax also can be used as a weapon. This happened in the United States in 2001. Anthrax was deliberately spread through the postal system by sending letters with powder containing anthrax. This caused 22 cases of anthrax infection.

The Department of Defense Anthrax Vaccine Immunization Program reports the following related threat of Anthrax as a biological warfare agent:

- Anthrax bacteria produce spores that can be processed to become easily airborne.
- Mail-sorting machinery can easily aerosolize anthrax in envelopes sent via regular methods through the US Postal Service.
- Anthrax spores can be spread in the air by missiles, rockets, artillery, aerial bombs and sprayers.
- Anthrax can travel downwind for hundreds of miles.
- Anthrax spores remain dangerous for decades.
- During WW II, the British experimented with anthrax on Gruinard Island. 40 years later, the island was still uninhabitable and had to be decontaminated.
- Naturally occurring anthrax spores remain dormant in the soil for decades. Grazing animals can ingest them and become infected with the disease.

- Anthrax can be produced in large quantities with relatively basic technology.
- All of the technology needed to produce anthrax is considered dual use, meaning it has legitimate uses in the biological and pharmaceutical industries.
- The technology is available on the open market with few controls regarding its purchase.
- Any country with basic healthcare or a basic pharmaceutical industry has the expertise to produce anthrax.

The Centers for Disease Control and Prevention has classified anthrax as a Category A agent (highest level) with respect to bio-terrorism potential. Category A agents are those that:

- Pose the greatest possible threat for a significant effect on public health.
- May spread across a large area.
- Need a great deal of planning to protect the public's health.

Some of the considerations for categorizing anthrax as the highest priority level are listed below:

- Research on anthrax as a biological weapon started over 80 years ago.
- 17 nations are believed to have offensive biological weapons programs.
- WHO's expert committee (1970) estimated that an aircraft release of 50 kg of anthrax over a 5 million population would kill 250,000 - 100,000 untreated citizens.
- Accidental aerosolized release of anthrax spores in the Soviet Union in 1979 resulted in 79 cases and 68 deaths.
- Outdoor aerosol release could be a threat to people indoors.
- US Congressional Office of Technology Assessment (1993) estimated that between 130,000 and 3 million deaths could follow the aerosolized release of 100 kg of anthrax spore upwind of the Washington, D.C. area. The lethality would match or exceed that of a hydrogen bomb.
- The CDC economic model estimated - $26 billion per 100,000 persons exposed.

Geographic Area Affected

Though anthrax can occur naturally, the State of Arkansas is primarily concerned about anthrax as a weaponized agent used in a bio-terrorism situation. Therefore the areas most likely to be affected by this are the major population centers:

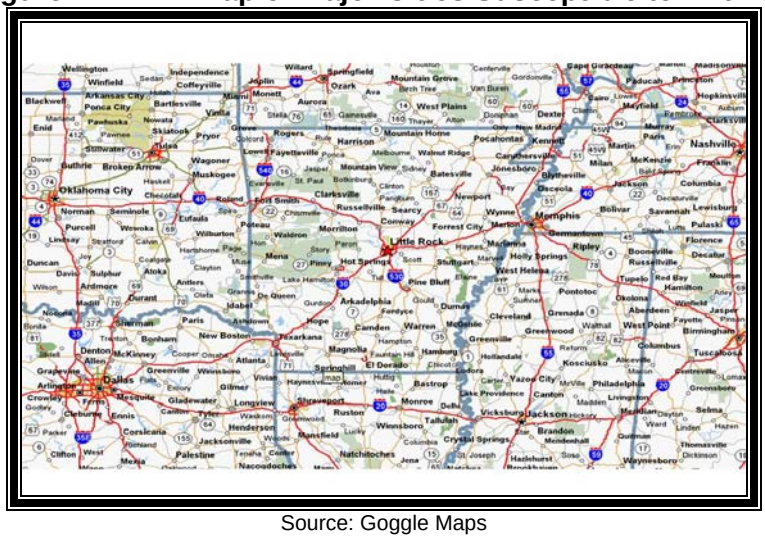
- Little Rock
- Fort Smith
- Pine Bluff
- Fayetteville

Critical infrastructure locations are also at risk. Information on the specific geographic areas affected has been submitted to the Department of Homeland Security as part of the national effort for critical infrastructure protection. These locations are not included in this document for security reasons.

Arkansas would also be involved in events that occur in cities near the state borders. If individuals in the city of Memphis became infected, the State of Arkansas would be necessarily affected. Other nearby population centers include:

- Tulsa, Oklahoma
- Oklahoma City, Oklahoma
- Jackson, Mississippi
- Dallas – Fort Worth, Texas

Figure 4.2.14-4: Map of Major Cities Susceptible to Anthrax



Source: Goggle Maps

Previous Occurrences

1990 Gulf War in Iraq: In the aftermath of the Gulf War, defectors forced Iraq to reveal that it had an extensive biological weapons program, including anthrax.

UNSCOM, the United Nations Special Commission, found evidence of anthrax-filled weapons in Iraq.

Although UNSCOM destroyed the Al Hakam production facility in Iraq, which had been used to produce anthrax, many experts feel that Iraq could rebuild its anthrax-producing capabilities easily.

UNSCOM discovered that Iraq conducted extensive aerosol dispersion tests using an anthrax simulant.

Iraq has acknowledged producing and weaponizing anthrax between 1955 and 1991.

1992 Soviet Union Admission: In 1992, Boris Yeltsin revealed that the former Soviet Union had a biological weapons program that dwarfed Iraq's by comparison.

Soviet expertise may be employed by potential adversaries.

Defectors revealed that the former Soviet Union had weaponized anthrax employed on missiles, bombs and artillery.

Defectors from the former Soviet Union stated that anthrax would have been used against US forces in a war in Europe.

Accidental aerosolized release of anthrax spores in the Soviet Union in 1979 resulted in 79 cases and 68 deaths.

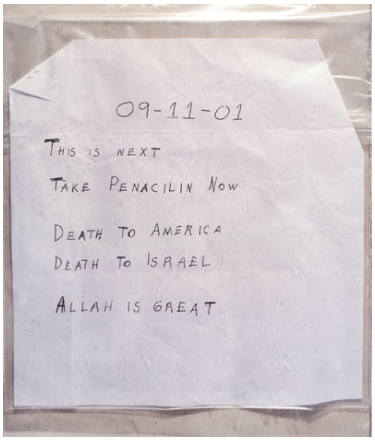
Recent Terrorist Events: Terrorist groups worldwide can also use anthrax as a biological weapon.

- The Japanese cult Aum Shinrikyo spent millions of dollars on the development of biological weapons and actually attempted to release anthrax in Tokyo.

- Evidence surfaced after the September 11 terror attacks that Osama bin Laden's Al-Qaeda organization attempted to develop anthrax as a biological weapon.

United States: September and October 2001: In an unprecedented biological terrorism event, letters containing Bacillus anthracis spores were sent through the U.S. Postal Service to various addresses in several states. Eleven inhalational and 11 cutaneous (four suspected and seven confirmed) anthrax cases resulted. Five of the 11 inhalational infections were fatal. These bioterrorism-associated cases occurred among residents of seven states along the east coast of the United States: Connecticut, one case; Florida, two cases; Maryland, three cases; New Jersey, five cases; New York City, eight cases (includes a case of a New Jersey resident exposed in New York City); Pennsylvania, one case; and Virginia, two cases. In addition to the 22 bioterrorism-associated cases, one naturally occurring case of cutaneous anthrax (associated with direct exposure to livestock that had died of anthrax) was reported from Texas in the summer of 2001.

Below are Anthrax related letters sent to national figures during this 2001 anthrax event.



2010 HMP Plan Update: There have been no new recorded anthrax events in Arkansas or the US since the major events of 2001.

Probability of Future Events

An anthrax attack occurred in the US through the mail system and the United States is still involved in the worldwide War on Terror. Therefore there is significant concern about potential anthrax attacks in the future. However, the probability for this hazard is considered to be **"Unlikely"** based on the prevention measures being taken by the government.

The federal government has funded a number of initiatives to assist in national preparedness to prevent future events. The Department of Health and Human Services (DHHS) has made available through the CDC more than $918 million for state and local health departments to enhance their terrorism preparedness programs. These funds are intended to strengthen capacity to respond to bioterrorism, other infectious disease emergencies and other urgent public health threats.

- Existing programs such as the Laboratory Response Network for Bioterrorism (LRN) and the Strategic National Stockpile (SNS) have also been strengthened.
- New facilities have been opened, and improvements in others are in progress or planned for the near future.
- The SNS has also been expanded to include additional medical supplies and personnel.
- State and local agencies are implementing measures to ensure the successful transport and delivery of these critical components of effective response.

At this moment there is no intelligence to suggest that an anthrax attack is planned in Arkansas. Therefore, the HMP Sub-Committee feels that the probability of a future anthrax event in the state is low. However, due to the national effort for bioterrorism preparedness, the State of Arkansas considers this a high priority and is implementing various mitigation measures related to anthrax and other bioterrorism agents.

The HMP Sub-Committee has reviewed this probability section as part of the 2010 plan revision and has determined that this existing analysis remains valid.

West Nile Virus Profile

The West Nile Virus (WNV) was first detected in the Western Hemisphere in 1999 and has since rapidly spread across the North American continent into all 48 continental states, seven Canadian provinces, and throughout Mexico. In addition, WNV activity has been detected in Puerto Rico, the Dominican Republic, Jamaica, Guadeloupe and El Salvador. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall.

West Nile Virus was first isolated from a fubile adult woman in the West Nile District of Uganda in 1937. The virus became recognized as a cause of severe human meningitis or encephalitis (inflammation of the spinal cord and brain) in elderly patients during an outbreak in Israel in 1957. West Nile Virus has been described in Africa, Europe, the Middle East, west and central Asia, and most recently, North America.

Statistically, a person's risk of contracting West Nile is low, and less than 1% of those infected develop serious illness from the virus. Those at highest risk for serious illness are the elderly and those with lowered immune systems. However, people of all ages can develop serious illness, so it is important for everyone to protect themselves from mosquito bites to minimize the risk of infection.

People over 50 are at higher risk to become severely ill. People over the age of 50 are more likely to develop serious symptoms of WNV and should take special care to avoid mosquito bites.

Being outside means a person is at risk. The more time someone is outdoors, the more time that person can be bitten by an infected mosquito. People must pay attention to avoiding mosquito bites if they spend a lot of time outside, either working or playing.

Risk through medical procedures is very low. All donated blood is checked for WNV before being used. The risk of getting WNV through blood transfusions and organ transplants is very small, and should not prevent people who need surgery from having it. If there are concerns, people should talk to their doctors.

Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite.

Serious Symptoms in a Few People: About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

Milder Symptoms in Some People: Up to 20 percent of the people who become infected have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks.

No Symptoms in Most People: Approximately 80 percent of people (about 4 out of 5) who are infected with WNV will not show any symptoms at all.

There is no specific treatment for WNV infection. In cases with milder symptoms, people experience symptoms such as fever and aches that pass on their own, although even healthy people have become sick for several weeks. In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

The easiest and best way to avoid WNV is to prevent mosquito bites.

When outdoors, use insect repellent containing an EPA-registered active ingredient.

Mosquitoes are most active at dusk and dawn. Use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.

Have good screens on windows and doors to keep mosquitoes out.

Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets and barrels. Change the water in pet dishes and replace the water in bird baths weekly. Drill holes in tire swings so water drains out. Keep children's wading pools empty and on there sides when they aren't being used.

West Nile Virus is an on-going issue in Arkansas. The following press releases were published by the State Department of Health in 2006 regarding this issue:

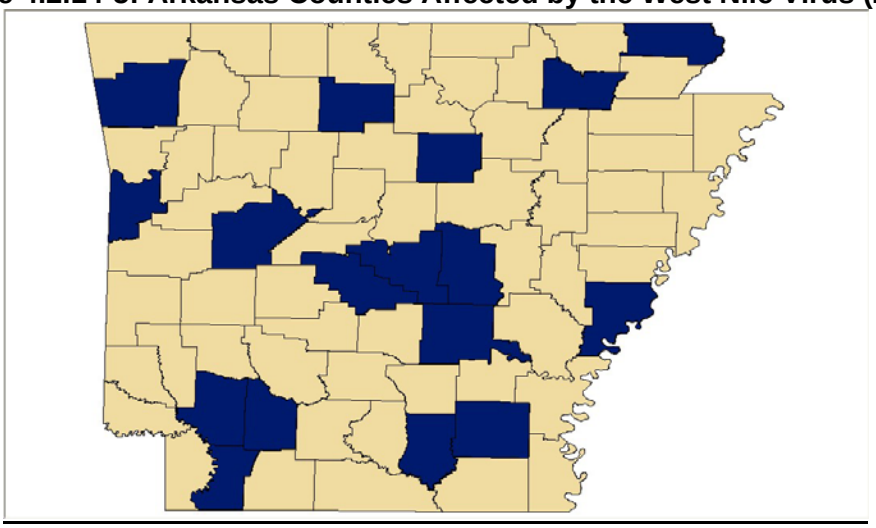
Nov 20, 2006	**Division of Health Announces Human Deaths from West Nile Virus Infection. Division of Health Announces Conclusion of West Nile Virus Surveillance Activities Involving Mosquitoes, Wild Birds, and Sentinel Chickens**
Sept 19, 2006	**Human Cases of West Nile Virus Increasing in Arkansas**
August 17, 2006	**First Human Cases of West Nile Virus in Pulaski, Sebastian and Jefferson Counties**
June 28, 2006	**Division of Health Announces Wild Birds in Boone, Faulkner, Marion, Pope, Pulaski, Sebastian, Madison, and Franklin Counties Found Positive for West Nile Virus Sentinel Chickens in Pulaski County Found Positive for West Nile Virus**
April 14, 2006	**Arkansas Department of Health and Human Services, Division of Health, Begins Statewide Surveillance for West Nile Virus on April 17th**

Geographic Area Affected

The entire State of Arkansas can potentially be affected by West Nile Virus. It is transmitted primarily by mosquitoes and this pest is prevalent throughout the state. Some areas in the state are more susceptible to high densities of mosquitoes such as rural areas and locations near bodies of still water.

As an example of the geographic areas affected across the state and the general random distribution of West Nile Virus in Arkansas, the following map shows the counties with at least one recorded WNV event in 2006.

Figure 4.2.14-5: Arkansas Counties Affected by the West Nile Virus (2006)



The counties in blue with WNV cases in 2006 are:

- Bradley
- Clay
- Cleburne
- Drew
- Hempstead
- Jefferson
- Lafayette
- Lawrence
- Lonoke
- Nevada
- Phillips
- Pulaski
- Saline
- Searcy
- Sebastian
- Yell
- Washington

Previous Occurrences

Outbreaks of WNV encephalitis in humans have occurred in the following areas:

Uganda 1937

Israel 1957

Algeria in 1994

Romania in 1996-1997

The Czech Republic in 1997

The Democratic Republic of the Congo in 1998

Russia in 1999

The United States in 1999-2003

Israel in 2000

France in 2000

According to the U.S. Centers for Disease Control and Prevention (CDC), over 15,000 people in the US have tested positive for WNV infection since 1999, including over 500 deaths. Many more people have likely been infected with WNV, but have experienced mild or no symptoms.

Nationally in 2006, there were over 3,700 cases and over 115 reported human deaths from West Nile Virus infection. In Arkansas, the following statistics are available for the two year period from 2007 through 2008. Currently the CDC has not released the final reports for 2009 and 2010 so the 2008 data remains the most current.

- 2008 – 9 confirmed cases with no deaths
- 2007 – 20 confirmed cases with one death

The following tables show the nationwide statistics for West Nile Virus throughout the country. Notice specifically that Arkansas had three deaths associated with WNV in 2005, four in 2006, one in 2007, and zero deaths in 2008. As shown by the data the number of confirmed cases and deaths have seen a decline in the last three years.

Table 4.2.14-9: Final 2008 West Nile Virus Activity in the United States

State	Encephalitis/ Meningitis	Fever	Other Clinical/Unspecified	Total	Fatalities
Alabama	11	7	0	18	0
Arizona	62	43	9	114	7
Arkansas	7	2	0	9	0
California	292	149	4	445	15
Colorado	17	54	0	71	1
Connecticut	5	2	1	8	0
Delaware	0	0	1	1	0
District of Columbia	4	1	3	8	0

Florida	3	0	0	3	0
Georgia	4	3	1	8	0
Idaho	2	31	6	39	1
Illinois	12	4	4	20	1
Indiana	3	0	1	4	0
Iowa	3	0	3	6	1
Kansas	14	17	0	31	0
Kentucky	3	0	0	3	0
Louisiana	18	31	0	49	1
Maryland	6	7	1	14	0
Massachusetts	1	0	0	1	0
Michigan	11	4	2	17	0
Minnesota	2	8	0	10	0
Mississippi	22	43	0	65	2
Missouri	12	3	0	15	1
Montana	0	3	2	5	0
Nebraska	7	40	0	47	1
Nevada	9	5	2	16	0
New Jersey	6	4	0	10	2
New Mexico	5	3	0	8	0
New York	32	14	0	46	6
North Carolina	2	0	1	3	0
North Dakota	2	35	0	37	0
Ohio	14	1	0	15	1
Oklahoma	4	5	0	9	0
Oregon	3	13	0	16	0
Pennsylvania	12	2	0	14	1
Rhode Island	1	0	0	1	0
South Carolina	0	1	0	1	0
South Dakota	11	28	0	39	0
Tennessee	12	7	0	19	1
Texas	40	24	0	64	1
Utah	6	18	2	26	0
Virginia	0	0	1	1	0
Washington	2	1	0	3	0
West Virginia	1	0	0	1	0
Wisconsin	4	3	1	8	1
Wyoming	0	8	0	8	0
Totals	**687**	**624**	**45**	**1356**	**44**

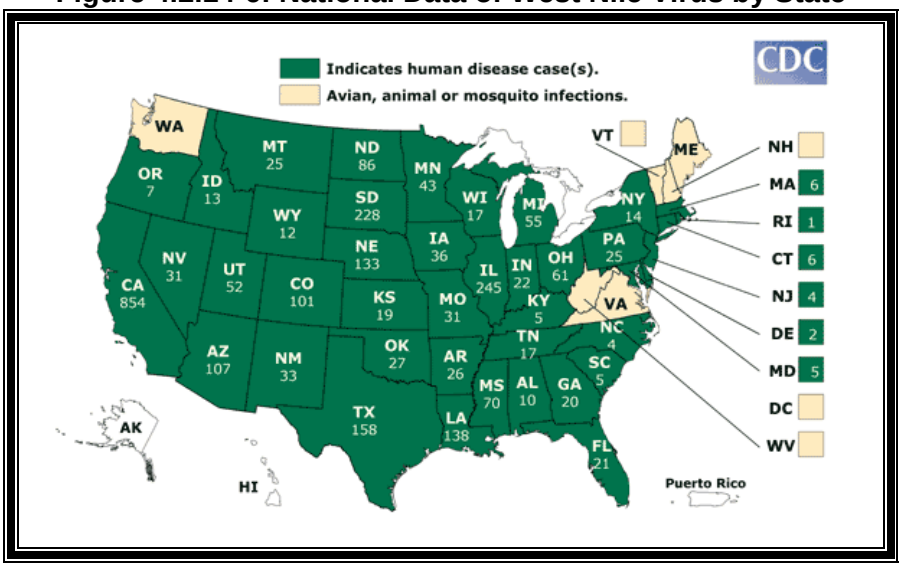
Table 4.2.14-10: 2007 West Nile Virus Activity in the United States

State	Encephalitis/ Meningitis	Fever	Other Clinical/Unspecified	Total	Fatalities
Alabama	17	7	0	24	3
Arizona	50	45	2	97	6
Arkansas	13	7	0	20	1
California	154	220	6	380	20
Colorado	99	477	0	576	7
Connecticut	2	2	0	4	0
Delaware	1	0	0	1	0
Florida	3	0	0	3	1
Georgia	23	24	3	50	1
Idaho	10	120	2	132	1
Illinois	57	26	18	101	4
Indiana	14	7	3	24	1
Iowa	12	15	3	30	3
Kansas	14	26	0	40	2
Kentucky	4	0	0	4	0
Louisiana	27	13	0	40	2
Maryland	6	3	1	10	0
Massachusetts	3	3	0	6	0
Michigan	14	1	2	17	4
Minnesota	44	57	0	101	2
Mississippi	50	86	0	136	4
Missouri	61	16	0	77	5
Montana	37	164	1	202	4
Nebraska	21	142	0	163	4
Nevada	2	6	4	12	1
New Jersey	1	0	0	1	0
New Mexico	39	21	0	60	3
New York	16	6	0	22	3
North Carolina	4	4	0	8	0
North Dakota	49	320	0	369	3
Ohio	13	9	1	23	3
Oklahoma	59	47	1	107	8
Oregon	7	19	0	26	0
Pennsylvania	5	5	0	10	0
Rhode Island	0	1	0	1	0
South Carolina	3	2	0	5	0
South Dakota	48	160	0	208	6

Tennessee	5	3	3	11	1
Texas	170	90	0	260	16
Utah	28	42	0	70	2
Virginia	3	1	1	5	0
Wisconsin	7	6	0	13	1
Wyoming	22	147	12	181	2
Totals	**1217**	**2350**	**63**	**3630**	**124**

The following map shows this same national data geographically by state:

Figure 4.2.14-6: National Data of West Nile Virus by State



More detailed WNV information is available for the State of Arkansas on a county-by-county basis for the year 2009. The following four maps show the incidents of WNV for humans, birds and mosquitoes for that year. The counties in pink are the ones that tested positively.

Figure 4.2.14-7: Human Cases of West Nile Virus (2009)

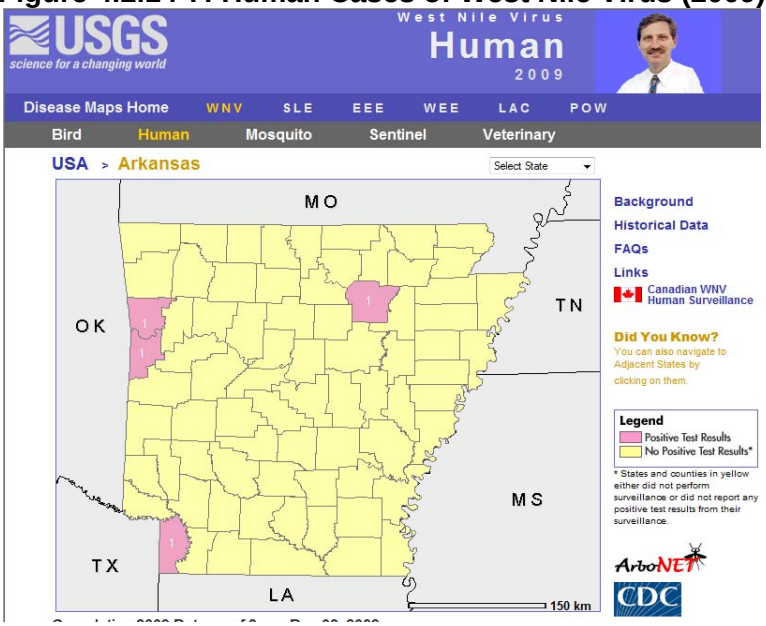


Figure 4.2.14-8: Bird Cases of West Nile Virus (2009)

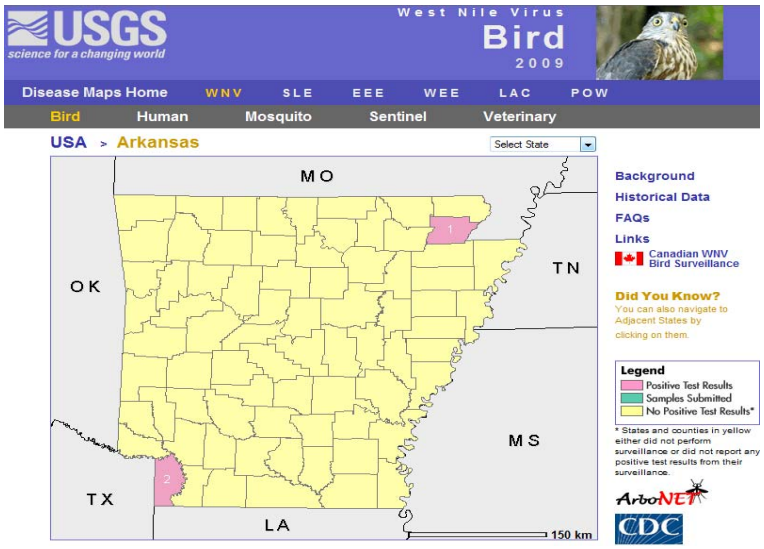
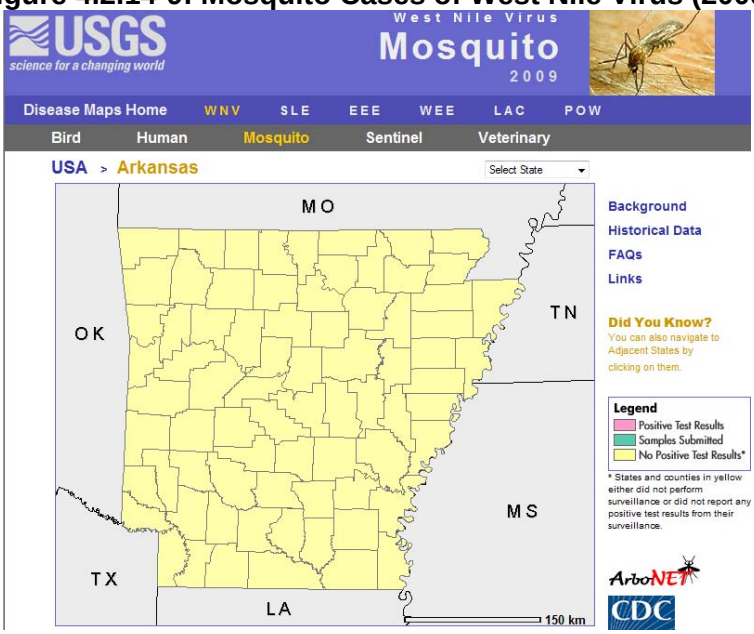
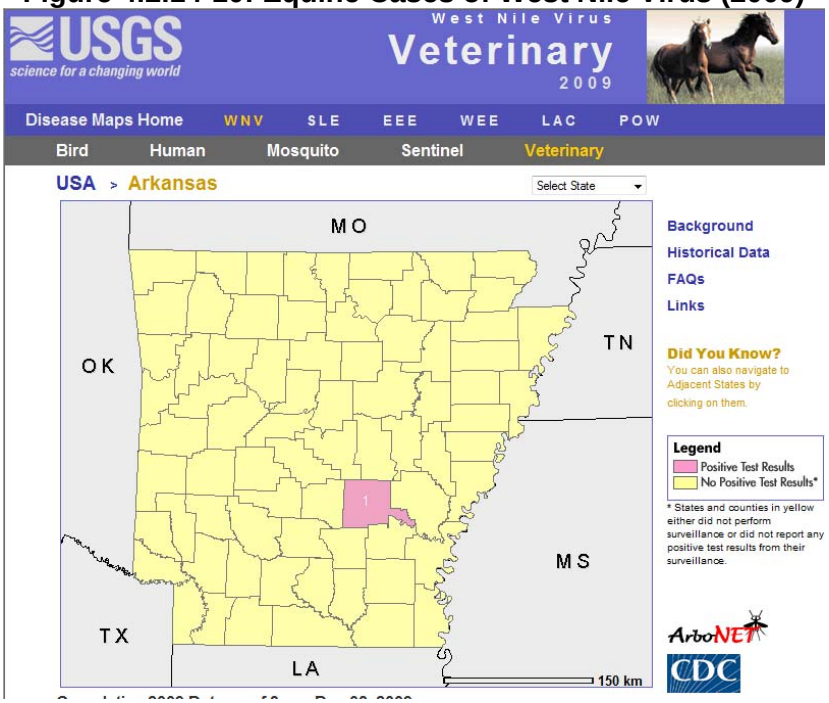


Figure 4.2.14-9: Mosquito Cases of West Nile Virus (2009)



West Nile Virus also poses a risk to the livestock and poultry industry of Arkansas. Birds and horses are known to be affected by WNV and experimental tests suggest that sheep, chickens, and pigs could be affected by WNV. Cows may show antibodies to the virus, which means they have contracted it without showing any clinical signs or becoming ill. The following map shows the cases of equine WNV in Arkansas.

Figure 4.2.14-10: Equine Cases of West Nile Virus (2009)



Probability of Future Events

There is a high probability that Arkansas will experience additional cases of West Nile Virus in people, birds and mosquitoes. This is a continuing issue for the entire country and Arkansas had three human deaths associated with this in 2005 and four deaths in 2006. Mitigation measures are very important for this on-going concern. The probability ranking for this hazard based on previous occurrences is considered to be **"Likely"**.

The HMP Sub-Committee has reviewed this probability analysis. Though new data has been collected about cases and geographic impact for the period from 2005-2009, it has not significantly affected the overall assessment and the future probability.

Small Pox Profile

Smallpox is a serious, contagious and sometimes fatal infectious disease. There is no specific treatment for smallpox disease, and the only prevention is vaccination. The name smallpox is derived from the Latin word for "spotted" and refers to the raised bumps that appear on the face and body of an infected person.

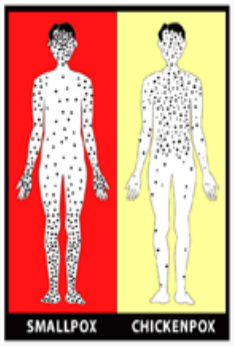
Smallpox outbreaks have occurred from time to time for thousands of years, but the disease is now eradicated after a successful worldwide vaccination program. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. After the disease was eliminated from the world, routine vaccination against smallpox among the general public was stopped because it was no longer necessary for prevention.

Smallpox is caused by the variola virus that emerged in human populations thousands of years ago. Except for laboratory stockpiles, the variola virus has been eliminated. However, in the aftermath of the events of September and October, 2001, there is heightened concern that the variola virus might be used as an agent of bioterrorism. For this reason, the U.S. government is taking precautions for dealing with a smallpox outbreak.

There are two clinical forms of smallpox. Variola major is the severe and most common form of smallpox, with a more extensive rash and higher fever. There are four types of variola major smallpox: ordinary (the most frequent type, accounting for 90% or more of cases); modified (mild and occurring in previously vaccinated persons); flat; and hemorrhagic (both rare and very severe). Historically, variola major has an overall fatality rate of about 30%; however, flat and hemorrhagic smallpox usually are fatal. Variola minor is a less common presentation of smallpox, and a much less severe disease, with death rates historically of 1% or less.

Generally, direct and fairly prolonged face-to-face contact is required to spread smallpox from one person to another. Smallpox also can be spread through direct contact with infected bodily fluids or contaminated objects such as bedding or clothing. Rarely, smallpox has been spread by virus carried in the air in enclosed settings such as buildings, buses, and trains. Humans are the only natural hosts of variola. Smallpox is not known to be transmitted by insects or animals.

A person with smallpox is sometimes contagious with the onset of fever (prodrome phase), but the person becomes most contagious with the onset of rash. At this stage the infected person is usually very sick and not able to move around in the community. The infected person is contagious until the last smallpox scab falls off.

Smallpox Disease	
Incubation Period (Duration: 7 to 17 days) *Not contagious*	**Exposure to the virus** is followed by an incubation period during which people do not have any symptoms and may feel fine. This incubation period averages about 12 to 14 days but can range from 7 to 17 days. During this time, people are not contagious.
Initial Symptoms *(Prodrome)* (Duration: 2 to 4 days) *Sometimes contagious**	The **first symptoms** of smallpox include fever, malaise, head and body aches, and sometimes vomiting. The fever is usually high, in the range of 101 to 104 degrees Fahrenheit. At this time, people are usually too sick to carry on their normal activities. This is called the *prodrome* phase and may last for 2 to 4 days.
Early Rash (Duration: about 4 days) *Most contagious*	A **rash emerges** first as small red spots on the tongue and in the mouth. These spots develop into sores that break open and spread large amounts of the virus into the mouth and throat. At this time, the person becomes **most contagious**.
Rash distribution:  e	Around the time the sores in the mouth break down, a rash appears on the skin, starting on the face and spreading to the arms and legs and then to the hands and feet. Usually the rash spreads to all parts of the body within 24 hours. As the rash appears, the fever usually falls and the person may start to feel better. By the third day of the rash, the rash becomes raised bumps. By the fourth day, the bumps fill with a thick, opaque fluid and often have a depression in the center that looks like a bellybutton. (This is a major distinguishing characteristic of smallpox.) Fever often will rise again at this time and remain high until scabs form over the bumps.
Pustular Rash (Duration: about 5	The bumps become **pustules**—sharply raised, usually round and firm to the touch as if there is a small round object under the skin. People often say the bumps feel

days) *Contagious*	like BB pellets embedded in the skin.
Pustules and Scabs (Duration: about 5 days) *Contagious*	The pustules begin to form a crust and then **scab**. By the end of the second week after the rash appears most of the sores have scabbed over.
Resolving Scabs (Duration: about 6 days) *Contagious*	The scabs begin to fall off, leaving marks on the skin that eventually become pitted **scars**. Most scabs will have fallen off three weeks after the rash appears. The person is contagious to others until all of the scabs have fallen off.
Scabs resolved *Not contagious*	Scabs have fallen off. Person is no longer contagious.

The State of Arkansas has identified Smallpox as a serious hazard due to its potential use as a bio-terrorism agent. Smallpox has been eliminated from the planet as a naturally occurring disease, so the only way citizens will become infected is if the disease is re-introduced to the human population as a terrorism weapon.

Smallpox is classified as a Category A agent by the Centers for Disease Control and Prevention. Category A agents are believed to pose the greatest potential threat for adverse public health impact and have a moderate to high potential for large-scale dissemination. The public is generally more aware of category A agents, and broad-based public health preparedness efforts are necessary. Other Category A agents are anthrax, plague, botulism, tularemia, and viral hemorrhagic fevers.

CDC has a detailed plan to protect Americans against the use of smallpox as a biological weapon. This plan includes the creation and use of special teams of health care and public health workers. If a smallpox case is found, these teams will take steps immediately to control the spread of the disease. Smallpox was wiped out through specific public health actions, including vaccination, and these actions will be used again.

- If a smallpox outbreak happens, public health officials will use television, radio, newspapers, the Internet and other channels to inform members of the public about what to do to protect themselves and their families.
- Officials will tell people where to go for care if they think they have smallpox.
- Smallpox patients will be isolated (kept away from other people who could get sick from them) and will receive the best medical care possible. Isolation prevents the virus from spreading to others.
- Anyone who has had contact with a smallpox patient will be offered a smallpox vaccination as soon as possible. Then, the people who have had contact with those individuals will also be vaccinated. Following vaccination, these people will need to watch for any signs of smallpox. People who have been exposed to smallpox may be asked to take their temperatures regularly and report the results to their health department.
- The smallpox vaccine may also be offered to those who have not been exposed, but would like to be vaccinated. At local clinics, the risks and benefits of the vaccine will be explained and professionals will be available to answer questions.

- No one will be forced to be vaccinated, even if they have been exposed to smallpox.
- To prevent smallpox from spreading, anyone who has been in contact with a person with smallpox but who decides not to get the vaccine may need to be isolated for at least 18 days. During this time, they will be checked for symptoms of smallpox.
- People placed in isolation will not be able to go to work. Steps will be taken to care for their everyday needs (e.g., food and other needs).

To review the entire Smallpox Response Plan and Guidance from the CDC (published November 26, 2002) please go to the following web address:

http://www.bt.cdc.gov/agent/smallpox/response-plan

Geographic Area Affected

The only way that citizens of Arkansas will be affected by Smallpox will be through a deliberate act of aggression and terrorism. There is no natural smallpox risk in the United States or anywhere in the entire world at this time. Based on the assumption of an overt act of bio-terrorism, the entire State of Arkansas is potentially at risk from an attack. However most likely a terrorist organization would target a specific location of strategic importance:

- Major population center
- Critical infrastructure location
- National or patriotic sites such as monuments, historic sites, etc.

This information is not detailed in this mitigation plan. Please contact ADEM directly for more information about Homeland Security issues and specific critical infrastructures at risk.

Previous Occurrences

Smallpox reached Europe between the 5th and 7th centuries and was present in major European cities by the 18th century. Epidemics occurred in the North American colonies in the 17th and 18th centuries. At one time smallpox was a significant disease in every country throughout the world except Australia and a few isolated islands. Millions of people died in Europe and Mexico as a result of widespread smallpox epidemics.

In 1796, Jenner took the fluid from a cowpox pustule on a dairymaid's hand and inoculated an 8-year-old boy. Six weeks later, he exposed the boy to smallpox, and the boy did not develop any symptoms. Jenner coined the term "vaccine" from the word "vaca" which means "cow" in Latin. His work was initially criticized, but soon was rapidly accepted and adopted. By 1800 about 100,000 people had been vaccinated worldwide.

The "modern" vaccine that was licensed by the FDA was taken from a weak strain of virus called the New York City Board of Health strain. It was produced by Wyeth

Laboratories and licensed under the name Dryvax. The last outbreak of smallpox in the United States occurred in Texas in 1949 with 8 cases and 1 death. Even though most of North America, Western Europe, Australia, and New Zealand were free of smallpox by this time, other countries such as Africa and India continued to suffer from epidemics,

In 1967 the World Health Organization (WHO) started a worldwide campaign to eradicate smallpox. This goal was accomplished in 10 years due in a large part to massive vaccination efforts. The last endemic case of smallpox occurred in Somalia in 1977. On May 8, 1980, the World Health Assembly declared the world free of smallpox.

The United States stopped vaccinating the general population in 1972, but continued to vaccinate military personnel. It was recommended that vaccination of military personnel stop in 1986, and vaccination was officially stopped in military recruits in 1990.

Probability of Future Events

As of November 13, 2002, the CDC has announced that the deliberate release of smallpox as an epidemic disease is now regarded as a possibility, and the United States is taking precautions to deal with this possibility.

The Arkansas Hazard Mitigation Planning Sub-Committee feels that the likelihood of a smallpox epidemic in the state is low; therefore, the probability for an event is considered **"Unlikely"**. However, this is a federal priority and therefore the State of Arkansas is committed to planning, response, recovery and mitigation for this potential epidemic. The Sub-Committee has reviewed this section as part of the 2010 plan revision and determined that the prior analysis still remains valid and the probability assessment has not changed significantly since the last revision.

Foot and Mouth Disease (FMD) Profile

FMD is a highly contagious and economically devastating disease of cattle and swine. It also affects sheep, goats, deer, and other cloven-hoofed (split-toed) ruminants. Many affected animals recover, but the disease leaves them debilitated. FMD causes severe losses in the production of meat and milk. Because it spreads widely and rapidly and because it has grave economic as well as physical consequences, FMD is one of the most dreaded animal diseases for livestock owners.

Vesicles (blisters) in the mouth, on the tongue and lips, on the teats, or between the toes—and the resulting excessive salivation or lameness— are the best-known signs of the disease. Blisters may not be observed until they have ruptured. Other signs, including fever, reduced feed consumption, and abortions, also may appear in affected animals during an FMD outbreak. Prior to and during the occurrence of such clinical signs, the virus can be shed through exhaled air, lesions, milk, semen, and blood, making its transmission difficult to control. Direct contact between animals can transmit the disease, as can most animal products, and even inanimate objects. The virus has a remarkable capacity for remaining viable in carcasses, in animal byproducts, in water, in such materials as straw and bedding, and even in pastures.

FMD can be confused with several similar—but less harmful— domestic diseases, such as vesicular stomatitis, bovine virus diarrhea, and foot rot. There are two other foreign

animal diseases that are clinically identical to FMD in swine – swine vesicular disease and vesicular exanthema of swine. Whenever blisters or other typical signs are observed and reported, tests must be conducted to determine whether the disease causing them is FMD.

The disease does not affect human safety. People, however, can spread the virus to animals. FMD can remain in human nasal passages for as long as 28 hours and can be carried on soiled footwear, clothing and other items for several days. Livestock producers need to watch their livestock for blisters around the mouth or muzzle, excessive drooling, lameness, and other signs of FMD in their herd. Swine and cattle typically show signs of the disease within two to seven days of exposure. Sheep and goats may display minimal clinical signs of the disease after an incubation period of up to fourteen days.

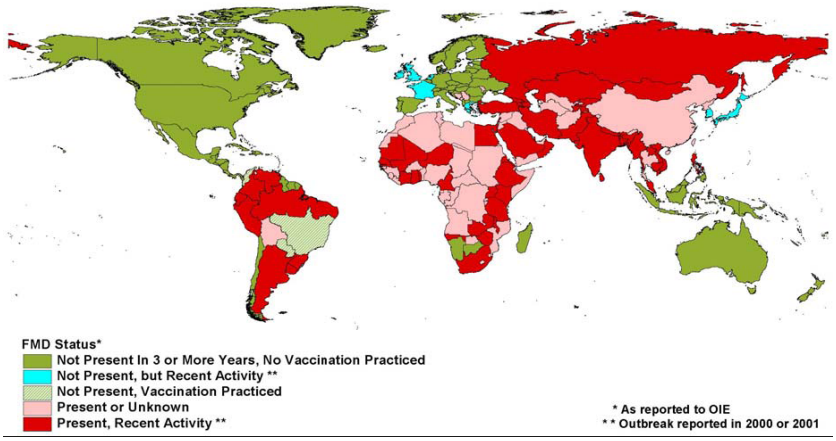
The following disinfectants have been demonstrated to be effective against FMD:

- Lye (sodium hydroxide) – 2 percent solution. Mix a 13-ounce can of lye in five gallons of water.
- Soda ash (sodium carbonate) – 4 percent solution. Mix one pound soda ash in three gallons of water.
- Citric acid - 0.2 percent solution.
- Vinegar (acetic acid) - 2 percent solution. Mix one gallon of vinegar (4 percent) in a gallon of water.
- Virkon S (Antec International) at a 1:200 dilution.
- Household bleach (sodium hypochlorite). Mix three parts bleach to two parts water.

Geographic Area Affected

The following world map from 2001 shows the many locations that have experienced FMD activity. At present the US has not had a case for over 70 years, but this disease is a concern and a high priority for planning purposes.

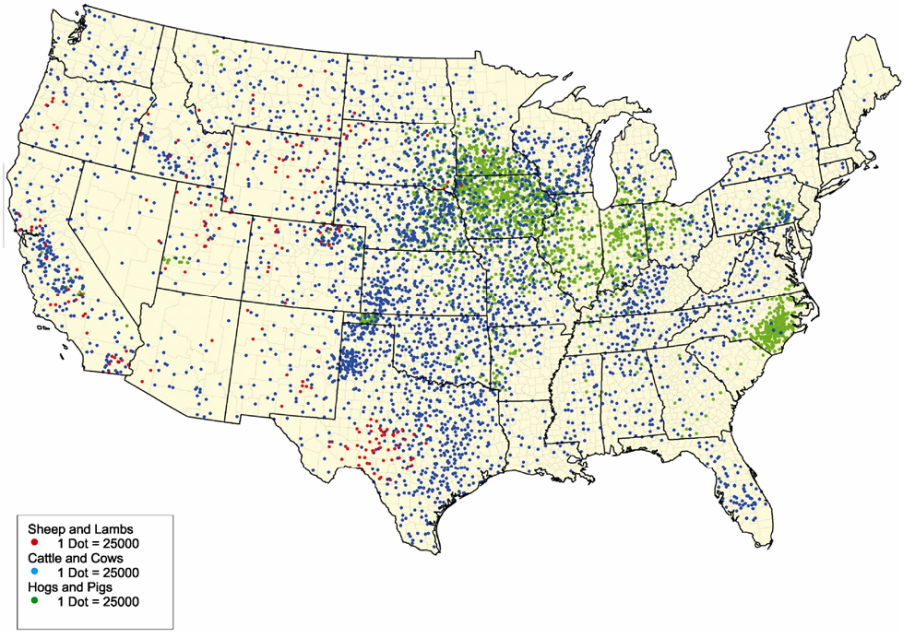
Figure 4.2.14-11: World FMD Status



Source: OIE

The map below shows the distribution of cloven-hoofed livestock in the US based on the 1997 Agricultural Census. These are the areas of the country that are geographically at risk – particularly the areas near the Mexican border and the major sea ports of entry.

Figure 4.2.14-12: Cloven-Hoofed Livestock in the US

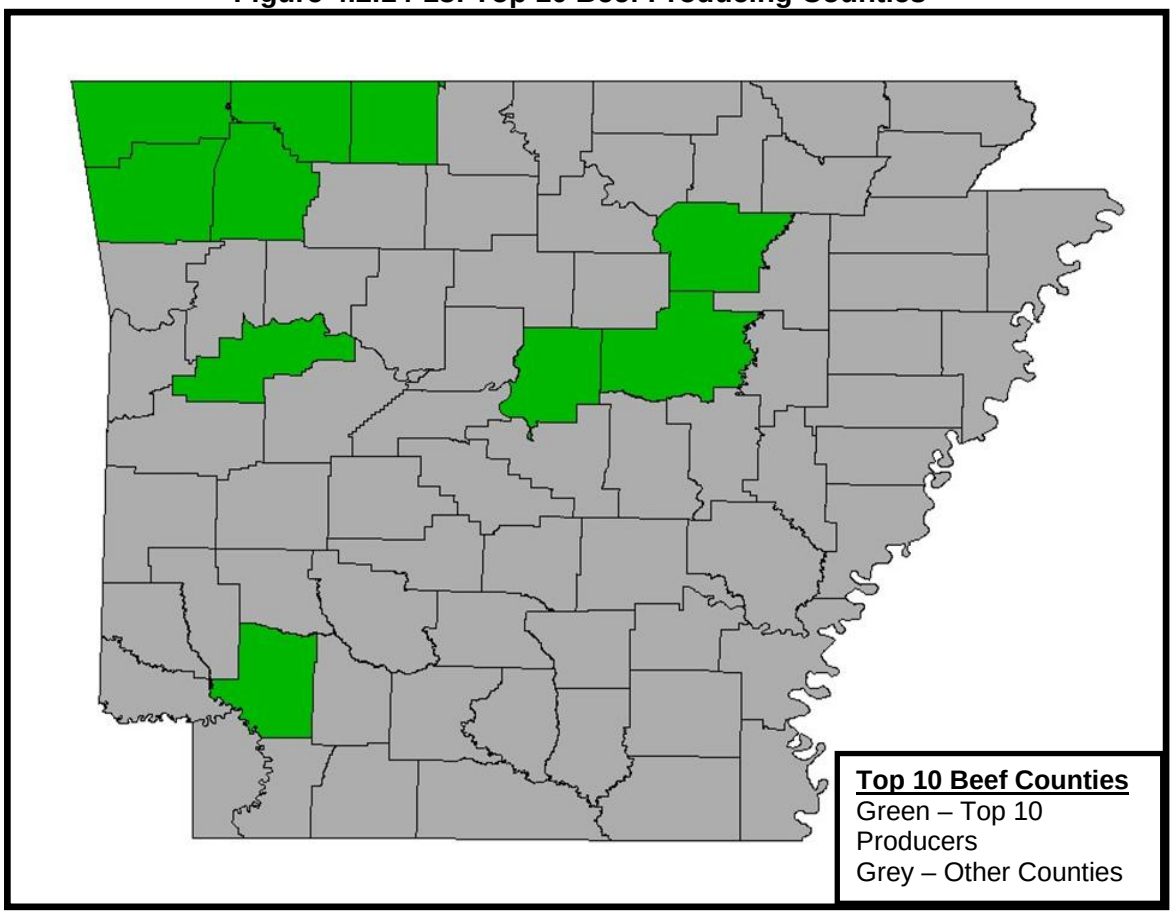


Source: OIE

If FMD reaches the North American continent, then the entire State of Arkansas will be at risk due to the large cattle industry. The following counties are the top producers of beef cattle in the state and are therefore the most likely geographic areas to be significantly affected:

Benton
Boone
Carroll
Faulkner
Hempstead
Independence
Logan
Madison
Washington
White

Figure 4.2.14-13: Top 10 Beef Producing Counties



Source: GeoStor

These counties remain the top 10 beef counties for the 2010 update.

Previous Occurrences

The disease has occurred in most countries of the world including Great Britain, Argentina, Bangladesh, and the Middle East. Besides the United States, only 48 countries or geographical regions were free of the disease as of January 2002. The United States has not had an outbreak of FMD since 1929.

FMD has been introduced into the US on eight occasions since the first reported occurrence in 1870. The most devastating epidemic occurred in 1914. Starting in Michigan, it spread to 22 states after contaminating the Chicago stockyards. During the eradication campaign, some 172,000 cattle, sheep, swine and goats were slaughtered.

In 1924, FMD was found in cattle in Alameda County, California, and the outbreak soon included 16 more counties. Quarantines were established to prevent movements from affected areas of animals, animal parts, manure, hay, fodder, grain and farm vehicles (unless cleaned and disinfected). Infected livestock were driven into trenches, shot and buried. A total of 109,855 cattle, goats, swine and sheep and 22,214 deer were killed. The eradication effort cost approximately $7 million with $4.4 million allocated for compensation for destroyed animals. In 1990 dollars, this equals approximately $45

million in livestock losses and $35 million in program costs (Dowell and Krass, 1992). These figures do not include production and trade losses.

A second California outbreak occurred in 1929. The total eradication cost was substantially smaller than in 1924 because the disease was rapidly diagnosed and intervention was decisive. The last appearances in neighboring countries were in Canada in 1952 and Mexico in 1954.

In February of 2001, Great Britain experienced an outbreak of the disease which has spread to N. Ireland, France and the Netherlands. This 2001 outbreak of Foot and Mouth led to the slaughter of more than six million animals and is estimated to have cost the UK as much as £4billion. Below are some photographs of this outbreak and the subsequent response.

Probability of Future Events

In today's highly mobile environment and global agricultural economy, there is a risk of an introduction of FMD into the United States. Unless the virus is eradicated very quickly after introduction, such an event would be devastating for animal industries, as well as for many other sectors of the economy.

The USDA has done significant research on FMD and the probability of this disease breaching the country's borders. These studies have identified the following pathways for entry. All of these have been considered and the USDA feels that the probability of a future epidemic is very small due to the planning and responsive actions. However due to the size of the US livestock industry, this remains a priority issue.

Table 1. FMD Entry Pathways Reviewed by USDA (ranked from highest perceived risk to lowest perceived risk*)
1. Contraband (prohibited meat products carried by passengers/in cargo containers/sent by mail/courier, black market)
2. Illegal transshipments (products from other than stated point of origin)
3. Garbage (small boats/private planes)
4. Edible animal products (fresh, frozen, chilled meat/dairy products)
5. Garbage (commercial ships/planes)
6. Illegal human movements from foreign countries (illegal immigrants)
7. Other animal-related products (straw, hay, packing material, crop movements, feed, farm equipment, shipping containers)
8. Legal human movements (civilian) from foreign countries
9. Live animals (zoo, breeding livestock)
10. Animal germplasm
11. Inedible animal products (fertilizer, vaccines and other biologics, cosmetics, pet food, casein, hides, taxidermy)
12. Military movements
*Source: Opinion survey of USDA/APHIS Area Veterinarians in Charge, from an "Evaluation in Response to International FMD Outbreaks in 2001", by USDA/APHIS, 10/2001

The probability of FMD in Arkansas which is located near the geographic center of the country is therefore lower than other areas near the borders and oceans, and is considered to be **"Unlikely"**. The HMP Sub-Committee has reviewed this section as part of the 2010 plan revision and determined that the prior analysis still remains valid and the probability assessment has not changed significantly since the last revision.

Mad Cow Disease Profile

Bovine Spongiform Encephalopathy (BSE) is the scientific term for a disease that affects the brains of cattle. Soon after BSE was first discovered in the United Kingdom, it became more commonly known as "Mad Cow Disease," most likely because of the emotional response it generated with the public. Mad Cow Disease is a slowly progressive, degenerative, fatal disease affecting the central nervous system of adult cattle.

Unlike most livestock diseases, BSE is not caused by a bacterial or viral infection, but rather is the result of infectious prions. These are unique proteins that may bond with a cow's brain cells, altering their composition and ultimately leading to the animal's death. In cattle with BSE, these abnormal prions initially occur in the small intestines and tonsils, and are found in central nervous tissues, such as the brain and spinal cord, and other tissues of infected animals experiencing later stages of the disease. Mad Cow Disease is believed to be transferred to cattle when they eat these infectious proteins, yet science has shown the disease can only affect those cows that are genetically susceptible.

A similar disease, scrapie, has affected sheep in the United Kingdom since at least the mid-18th century. Scientists believe that through centuries of close contact in rural

England, the disease managed to transfer to cattle, where it was first identified in 1985. In the years that followed, more than 180,000 cows became infected in the U.K. The British practice of processing central nervous tissue into animal feed allowed the prions to spread rapidly through their herds. As the British exported feed and live animals to various regions of the world, cases of BSE began to appear in other countries.

The disease, which is believed to be caused by an agent smaller than most viruses, has an incubation period of two to eight years and is invariably fatal. There is neither any treatment nor a vaccine to prevent the disease, and there is no test to detect the disease in a live animal. There is no evidence that BSE spreads by contact between adult cattle or, in nature, from cattle to other species. It has spread to native cattle in 19 countries, mostly in Europe, probably mainly through the practice of mixing BSE-contaminated ruminant products into animal feed as an added source of protein.

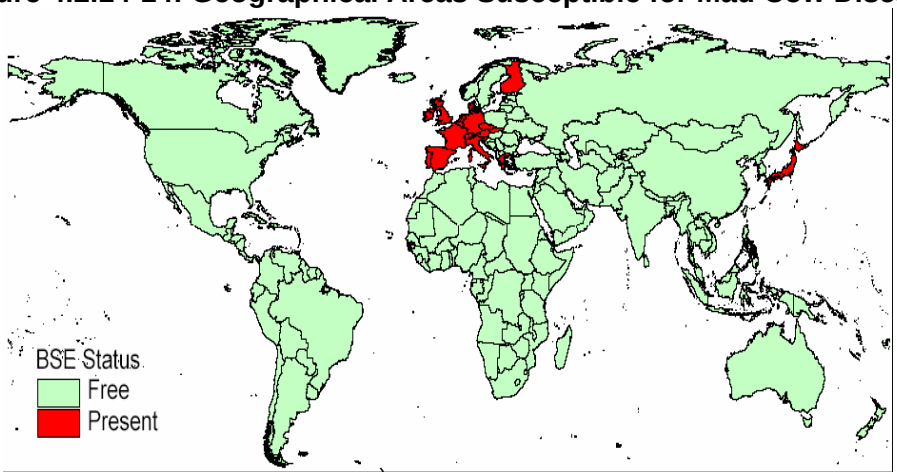
Since 1990, the U.S. Department of Agriculture (USDA) has conducted aggressive surveillance of the highest risk cattle going to slaughter in the United States. In 1997, the United States banned materials that can possibly contain prions from cattle feed, while also eliminating these specified risk materials from the human food supply. This firewall feed ban, in place now for nearly seven years, ensures that BSE cannot spread through American herds the way it did in Europe, where such a feed ban did not occur until after Mad Cow Disease had reached epidemic proportions.

In 1998, USDA commissioned the Harvard Center for Risk Analysis to conduct an analysis and evaluation of the US regulatory measures to prevent the spread of BSE in the US and to reduce the potential exposure of US consumers to BSE. The Harvard study concluded that, if introduced, due to the preventive measures currently in place in the US, BSE is extremely unlikely to become established in the United States.

Geographic Area Affected

All areas of the country that raise and trade cattle are geographically susceptible to a Mad Cow Disease epidemic. However, the US is currently free of BSE. See the map on the following page (Figure 4.2.14-14) from December 2001 showing the affected countries.

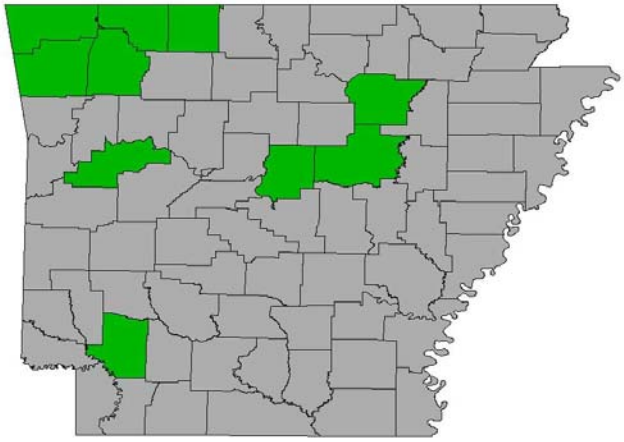
Figure 4.2.14-14: Geographical Areas Susceptible for Mad Cow Disease



Source: OIE

Arkansas is the 17th largest state in production of cattle in the US with 1.8 million head, so most of the state is at risk to Mad Cow Disease. However, the top 10 Arkansas counties in beef cattle production are: Washington, Benton, Carroll, Madison, Boone, White, Hempstead, Independence, Logan, and Faulkner. See the map below to identify these geographic areas. These are the counties with the highest economic vulnerability; therefore the HMP Sub-Committee considers these areas to be most at risk for Mad Cow Disease.

Figure 4.2.14-15: Top 10 Beef Producing Counties



Green – Top 10 Beef Producing Counties
Grey – Other Counties

Previous Occurrences

Mad Cow Disease is currently a concern for the federal US government as well as the major cattle states. This disease caused severe health and economic hardships to England in the late 1980s and early 1990s and a few cases have been showing up in North America in the past few years. BSE has never been detected in the United States, despite active surveillance since 1990. Listed below are the recent occurrences of BSE.

2007 to 2010: There are no reported incidents of BSE in Arkansas or the United States.

June 24, 2005: Agriculture Secretary Mike Johanns announced that the U.S. Department of Agriculture has received final test results from The Veterinary Laboratories Agency in Weybridge, England, confirming that a sample from an animal that was blocked from the food supply in November 2004 has tested positive for BSE.

January 11, 2005: The Canadian Food Inspection Agency (CFIA) announced that Canada's national surveillance program has detected bovine spongiform encephalopathy (BSE) in an Alberta beef cow of seven years of age. As part of its surveillance program, the CFIA took control of the carcass. No part of the animal entered the human food or animal feed systems.

January 2, 2005: Confirmed case in Canada.

December 2004: A second possible case of bovine spongiform encephalopathy (BSE) in the US proved to be a false alarm when the tests came back negative. But the US border remained closed to Canadian beef because of the one confirmed BSE case found in Canada in 2003.

Dec. 23, 2003: The U.S. Department of Agriculture reported that a cow in Washington State had tested positive for BSE.

May 2003: A cow slaughtered in Alberta, Canada in January tested positive for mad cow disease. The 8-year-old cow was tested and killed in January after showing signs of illness. Tests at a laboratory in the United Kingdom confirmed signs of Bovine Spongiform Encephalopathy (BSE) or Mad Cow Disease.

1986-1993: The epidemic in cattle in Great Britain reached incredible proportions; by 1993 more than 1,000 cases per week were being reported. More than 160,000 infected cows were identified, involving more than 50% of the dairy herds in the UK. Protein supplements containing sheep and cattle offal were banned in the UK in 1988, but it was not until 1991-1992 that the ban was strictly enforced. Given the long incubation of BSE, the epidemic curve (number of new cases reported per week) didn't start downward until late 1993.

Probability of Future Events

There is a relatively low probability of a case of BSE affecting the herds of Arkansas.

The U.S. Department of Agriculture (USDA) has conducted several risk assessments examining the possibility of BSE emerging in the United States. All the assessments have concluded that the potential risk of BSE emerging in the United States is substantially less than in the United Kingdom. A three-year study of the risk of BSE in

the United States, completed by the Harvard Center for Risk Analysis in November 2001, concluded that the U.S. Government's actions have successfully minimized the risk of BSE in the United States, to the point that even if a few infected animals were detected here, the disease would not become established. Nevertheless, the adverse economic impact of a BSE case in the United States would likely be similar in many respects to that experienced in the United Kingdom.

To date, there is no evidence of BSE in the State of Arkansas or in the United States in general, with the excpetion of 3 cows being infected in the past 10 years, therefore the probability for an outbreak is rated as **"Unlikely"**. The U.S. Government is working proactively to keep BSE out of this country. The Sub-Committee has reviewed this section as part of the 2010 plan revision and determined the probability assessment has not changed significantly since the last revision.

All Hazard Mitigation Plan
State of Arkansas

Chapter 3 – Vulnerability Assessment

Updated September 2, 2010

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4.3 Assessing Vulnerability by Jurisdiction

Assessing Vulnerability by Jurisdiction	
IFR REQUIREMENT *201.4(c)(2)(ii):*	[The risk assessment shall include] an overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2) based on estimates provided in local risk assessments The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events...
Explanation:	The plan **shall** describe which jurisdictions are most threatened and vulnerable to hazards and the process used to identify them. Identification of these jurisdictions **shall** be based on an analysis of available local risk assessments conducted throughout the State, and where not available, on State risk assessments.
Plan Update	The State **shall** describe any changes, clarifications, or refinements to the previous overview of the State's vulnerability resulting from any new or updated data, as well as information generated through local mitigation plans. The update **must** explain the process used to analyze information from the local risk assessments and adjust the statewide risk assessment, as necessary. Recognizing the differences in local risk assessments, information from local mitigation plans allows the State to better understand or describe its vulnerability in terms of the jurisdictions most threatened by natural hazards. However, the update should not attempt to include the details provided in every local mitigation plan. Recognizing that statewide vulnerability may not change much in any given three-year update cycle, this section provides an opportunity to anticipate future risk. The State **must** consider in its assessment, for jurisdictions in hazard prone areas, changes in development that may impact vulnerability such as: • Significant population increases and shifts in population to vulnerable areas; • A concentration or changes in land use or land use activities in vulnerable areas; and/or • Implementation of mitigation actions that have reduced vulnerability

In conducting this vulnerability and impact analysis of hazard events, the HMP Sub-Committee has reviewed the official guidance and information from the Federal Emergency Management Agency (FEMA) and the Emergency Management Accreditation Program (EMAP) regarding the specific elements of a complete hazard analysis. Based on this research, the planning team has considered the following elements for this Vulnerability and Impact Analysis:

The overall vulnerability of each jurisdiction within the state, including the vulnerability of its residents, animals, property, facilities and state infrastructure;

Vulnerability of specific state-owned facilities within each jurisdiction;

Potential losses to life and property within each jurisdiction, including the on-going economic and financial impact to the State of Arkansas;

The health and safety of the population (including injury and death), during an event;

The state government's ability to continue operations and to deliver essential services to the population;

The overall environmental impact, including any long-term or residual effects; and

The state's regulatory and contractual obligation to the public, as well as the public's confidence in the state's response and recovery abilities.

Because of local data limitations, the jurisdictional vulnerability assessment was conducted on a state level for the identified hazards. As of January, 2010, 62 Arkansas local mitigation plans have been approved by ADEM and FEMA under the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). The local risk assessments are publicly available and data from the plans has been used for this assessment of vulnerability by local jurisdictions. A detailed discussion of local jurisdiction planning timelines is provided in Sections 5.6 and 5.7 of this plan. Along with this state-level analysis, all approved local vulnerability and loss estimate data have been reviewed and integrated into this state plan. This local data has been combined with historical data found in the National Climactic Data Center's Storm Event Database as part of the overall local loss estimation section. For local loss estimate information, please refer to the Local Plan Integration Section and to each local mitigation plan for complete details.

Methodologies for Analyzing Vulnerability

The HMP Sub-Committee conducted an extensive search for information and data about the overall vulnerability of the state. The committee focused on establishing a baseline understanding of the populations, critical facilities and collective infrastructure at risk from the various hazards. The extensive effort comprised a number of individual initiatives:

- Interviews with state departments about best available data for their facilities and programs.
- Coordination with the Arkansas Geographic Information Office and the Arkansas Office of Information Technology regarding state owned and operated facilities, and other existing state databases.
- Research of public records including newspapers, libraries, and the internet.
- Communication with federal agencies with national data for weather, dams, highways and other critical infrastructure.
- Meetings with private businesses and subject-matter experts for various industries.

After this research phase, all the available data was collated and developed into the state vulnerability baseline. Using this baseline data, the HMP Sub-Committee determined three distinct methodologies for analyzing the vulnerability of the overall state. Each of the methodologies is independent from the others and the resulting analysis is therefore different. However, the combination of the three methods gives a solid and complementary perspective of the "big picture" in Arkansas. The following details the three methodologies:

- **HAZUS MH2 –** The original vulnerability analysis performed in 2004 used the FEMA approved risk assessment software, HAZUS. County-level reporting consisted of number and types of critical facilities, dollar exposure for infrastructure and estimated populations. This data was then used for each hazard specific analysis. For the 2007 plan revision, the newest version of HAZUS was employed and data from the Arkansas Geographic Information Office was integrated for improved accuracy.
- **Local Plan Integration –** Arkansas currently has 62 jurisdictions that have completed the FEMA-approval process under the Disaster Mitigation Act of 2000. These 62

jurisdictions developed detailed risk assessments and mitigation strategies for their specific areas and these plans were incorporated into this state-level vulnerability analysis. Each local plan was reviewed and specific data about each hazard was collected and collated into a statewide matrix. As more local plans are approved by FEMA, this matrix will expand, thereby providing more details for this vulnerability analysis. The hazard ranking and corresponding color coded map indicate the jurisdictions risk ranking for each hazard, not the probability of future events.

- **GIS Baseline Dataset –** The best available GIS data for the State of Arkansas was collected, standardized and collated into a baseline dataset for hazard modeling. This data includes emergency management locations, schools, medical facilities, private business infrastructure and transportation. Using commercial off-the-shelf GIS mapping applications and this dataset, risk modeling was conducted for each hazard resulting in maps and spreadsheet reports.

Methodology 1 - HAZUS MH2

The original plan (2003-2004) used HAZUS-MH - FEMA's software program for estimating potential losses from disasters. This modeling program was used to inventory assets and determine the exposure to hazards addressed in this plan at both the state and county levels. Data DVD #3 (C1) Version 1.0, January 2004 was used for the original asset data listed in this plan. For the 2007 plan revision, the newest version of HAZUS-MH2 was used along with the updated national dataset Data DVD #3 (C1) Version 1.2, May, 2006 that came integrated with this application. The HMP Sub-Committee used AGIO data to replace some of the less accurate national datasets in HAZUS. This advanced data integration was performed by Bold Planning Solutions; one of the few FEMA authorized HAZUS-MH2 vendors. See the related article on the FEMA website below.

http://www.fema.gov/plan/prevent/hazus/hz_psi_vendors.shtm

The State of Arkansas project involves the incorporation of HAZUS "Level II" data into the statewide GIS inventory. In close collaboration with the state's AGIO, Bold Planning Solutions replaced HAZUS-MH2 default inventory data with updated data (including fire, law enforcement, schools and hospitals). By incorporating the most up-to-date local GIS information into HAZUS-MH2, this risk assessment produced more detailed modeling results, which better reflect the effects of a disaster.

The data in Table 4.3-3 consists of HAZUS related data from HAZUS-MH2 for the 2007 revision plan. This gives an overall picture of the state exposure in terms of human population, number of essential facilities, and economic exposure. For this HAZUS-MH2 methodology, this data is the baseline for the individual hazard analysis.

Based on 2000 census data (the last official census), the State of Arkansas has 2,673,400 persons living in 1,042,696 households (Table 4.3-1). The US Census bureau has published the 2009 population estimates for the State of Arkansas. Based on the statewide estimate of 2,889,450 individuals and 1,298,137 households, the state has seen a projected growth rate of approximately one percent over the past five years. For the purposes of this 2010 vulnerability analysis the HMP Sub-Committee has considered the population exposure to be basically flat since the original risk assessment was performed in 2003-2004.

Table 4.3-1: Arkansas Demographic Characteristics for 2009

General Demographic Characteristics: 2009	Estimate	Margin of Error
Total population	**2,889,450**	*****
SEX AND AGE		
Male	1,385,579	+/-3,291
Female	1,444,468	+/-3,291
HOUSEHOLDS BY TYPE		
Total households	**1,106,185**	**+/-4,447**
Family households (families)	753,559	+/-5,385
With own children under 18 years	331,978	+/-3,931
Married-couple families	562,164	+/-5,234
With own children under 18 years	220,526	+/-3,508
Male householder, no wife present	46,700	+/-2,031
With own children under 18 years	23,682	+/-1,509
Female householder, no husband present	144,695	+/-3,041
With own children under 18 years	87,770	+/-2,719
Non-family households	352,626	+/-4,491
Householder living alone	303,344	+/-4,429
65 years and over	113,119	+/-2,286
Households with one or more people under 18 years	376,392	+/-4,226
Households with one or more people 65 years and over	278,642	+/-1,995
Average household size	2.49	+/-0.01
Average family size	3.02	+/-0.02

For the purposes of this vulnerability analysis, the HMP Sub-Committee has also included data about the 2009 Census estimates for the number of housing units in the state as well as the estimated replacement values.

Table 4.3-2: Arkansas Census Housing Characteristics for 2009

Selected Housing Characteristics: 2009	Estimate	Margin of Error
HOUSING OCCUPANCY		
Total housing units	**1,286,382**	**+/-349**
Occupied housing units	1,106,185	+/-4,447
Vacant housing units	180,197	+/-4,531
Owner-occupied units	**750,243**	**+/-6,001**
VALUE		
Less than $50,000	145,203	+/-3,506
$50,000 to $99,999	231,514	+/-3,932
$100,000 to $149,999	151,292	+/-2,949
$150,000 to $199,999	96,839	+/-2,348
$200,000 to $299,999	71,467	+/-2,202
$300,000 to $499,999	37,017	+/-1,425
$500,000 to $999,999	13,898	+/-926
$1,000,000 or more	3,013	+/-402
Median (dollars)	99,600	+/-859

HAZUS-MH2 Analysis Overview

HAZUS-MH2 was used to inventory assets and determine the exposure to hazards addressed in this plan at both the state and county levels. Data DVD #3 (C1) Version 1.2, May, 2006 was used for the asset data listed in this plan.

HAZUS estimates show 1,143,000 buildings with an aggregate total replacement value (building and contents) of over $251.5 billion. Detailed information on the general distribution of the building stock exposure by general occupancy, by county, is provided in the table below. Wood frame construction makes up 73% of the building inventory within the State of Arkansas, with the remaining percentage distributed amongst other general building types.

Lifeline inventory within HAZUS is divided between transportation and utility lifeline systems. The transportation lifeline inventory consists of seven transportation systems that include highways, railways, light rails, buses, ports, ferries and airports. The utility lifeline inventory is comprised of six utility systems including potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data is provided in the table below. The total value of the lifeline inventory is over $96,374 million and includes over 15,980 kilometers of highways, 5,634 bridges and 382,167 kilometers of pipes. The statewide dollar distribution of building stock and lifelines is shown in Table 4.3-3.

Critical facilities are broken into two categorizations by HAZUS: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites. Essential facilities within the region include 109 hospitals with a total bed capacity of 12,071, 1,259 schools, 1,318 fire stations, 515 police stations and 11 emergency operation facilities. HPL facilities within the region include, 1,174 dams, of which, 173 are classified as “high hazard.” The inventory also includes 1,475 hazardous material sites, and 1 nuclear power plant. Table 4.3-4 provides an inventory of critical facilities, by county, that are vulnerable to hazards.

Table 4.3-3: 2007 HAZUS Report - Population, building, and lifelines exposed to hazards in Arkansas by county

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Arkansas	20,749	8,457	$1,959,105	$819,062	$376,884	$3,155,051
Ashley	24,209	9,384	$2,079,308	$1,033,710	$407,839	$3,520,857
Baxter	38,386	17,052	$3,783,546	$954,706	$261,435	$4,999,687
Benton	153,406	58,212	$15,341,645	$1,371,340	$965,847	$17,678,832
Boone	33,948	13,851	$3,185,271	$910,572	$116,232	$4,212,075
Bradley	12,600	4,834	$992,949	$587,155	$116,058	$1,696,162
Calhoun	5,744	2,317	$429,651	$804,551	$289,884	$1,524,086
Carroll	25,357	10,189	$2,331,319	$969,171	$414,642	$3,715,132
Chicot	14,117	5,205	$968,683	$926,061	$203,058	$2,097,802
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Clay	17,609	7,417	$1,574,149	$721,963	$581,665	$2,877,777
Cleburne	24,046	10,190	$2,841,804	$603,242	$145,116	$3,590,162
Cleveland	8,571	3,273	$626,923	$498,190	$173,826	$1,298,939
Columbia	25,603	9,981	$2,037,015	$1,042,009	$378,694	$3,457,718

Conway	20,336	7,967	$1,867,754	$753,888	$203,919	$2,825,561
Craighead	82,148	32,301	$8,156,237	$913,854	$734,106	$9,804,197
Crawford	53,247	19,702	$4,161,626	$1,162,819	$265,315	$5,589,760
Crittenden	50,886	18,471	$4,358,456	$1,648,511	$521,913	$6,528,880
Cross	19,526	7,391	$1,483,817	$830,815	$290,058	$2,604,690
Dallas	9,210	3,519	$797,958	$660,375	$202,971	$1,661,304
Desha	15,341	5,922	$1,308,846	$582,976	$347,826	$2,239,648
Drew	18,723	7,337	$1,552,496	$711,165	$174,174	$2,437,835
Faulkner	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Franklin	17,771	6,882	$1,452,041	$585,923	$290,563	$2,328,527
Fulton	11,624	4,810	$1,045,832	$833,949	$116,058	$1,995,839
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Grant	16,464	6,241	$1,279,753	$795,183	$174,174	$2,249,110
Greene	37,331	14,750	$3,391,720	$690,119	$327,729	$4,409,568
Hempstead	23,587	8,959	$1,689,613	$1,149,661	$414,642	$3,253,916
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
Howard	14,300	5,471	$1,058,845	$876,166	$232,203	$2,167,214
Independence	34,233	13,467	$3,097,289	$878,415	$452,748	$4,428,452
Izard	13,249	5,440	$1,055,007	$737,243	$376,623	$2,168,873
Jackson	18,418	6,971	$1,580,775	$912,604	$619,336	$3,112,715
Jefferson	84,278	30,555	$7,512,310	$15,421,946	$677,112	$23,611,368
Johnson	22,781	8,738	$1,765,691	$827,011	$209,696	$2,802,398
Lafayette	8,559	3,434	$647,857	$551,756	$329,365	$1,528,978
Lawrence	17,774	7,108	$1,452,704	$974,861	$522,774	$2,950,339
Lee	12,580	4,182	$660,998	$501,439	$231,942	$1,394,379
Lincoln	14,492	4,265	$899,908	$538,284	$174,861	$1,613,053
Little River	13,628	5,465	$1,129,972	$385,969	$289,797	$1,805,738
Logan	22,486	8,693	$1,832,764	$568,467	$394,032	$2,795,263
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Madison	14,243	5,463	$1,088,498	$984,759	$59,064	$2,132,321
Marion	16,140	6,776	$1,505,908	$630,457	$173,826	$2,310,191
Miller	40,443	15,637	$3,028,753	$1,045,446	$175,122	$4,249,321
Mississippi	51,979	19,349	$4,226,460	$2,171,344	$1,214,781	$7,612,585
Monroe	10,254	4,105	$876,557	$1,083,840	$202,971	$2,163,368
Montgomery	9,245	3,785	$804,599	$782,797	$231,768	$1,819,164
Nevada	9,955	3,893	$704,325	$926,367	$89,932	$1,720,624
Newton	8,608	3,500	$854,540	$515,993	$144,942	$1,515,475
Ouachita	28,790	11,613	$2,261,900	$946,103	$356,961	$3,564,964
Perry	10,209	3,989	$867,114	$436,122	$57,942	$1,361,178
Phillips	26,445	9,711	$1,830,095	$631,642	$502,764	$2,964,501

Pike	11,303	4,504	$961,598	$575,156	$174,000	$1,710,754
Poinsett	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Polk	20,229	8,047	$1,455,330	$872,440	$233,064	$2,560,834
Pope	54,469	20,701	$5,179,873	$968,461	$555,713	$6,704,047
Prairie	9,539	3,894	$920,317	$1,009,934	$289,797	$2,220,048
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Randolph	18,195	7,265	$1,445,881	$449,940	$292,729	$2,188,550
St. Francis	29,329	10,043	$2,138,818	$950,083	$750,723	$3,839,624
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
Scott	10,996	4,323	$789,013	$953,781	$117,006	$1,859,800
Searcy	8,261	3,523	$644,909	$651,931	$174,000	$1,470,840
Sebastian	115,071	45,300	$12,255,589	$764,711	$707,380	$13,727,680
Sevier	15,757	5,708	$1,089,374	$678,002	$289,710	$2,057,086
Sharp	17,119	7,211	$1,638,420	$617,077	$174,000	$2,429,497
Stone	11,499	4,768	$970,125	$445,230	$87,174	$1,502,529
Union	45,629	17,989	$4,174,282	$928,430	$734,454	$5,837,166
Van Buren	16,192	6,825	$1,565,684	$793,475	$347,826	$2,706,985
Washington	157,715	60,151	$15,034,068	$1,975,733	$321,456	$17,331,257
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Woodruff	8,741	3,531	$678,476	$834,977	$327,468	$1,840,921
Yell	21,139	7,922	$1,645,708	$812,038	$319,890	$2,777,636
Totals	**2,673,402**	**1,042,696**	**251,524,662**	**81,355,657**	**28,899,658**	**361,779,977**

The following table produced by HAZUS-MH2 provides the total exposure of buildings and contents by the General Occupancy types. The total exposure amounts in this table correspond to the Building Stock numbers in Table 4.3-3.

County	Residential (X1000)	Commercial (X1000)	Industrial (X1000)	Agricultural (X1000)	Religious (X1000)	Educational (X1000)	Governmental (X1000)	Total (X1000)
Arkansas	$1,619,665	$241,388	$38,200	$29,458	$14,702	$5,814	$9,878	$1,959,105
Ashley	$1,659,509	$241,951	$118,566	$9,696	$36,320	$11,856	$1,410	$2,079,308
Baxter	$3,051,982	$487,229	$161,021	$9,520	$47,082	$17,186	$9,526	$3,783,546
Benton	$12,842,850	$1,707,803	$570,009	$28,206	$129,424	$48,835	$14,518	$15,341,645
Boone	$2,462,302	$523,720	$140,863	$6,986	$28,906	$18,142	$4,352	$3,185,271
Bradley	$890,622	$72,200	$14,505	$372	$7,382	$5,066	$2,802	$992,949
Calhoun	$382,738	$23,769	$8,888	$388	$10,060	$3,350	$458	$429,651
Carroll	$1,812,467	$339,753	$111,006	$4,592	$40,810	$15,522	$7,169	$2,331,319
Chicot	$761,898	$120,140	$44,495	$18,432	$19,574	$2,686	$1,458	$968,683
Clark	$1,572,182	$230,639	$87,400	$5,248	$24,876	$21,071	$4,994	$1,946,410
Clay	$1,352,864	$144,434	$41,493	$10,642	$11,222	$10,392	$3,102	$1,574,149
Cleburne	$2,265,447	$372,936	$127,899	$6,352	$39,348	$25,906	$3,916	$2,841,804

Cleveland	$596,820	$17,333	$4,990	$312	$4,848	$1,172	$1,448	$626,923
Columbia	$1,652,005	$223,823	$111,263	$2,762	$26,118	$19,096	$1,948	$2,037,015
Conway	$1,515,625	$215,982	$72,096	$7,232	$29,578	$20,401	$6,840	$1,867,754
Craighead	$5,932,983	$1,489,834	$543,915	$30,470	$87,976	$43,702	$27,357	$8,156,237
Crawford	$3,537,556	$412,746	$140,284	$5,116	$39,368	$22,066	$4,490	$4,161,626
Crittenden	$3,582,891	$525,755	$133,874	$10,850	$61,266	$31,319	$12,501	$4,358,456
Cross	$1,227,624	$166,868	$32,481	$17,594	$26,108	$3,958	$9,184	$1,483,817
Dallas	$659,240	$88,188	$26,184	$702	$18,012	$4,378	$1,254	$797,958
Desha	$947,795	$208,018	$84,249	$25,240	$23,858	$14,260	$5,426	$1,308,846
Drew	$1,256,907	$182,575	$34,650	$13,250	$42,678	$19,748	$2,688	$1,552,496
Faulkner	$6,564,285	$905,744	$517,522	$15,922	$76,782	$481,956	$15,093	$8,577,304
Franklin	$1,241,539	$113,969	$36,254	$12,112	$19,486	$19,054	$9,627	$1,452,041
Fulton	$844,513	$102,725	$67,212	$4,130	$11,768	$13,290	$2,194	$1,045,832
Garland	$7,465,533	$1,162,950	$354,352	$18,382	$86,260	$23,266	$10,492	$9,121,235
Grant	$1,148,125	$93,438	$24,006	$778	$6,682	$1,930	$4,794	$1,279,753
Greene	$2,802,200	$420,692	$121,804	$10,632	$25,546	$7,740	$3,106	$3,391,720
Hempstead	$1,422,097	$195,143	$27,632	$5,612	$15,234	$17,947	$5,948	$1,689,613
Hot Spring	$2,131,888	$282,283	$133,795	$5,686	$40,814	$27,394	$4,386	$2,626,246
Howard	$887,204	$123,142	$32,141	$4,070	$11,344	$850	$94	$1,058,845
Independence	$2,513,611	$421,778	$86,627	$13,078	$32,388	$23,415	$6,392	$3,097,289
Izard	$865,783	$120,297	$34,271	$2,856	$17,034	$13,222	$1,544	$1,055,007
Jackson	$1,272,288	$254,044	$15,867	$12,458	$10,896	$11,264	$3,958	$1,580,775
Jefferson	$6,140,299	$1,002,864	$183,361	$13,622	$106,214	$38,056	$27,894	$7,512,310
Johnson	$1,441,906	$193,088	$82,307	$4,966	$22,604	$11,408	$9,412	$1,765,691
Lafayette	$583,597	$38,846	$5,708	$4,098	$7,664	$7,538	$406	$647,857
Lawrence	$1,248,620	$143,582	$32,141	$7,012	$5,124	$13,575	$2,650	$1,452,704
Lee	$573,287	$63,125	$3,355	$7,398	$9,222	$3,756	$855	$660,998
Lincoln	$798,783	$59,306	$15,537	$6,608	$13,602	$5,140	$932	$899,908
Little River	$1,008,393	$85,943	$15,068	$2,362	$14,134	$2,442	$1,630	$1,129,972
Logan	$1,576,228	$159,577	$52,103	$3,676	$23,098	$3,324	$14,758	$1,832,764
Lonoke	$4,189,572	$355,704	$125,569	$13,514	$47,004	$12,266	$8,333	$4,751,962
Madison	$954,882	$74,254	$30,064	$6,320	$14,612	$7,654	$712	$1,088,498
Marion	$1,200,817	$124,898	$145,726	$6,532	$17,232	$7,764	$2,939	$1,505,908
Miller	$2,645,165	$267,229	$33,077	$10,190	$45,314	$21,030	$6,748	$3,028,753
Mississippi	$3,498,721	$450,592	$170,574	$44,494	$34,256	$20,071	$7,752	$4,226,460
Monroe	$705,354	$122,558	$18,962	$12,792	$6,904	$5,350	$4,637	$876,557
Montgomery	$689,767	$62,948	$24,983	$6,620	$9,212	$5,220	$5,849	$804,599
Nevada	$627,715	$43,535	$18,233	$2,418	$8,678	$346	$3,400	$704,325
Newton	$583,680	$226,265	$12,459	$2,370	$18,038	$10,204	$1,524	$854,540
Ouachita	$1,897,664	$243,598	$65,761	$1,636	$28,078	$17,378	$7,785	$2,261,900
Perry	$770,806	$42,144	$22,652	$6,572	$17,730	$5,588	$1,622	$867,114
Phillips	$1,496,046	$222,981	$42,815	$7,306	$20,292	$30,385	$10,270	$1,830,095

Pike	$749,590	$136,222	$28,432	$8,172	$24,316	$9,114	$5,752	$961,598
Poinsett	$1,667,415	$374,448	$233,146	$16,516	$28,268	$10,210	$6,488	$2,336,491
Polk	$1,189,109	$196,367	$43,914	$4,692	$7,390	$9,688	$4,170	$1,455,330
Pope	$4,126,016	$655,290	$302,421	$12,966	$62,790	$17,358	$3,032	$5,179,873
Prairie	$787,246	$56,440	$32,083	$21,200	$10,226	$10,678	$2,444	$920,317
Pulaski	$33,365,514	$8,420,036	$1,651,700	$49,062	$550,334	$361,952	$409,581	$44,808,179
Randolph	$1,247,712	$115,960	$65,263	$3,780	$10,486	$714	$1,966	$1,445,881
Saint Francis	$1,709,381	$206,862	$141,398	$17,548	$32,324	$26,023	$5,282	$2,138,818
Saline	$6,505,119	$610,136	$177,448	$5,092	$74,884	$23,802	$8,698	$7,405,179
Scott	$668,990	$76,731	$14,817	$5,528	$10,524	$8,044	$4,379	$789,013
Searcy	$549,514	$57,081	$18,506	$5,282	$6,594	$7,932	$0	$644,909
Sebastian	$9,329,882	$2,071,425	$649,472	$16,562	$120,620	$48,378	$19,250	$12,255,589
Sevier	$903,591	$137,758	$13,984	$6,010	$12,486	$8,036	$7,509	$1,089,374
Sharp	$1,334,116	$218,050	$31,969	$2,692	$25,040	$19,230	$7,323	$1,638,420
Stone	$741,326	$152,298	$32,419	$2,484	$25,002	$9,884	$6,712	$970,125
Union	$3,146,567	$834,213	$96,677	$5,098	$42,076	$40,224	$9,427	$4,174,282
Van Buren	$1,297,610	$162,677	$40,043	$8,632	$41,758	$7,314	$7,650	$1,565,684
Washington	$11,392,797	$2,718,107	$558,599	$37,994	$154,540	$137,274	$34,757	$15,034,068
White	$4,766,133	$779,600	$227,797	$11,526	$66,832	$68,289	$3,628	$5,923,805
Woodruff	$594,774	$54,964	$8,280	$13,546	$4,338	$1,980	$594	$678,476
Yell	$1,376,749	$148,713	$65,102	$18,498	$22,088	$7,496	$7,062	$1,645,708
Total	**$200,823,491**	**$34,399,704**	**$9,633,739**	**$792,522**	**$2,925,678**	**$2,069,369**	**$880,159**	**$251,524,662**

Table 4.3-4: 2007 HAZUS-MH2 Inventory of critical facilities exposed to hazards in Arkansas by county

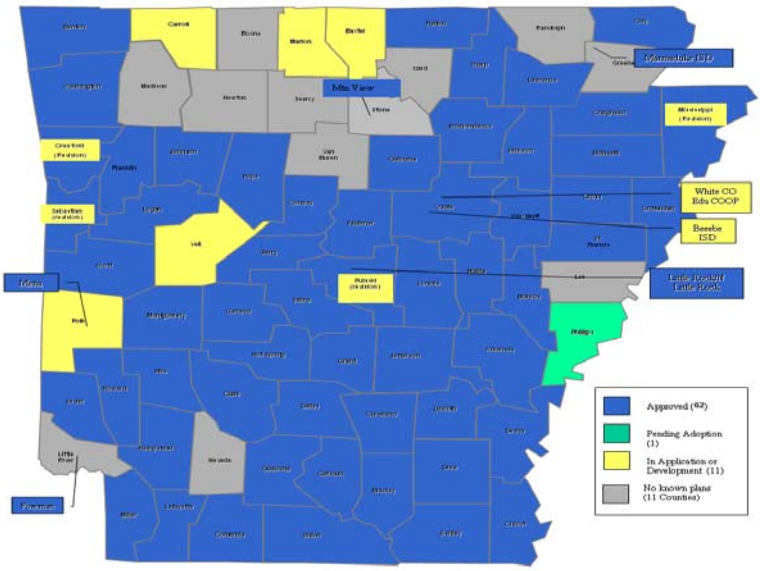
	Critical Facilities Exposure									
	Essential Facilities						High Potential Loss Facilities			
County	Hospitals	Hospital Beds	Schools	Fire Stations	Police Stations	Emergency Operation Facilities	Dams	High Hazard Dams	Hazardous Materials Facilities	Nuclear Power Plants
Arkansas	2	74	13	13	8	0	71	0	1	0
Ashley	1	33	13	11	9	0	9	0	10	0
Baxter	1	268	12	25	6	0	6	3	0	0
Benton	3	366	61	48	18	0	20	5	10	0
Boone	1	160	22	26	5	0	2	0	3	0
Bradley	1	35	7	10	4	0	6	0	0	0
Calhoun	0	0	2	7	3	0	7	0	5	0
Carroll	2	47	11	17	5	1	10	3	0	0
Chicot	1	25	10	6	4	0	5	0	0	0
Clark	1	25	10	15	6	0	10	4	6	0
Clay	1	25	7	11	5	0	10	1	4	0
Cleburne	1	25	12	19	6	0	14	2	0	0
Cleveland	0	0	5	10	3	0	8	0	0	0
Columbia	1	70	9	16	5	0	17	0	27	0
Conway	1	35	12	15	6	0	34	3	16	0
Craighead	5	594	41	24	13	0	27	4	20	0
Crawford	1	103	24	34	8	0	16	6	4	0
Crittenden	1	152	27	16	14	1	1	0	29	0
Cross	1	15	7	7	4	0	15	4	11	0
Dallas	1	25	5	10	3	0	3	0	2	0
Desha	2	60	7	9	10	0	2	0	1	0
Drew	1	49	7	12	4	1	9	1	0	0
Faulkner	2	175	34	28	10	1	37	11	10	0
Franklin	1	25	13	11	4	1	20	1	7	0
Fulton	1	25	6	13	4	0	25	1	0	0
Garland	6	639	32	34	11	0	29	8	9	0
Grant	0	0	6	11	2	0	8	0	4	0
Greene	1	129	19	11	4	0	12	5	21	0
Hempstead	1	79	11	17	5	0	28	1	0	0
Hot Spring	1	78	15	23	6	0	6	2	7	0
Howard	1	25	10	11	4	0	14	2	5	0
Independence	1	185	19	19	2	0	12	0	32	0
Izard	1	25	9	11	3	0	7	0	0	0
Jackson	1	133	8	12	8	0	2	0	2	0
Jefferson	2	473	40	22	12	2	27	0	33	0

Johnson	1	80	13	20	5	0	6	2	10	0
Lafayette	0	0	4	9	4	0	10	0	0	0
Lawrence	1	25	15	14	5	0	17	1	1	0
Lee	0	0	5	6	2	0	2	0	0	0
Lincoln	0	0	3	11	4	0	10	0	0	0
Little River	1	25	9	18	4	0	13	1	14	0
Logan	2	41	12	26	4	0	24	6	4	0
Lonoke	0	0	22	23	9	0	23	0	0	0
Madison	0	0	9	14	2	0	4	0	2	0
Marion	0	0	8	20	3	1	0	0	0	0
Miller	1	62	14	17	7	0	27	2	12	0
Mississippi	2	193	30	19	12	0	0	0	40	0
Monroe	0	0	6	7	6	0	5	0	0	0
Montgomery	0	0	6	11	1	0	7	2	0	0
Nevada	0	0	6	13	2	0	11	0	3	0
Newton	0	0	8	14	2	0	6	0	0	0
Ouachita	1	98	15	22	9	0	19	3	10	0
Perry	0	0	4	14	4	0	25	4	0	0
Phillips	1	155	13	12	6	0	3	0	29	0
Pike	1	32	9	9	3	0	8	1	0	0
Poinsett	0	0	13	9	7	0	28	8	1	0
Polk	1	65	12	16	4	0	22	5	3	0
Pope	1	155	26	15	10	0	17	1	1	0
Prairie	0	0	5	13	4	0	19	1	0	0
Pulaski	20	3829	159	67	57	1	89	20	61	0
Randolph	1	50	10	11	3	0	20	0	8	0
St. Francis	1	118	11	8	8	0	9	2	2	0
Saline	2	232	26	38	6	0	46	6	33	0
Scott	1	24	5	18	3	0	23	3	5	0
Searcy	0	0	6	12	2	0	2	0	0	0
Sebastian	6	975	51	31	23	1	21	8	37	0
Sevier	1	25	9	9	4	1	10	2	1	0
Sharp	0	0	9	17	7	0	24	13	0	0
Stone	1	25	6	22	2	0	4	0	0	0
Union	1	149	26	11	8	0	15	1	123	0
Van Buren	1	25	11	24	3	0	9	0	0	0
Washington	9	997	68	40	20	0	22	6	14	0
White	2	438	30	40	12	0	30	1	13	0
Woodruff	0	0	5	6	6	0	0	0	4	0
Yell	2	76	14	22	8	0	15	7	0	1
Totals	**109**	**12,071**	**1,259**	**1312**	**515**	**11**	**1,174**	**173**	**710**	**1**

Methodology 2 - Local Plan Integration

The HMP Sub-Committee focused on producing a state-wide vulnerability analysis based on estimates provided by FEMA approved local mitigation plan risk assessments. In 2010, 62 jurisdictions have completed the FEMA approval process for hazard mitigation plans under the requirements of DMA 2000. These plans were collected and reviewed. The 62 jurisdictions with approved local hazard mitigation plans form the 2010 baseline for this methodology.

Figure 4.3-1: Local Mitigation Plan Status for 2010



Source: ADEM

Each plan was considered for the following items:

- Hazard Identification
- Hazard probability, extent and magnitude
- Local vulnerabilities
- Locally estimated losses

As more local plans are approved by FEMA, the locally driven data will be added to this baseline in order to improve the overall state vulnerability analysis.

Methodology 3 – GIS Baseline Dataset

Based on FEMA guidance and planning "best practices," the HMP Sub-Committee incorporated Geographic Information Systems (GIS) into the Vulnerability Analysis as part of the previous plan revision and continued to incorporate GIS as part of the 2010 revision. For all hazards the areas deemed "highest risk" in the previous plan remained the highest for the 2010 update. This is because they still show the highest risk throughout the state. This GIS effort has resulted in a new and complimentary methodology for determining state-level vulnerability to each of the identified hazards.

The Sub-Committee determined that a realistic vulnerability analysis must be based on the best available data for populations, facilities and infrastructure within the state. Therefore a major part of this plan revision focused on the development of a comprehensive dataset for the entire state. Using this comprehensive dataset, each individual hazard was considered and the jurisdictional vulnerabilities analyzed.

The HMP Sub-Committee followed a detailed process in the development of this baseline dataset. The committee recognizes that this dataset is based on the best available data and that continual effort is required to improve this listing and to keep it current. The following list details the process for the development of this dataset:

- Data Requirements and Identification – The Sub-Committee met and determined the relevant types of locations to be considered for this vulnerability analysis.
    - Critical facilities - Fire stations, law enforcement, hospitals, etc.
    - Other facilities - Schools, nursing homes, private businesses, etc.
    - Infrastructure – Airports, power plants, AWIN towers, etc.
    - Transportation infrastructure – highways, bridges, railways, pipelines, etc.
- Data Collection – After the development of the all-inclusive list, the Sub-Committee researched all available data at the state and federal level to find the best available datasets. This data collection effort was completed with the direct support of the Arkansas Department of Emergency Management and the Arkansas Geographic Information Office.
- Data Review – Upon receipt of all the diverse datasets for the various types of facilities and infrastructure, the data was all reviewed for format, content and correctness. From this review, all relevant and useable data was included in this baseline dataset.
- Data Standardization – The existing data was technically manipulated for standardization purposes including:
    - Conversion into GIS-compatible formats and projections,
    - Development of meta-data and a quick reference data dictionary,
    - Organized into specific related categories.
- Data Mapping – For each identified database, a state-level map was developed as well as an overall map with all vulnerability data combined.
- Data Reporting – For each identified database, a spreadsheet report was developed with all relevant data listed and standardized.

This complete GIS dataset along with the maps and reports represents the Arkansas "universe" with respect to hazard vulnerability. The HMP Sub-Committee recognizes that an on-going effort is required to improve and maintain this baseline dataset. The Sub-Committee has identified the following areas for gradual and continual improvement of the dataset:

- Research and collect new "types" of data to be added to this baseline.
- Improve the geographic accuracy (Lat/Long) of all existing locations.
- Add all missing locations to the baseline dataset.
- Review and confirm all listed data including addresses, contact names and phone numbers.
- Add data about estimated building replacement values and content values.
- Develop a routine and on-going maintenance process for updating this data.
- Annual review of the dataset by the HMP Sub-Committee.

With this baseline data, the HMP Sub-Committee conducted analyses for each hazard to try and determine the related vulnerability. Using the hazard profile information about geographic extent and previous occurrences, high-risk areas were identified on the state map. These risk areas were queried and modeled and reports were developed for the affected locations. The exact methodology for each hazard analysis and the resulting data is summarized in the following hazard-specific sections.

The remainder of this section details the specific data that was collected and included in this baseline dataset. Each individual database has been categorized into one of the following groups:

- Emergency Response
- Schools and Universities
- Medical Facilities
- Infrastructure
- Private Business
- Transportation

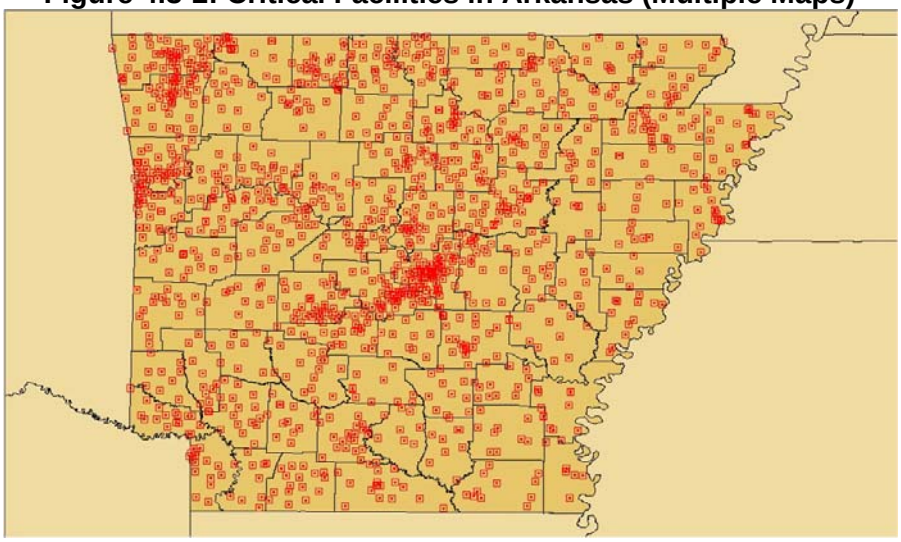
For each database, relevant data has been provided including a state-level map of all the specific locations.

Emergency Response

The HMP Sub-Committee identified the following locations as critical for emergency response. From a high-level, statewide perspective, all of these locations are considered vulnerable and are included in the resulting analysis and reporting.

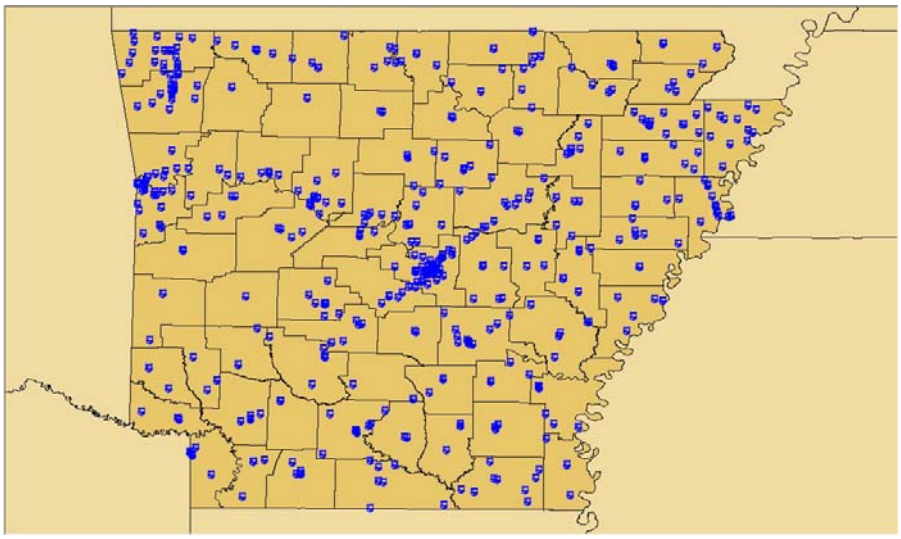
1. Fire Stations
    - File Name: STRUC_FIRE_STATIONS_TGS_point.shp
    - Point File – 1318 locations
    - Data includes name, address, county, contact, phone, type, directions
    - AGIO data from Geostor

Figure 4.3-2: Critical Facilities in Arkansas (Multiple Maps)



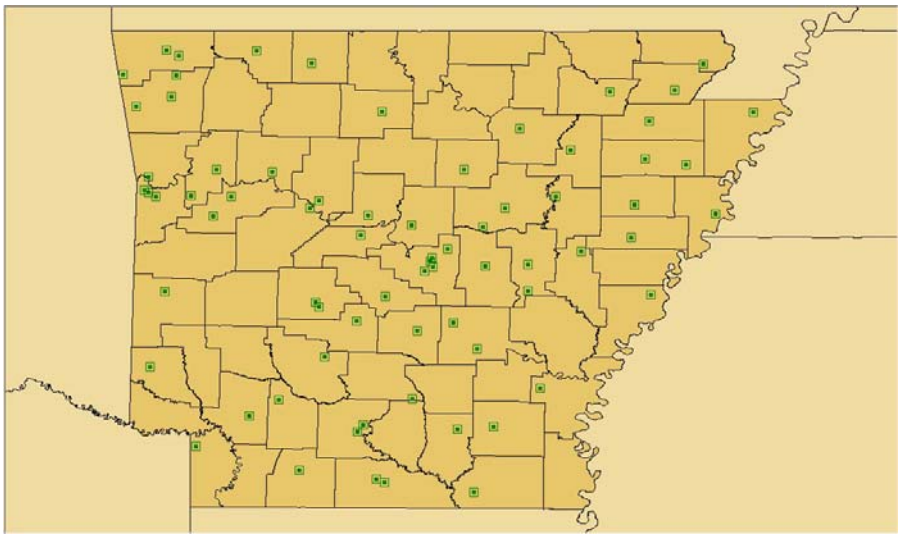
Source: Geostor

2. Law Enforcement Facilities – Police and Sheriff
    - File Name: STRUC_LAW_ENFORCE_TGS_point.shp
    - Point File – 515 locations
    - Data includes name, address, county, contact, phone, type, directions
    - AGIO data from Geostor



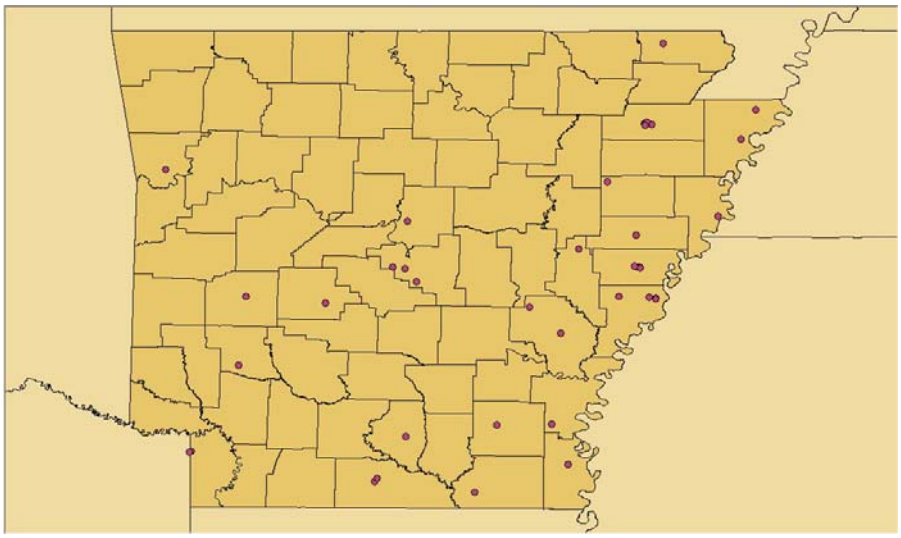
Source: Geostor

3. National Guard Armories
   - File Name: CULTU_ARMORIES_AHTD_point.shp
   - Point File – 142 locations
   - Data includes name, title, brigade, address, contact name, phone, county
   - AGIO data from Geostor



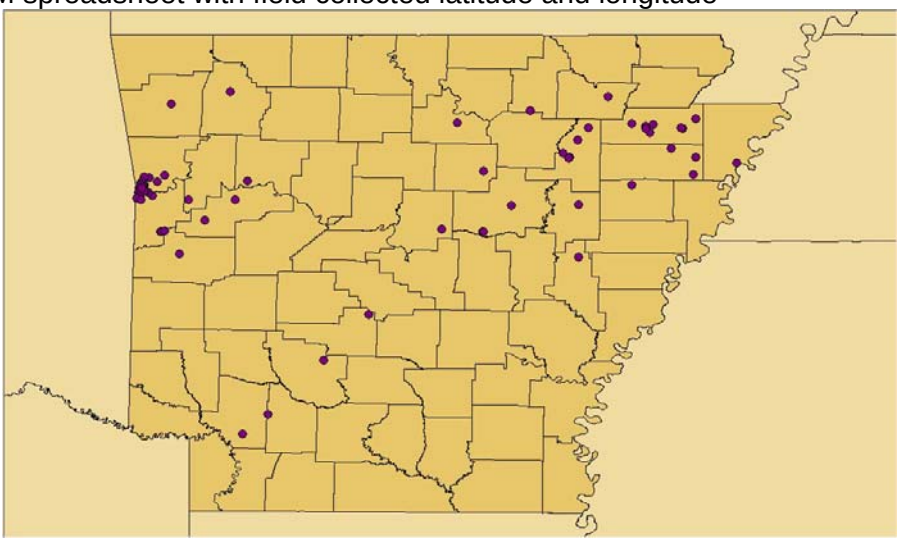
Source: Geostor

4. Church Camps – Shelters
   - File Name: ChurchCamps.shp
   - Point File - 41 locations
   - Data includes name, address, county, capacity, stories, construction type, and altitude
   - ADEM spreadsheet with field collected latitude and longitude



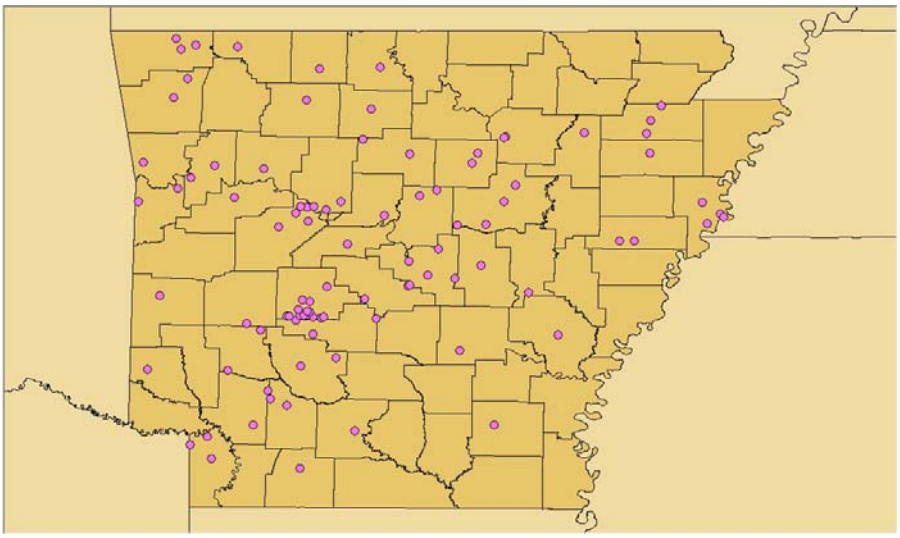
Source: Geostor

5. Safe Rooms – ADEM Sponsored Shelters – (Located on the next page)
   - File Name: SafeRooms.shp
   - Points File – 63 locations
   - Data includes name, address, capacity, contact, phone, comments, stories, construction type, and altitude
   - ADEM spreadsheet with field collected latitude and longitude



Source: Geostor

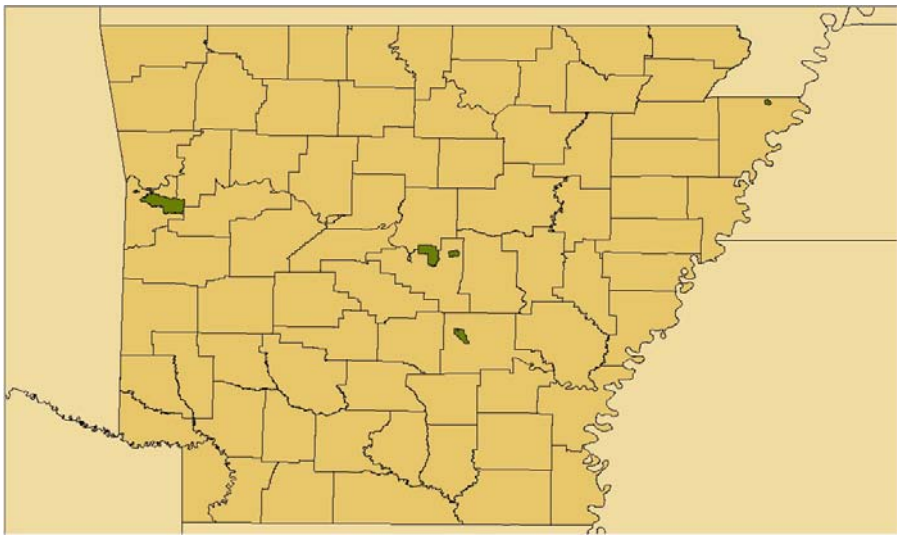
6. Fairgrounds and Speedways – Potential Shelters
   - File Name: CULTU_FAIRGROUNDS_SPEEDWAY_AHTD_point.shp
   - Point File - 97 locations
   - ID only – No name or additional data
   - AGIO data from Geostor



Source: Geostor

7. Military Installations

- File Name: ADMIN_INSTALLATION_AREAS_ANG_poly.shp
- Polygon file – 6 base footprints
- Data includes base name service, area, type, etc.
- AGIO data from Geostor



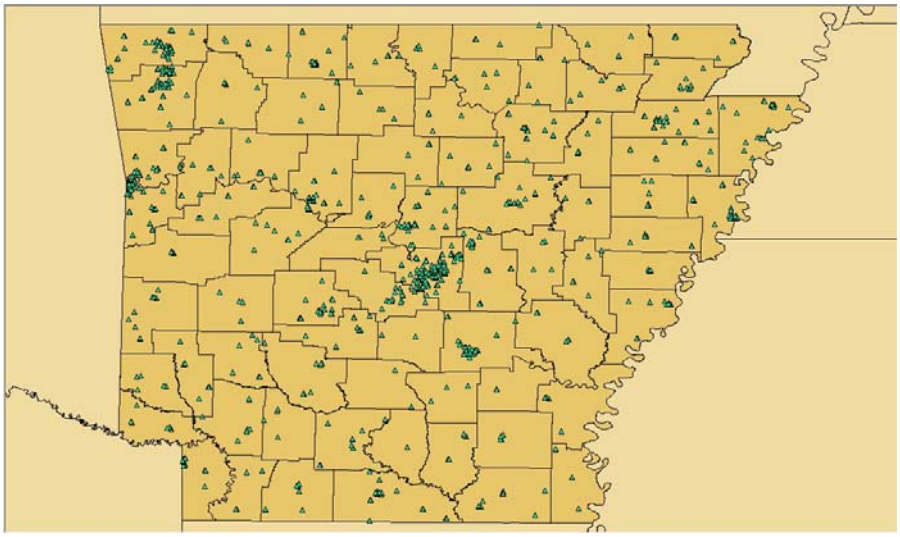
Source: Geostor

Schools and Universities

The HMP Sub-Committee identified the following locations for schools and universities across the state. From a high-level, statewide perspective, all of these locations are considered vulnerable and are included in the resulting analysis and reporting.

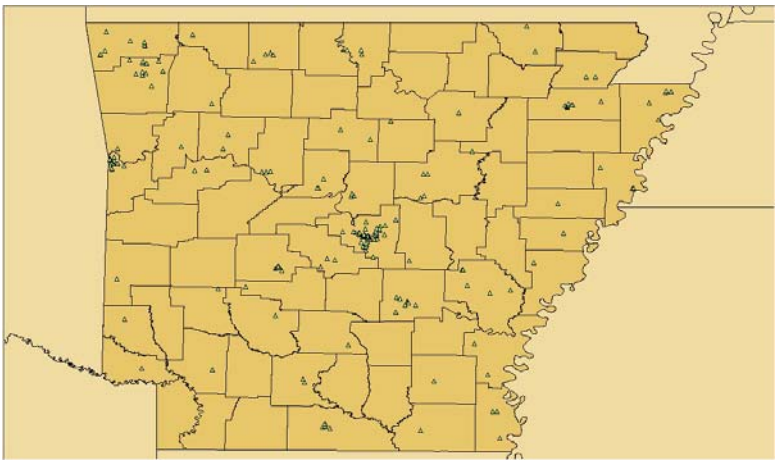
1. Public Schools – Elementary, Middle and High Schools

- File Name: STRUC_PUBLIC_SCHOOLS_DOE_point.shp
- Point File – 1067 locations
- ID and name only, updated through October 2006
- AGIO data from Geostor



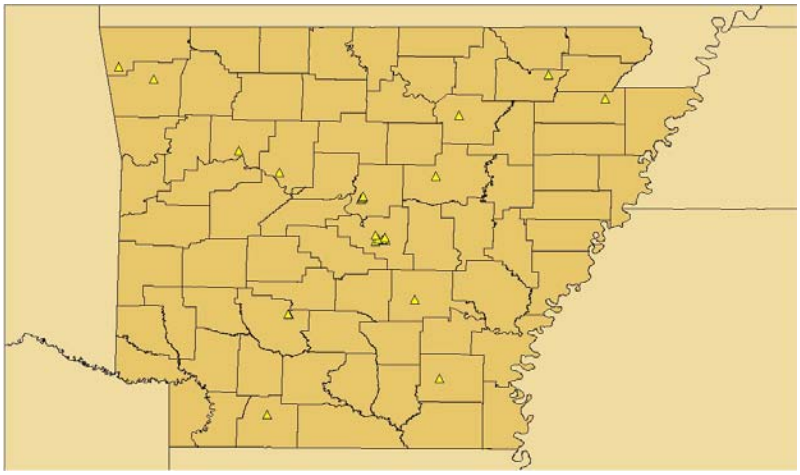
Source: Geostor

2. Private Schools
   - File Name: STRUC_PRIVATE_SCHOOLS_DOE_2001_point.shp
   - Point File – 192 locations
   - Data includes name, address, county, phone, enrollment numbers and demographics, school type, affiliation
   - AGIO data from Geostor



Source: Geostor

3. Universities and Colleges
   - File Name: STRUC_COLLEGES_4YR_ADHE_2001_point.shp
   - Point File – 22 locations
   - Data includes name, address, phone, fax, county, president's name, type, and website
   - AGIO data from Geostor

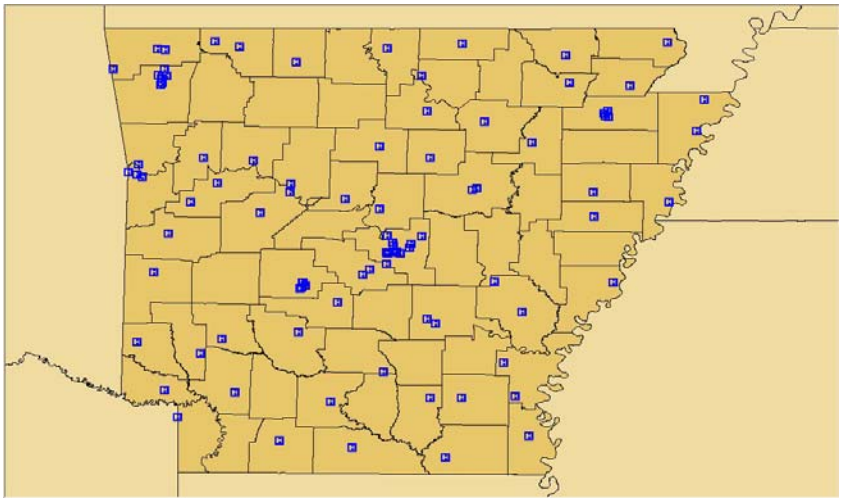


Source: Geostor

Medical Facilities

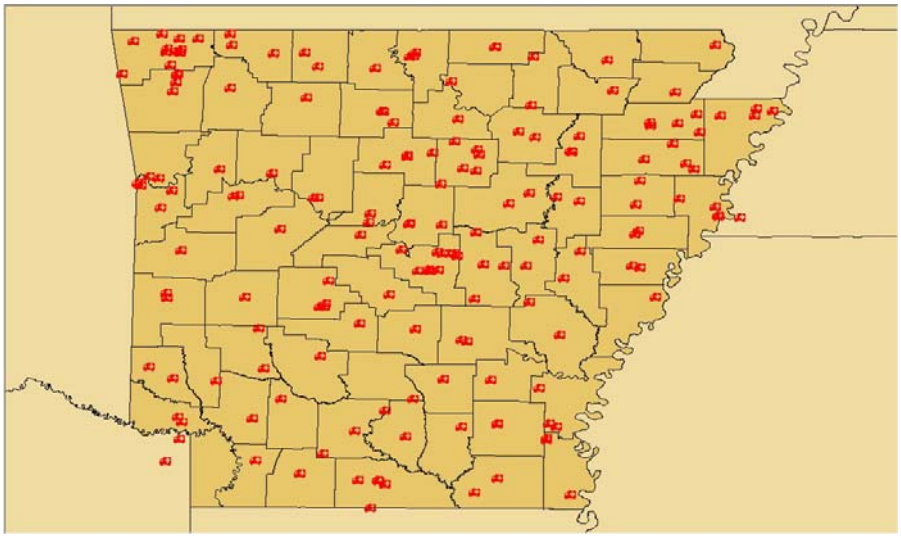
The HMP Sub-Committee identified the following locations for medical facilities across the state. From a high-level, statewide perspective, all of these locations are considered vulnerable and are included in the resulting analysis and reporting.

1. Hospitals
   - File Name: HEALT_HOSPITALS_AHD_POINT.shp
   - Point File – 109 locations
   - Data includes name, address, county, phone, contact, number of beds, and facility type
   - AGIO data from Geostor



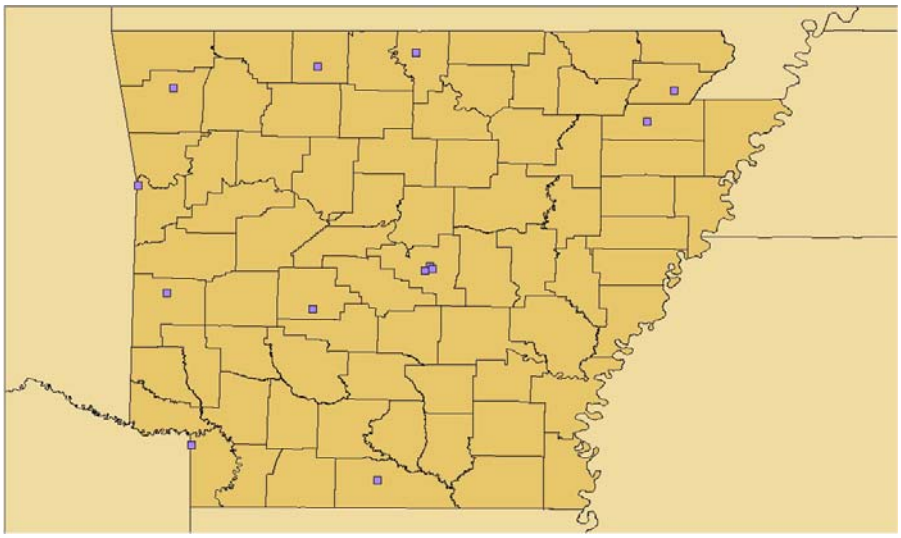
Source: Geostor

2. Emergency Medical Services (EMS) and Ambulances Services
   - File Name: HEALT_EMERG_MEDICAL_SERVICES_AHD_point.shp
   - Point File – 200 locations
   - Data includes name, address, county, contact, phone, email, level, and owner
   - AGIO data from Geostor



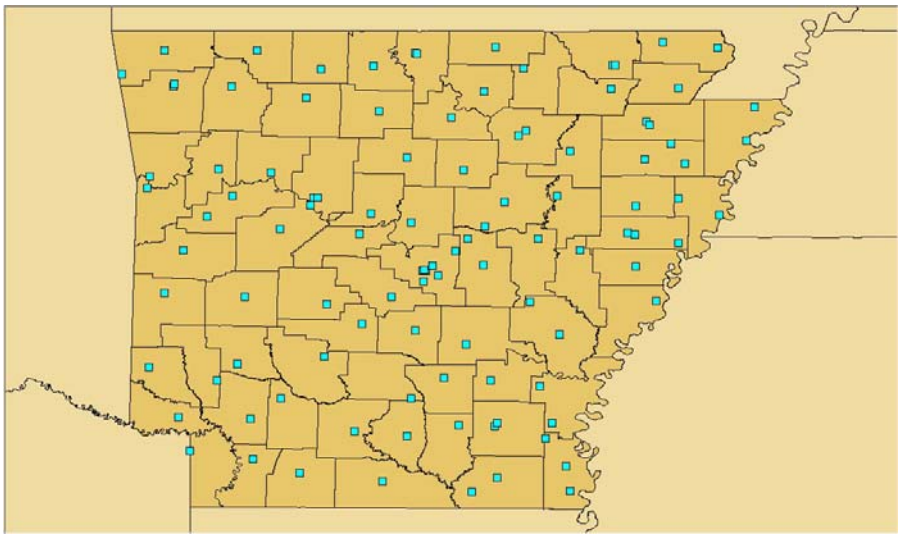
Source: Geostor

3. Veteran's Affairs Hospitals and Medical Facilities
   - File Name: HEALT_VETERANS_AFFAIRS_SERVICES_ADH_point.shp
   - Point File - 14 locations
   - Data includes name, address, county, phone
   - AGIO data from Geostor



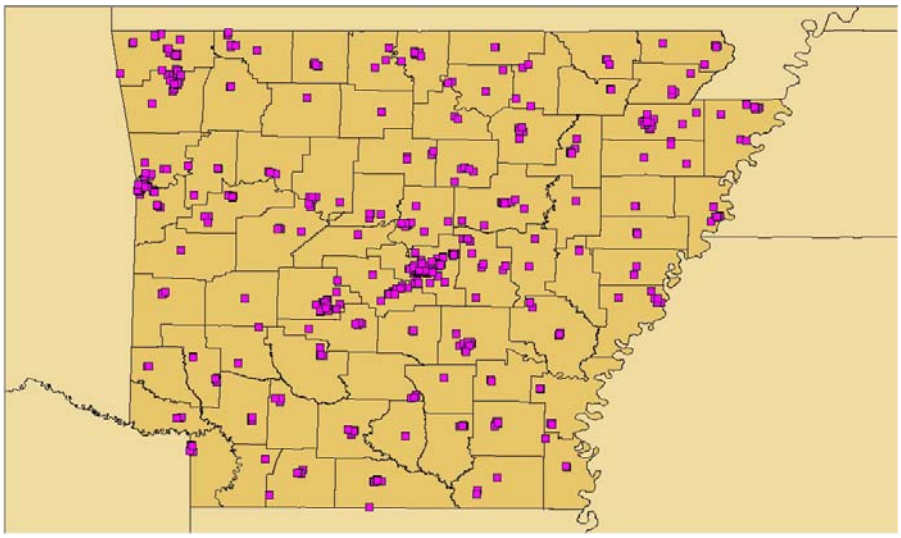
Source: Geostor

4. Local Government Health Department Units
   - File Name: HEALT_LOCAL_HEALTH_UNITS_ADH_point.shp
   - Point File – 108 locations
   - Data includes name, address, county, phone
   - AGIO data from Geostor



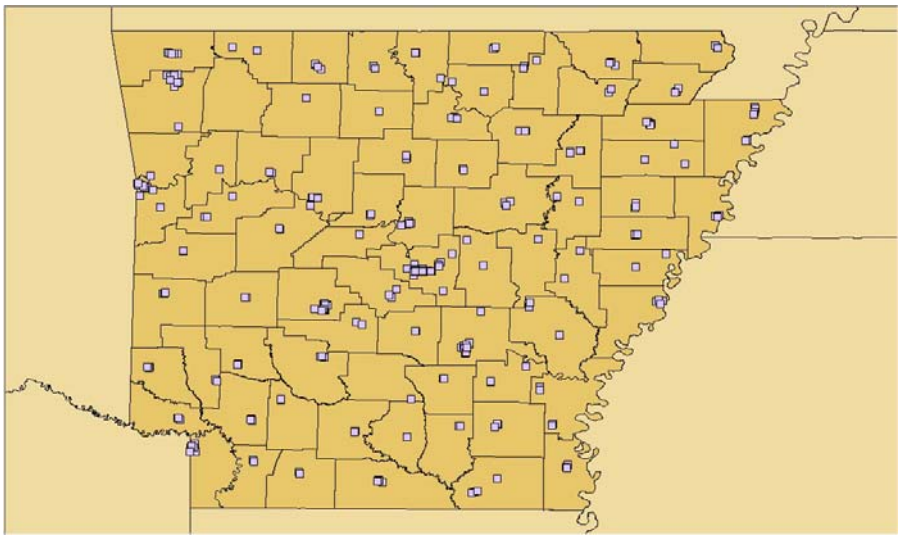
Source: Geostor

5. Long-Term Health Care Facilities and Nursing Care Facilities
   - File Name: HEALT_LONG_TERM_CARE_FACILITIES_ADH_point.shp
   - Point File - 536 locations
   - Data includes name, address, county, contact, phone, and type of facility
   - AGIO data from Geostor



Source: Geostor

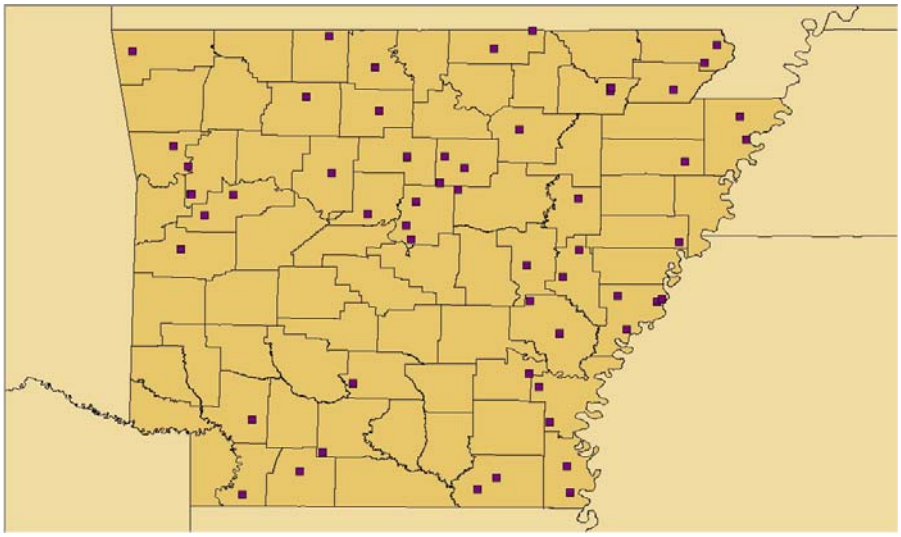
6. County Health Units, Hospices and Related Medical Facilities
   - File Name: HEALT_HOSPITAL_RELATED_SERVICES_ADH_point.shp
   - Point File - 365 locations
   - Data includes name, address, county, contact name, phone, facility type. Some listings include a total bed count for the facility.,
   - AGIO data from Geostor



Source: Geostor

7. Rural Health Clinics

- File Name: HEALT_RURAL_HEALTH_CLINICS_ADH_point.shp
- Point File – 66 locations
- Data includes name, address, county, contact and phone
- AGIO data from Geostor



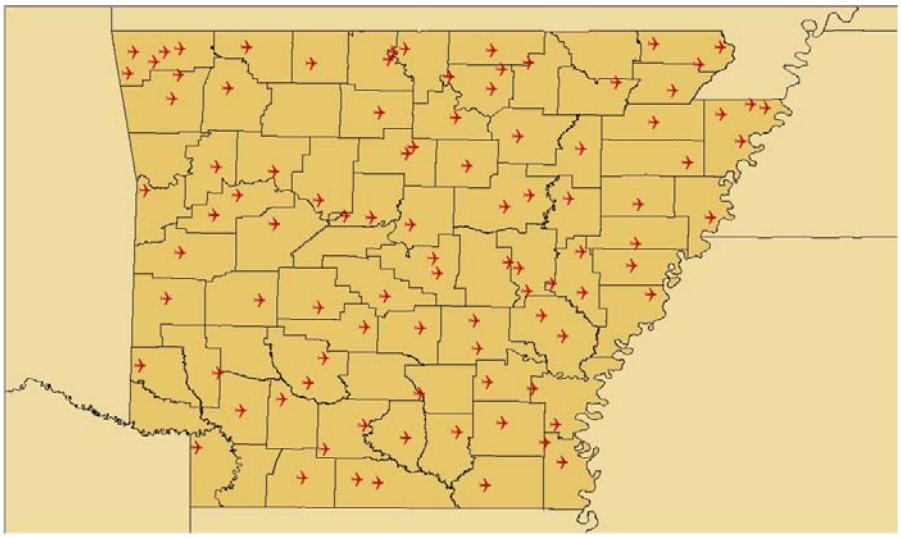
Source: Geostor

Infrastructure

The HMP Sub-Committee identified the following locations for critical infrastructure across the state. From a high-level, statewide perspective, all of these locations are considered vulnerable and are included in the resulting analysis and reporting.

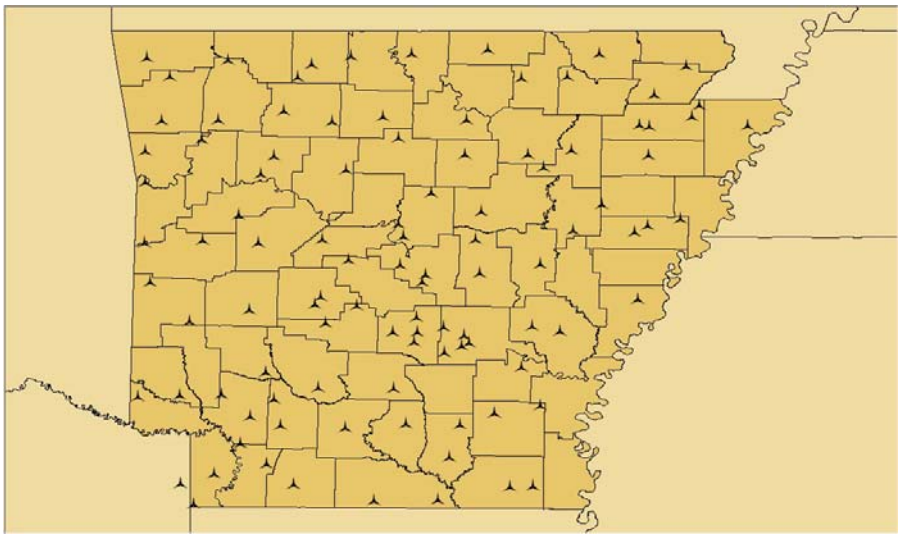
1. Airports

- File Name: Airports_AHTD_Point.shp (subset of original - CULTU_AIRPORTS_AHTD_point)
- Point File – 95 locations
- Data includes name and county
- AGIO data from Geostor



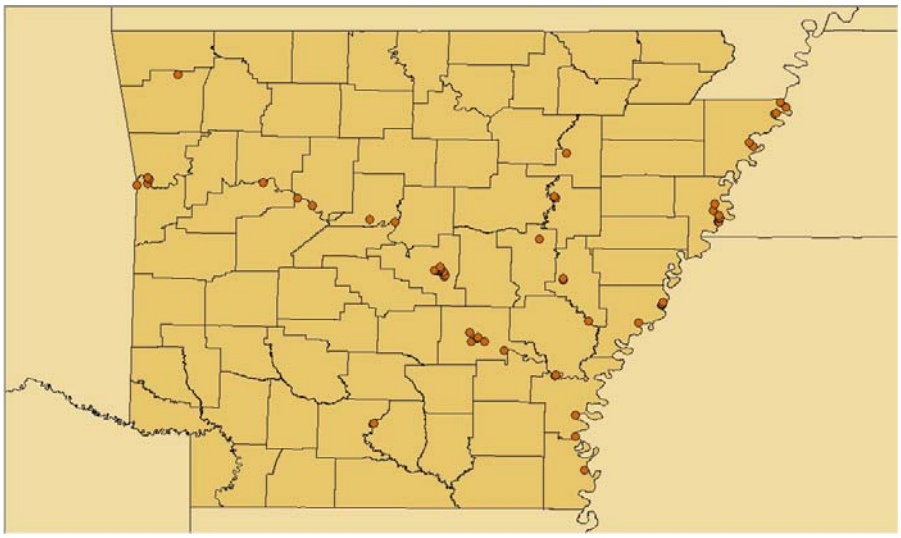
Source: Geostor

2. AWIN Communications Tower Locations
   - File Name: AWIN_TOWER_LAT_LONG.shp
   - Point file – 102 locations
   - Data includes name, Type and Call ID
   - AGIO data from Geostor



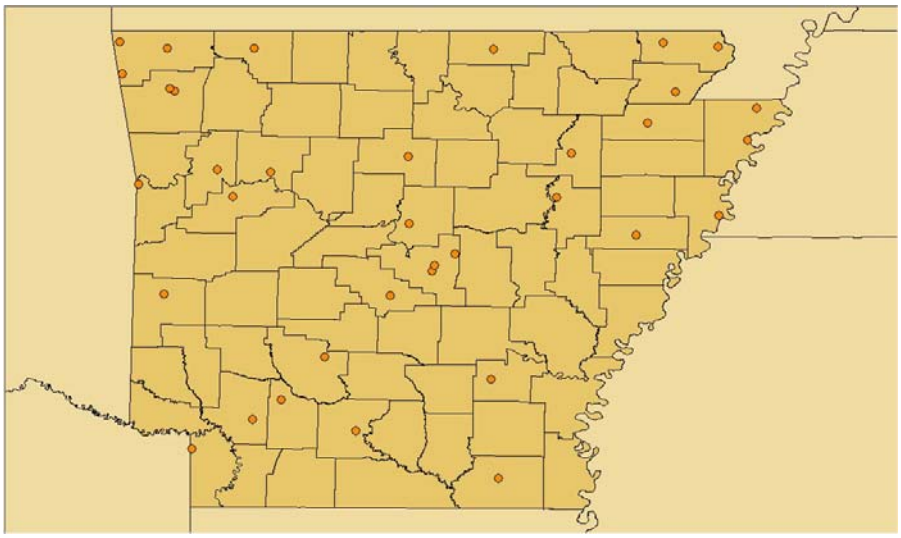
Source: Geostor

3. Intermodal Transportation Terminals, Elevators, Docks and Ports
   - File Name: INTERMODAL_TERMINALS98_BTS_point.shp
   - Point File – 62 locations
   - Data for name and ID
   - AGIO data from Geostor



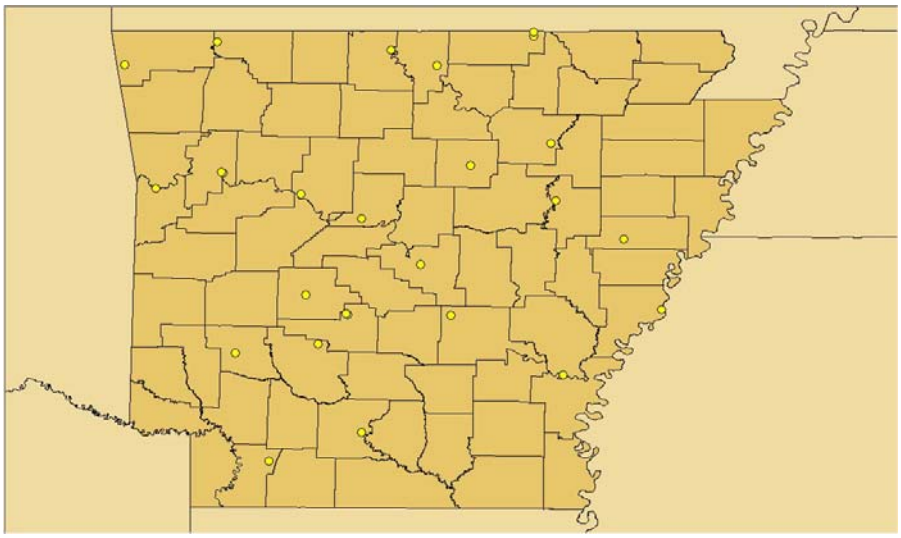
Source: Geostor

4. Electricity Providers
    - File Name: UTILIT_ELECTRIC_PROVIDERS_EIA_2001_point.shp
    - Point File – 36 locations
    - Data includes name, address, contact, phone and website
    - AGIO data from Geostor



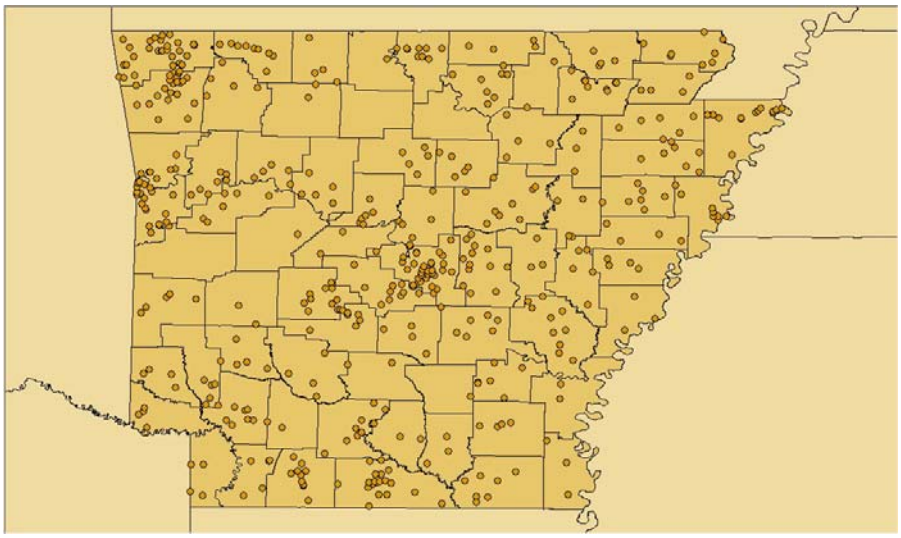
Source: Geostor

5. Power Plants
    - File Name: CULTU_POWER_PLANTS_AHTD_point.shp
    - Point File - 26 locations
    - ID only – No name or additional data
    - AGIO data from Geostor



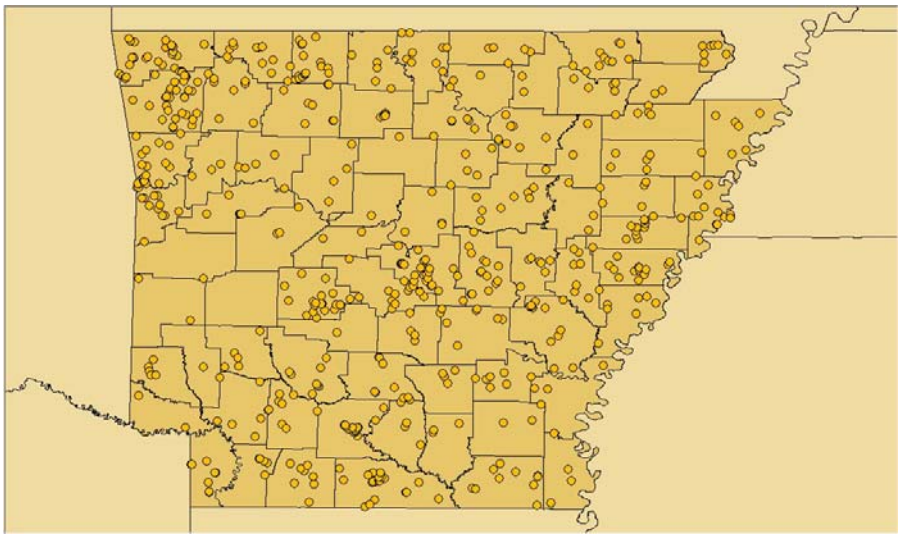
Source: Geostor

6. Power Substations
   - File Name: CULTU_POWER_SUBSTATIONS_AHTD_point.shp
   - Point File - 501 locations
   - ID only – No name or additional data
   - AGIO data from Geostor



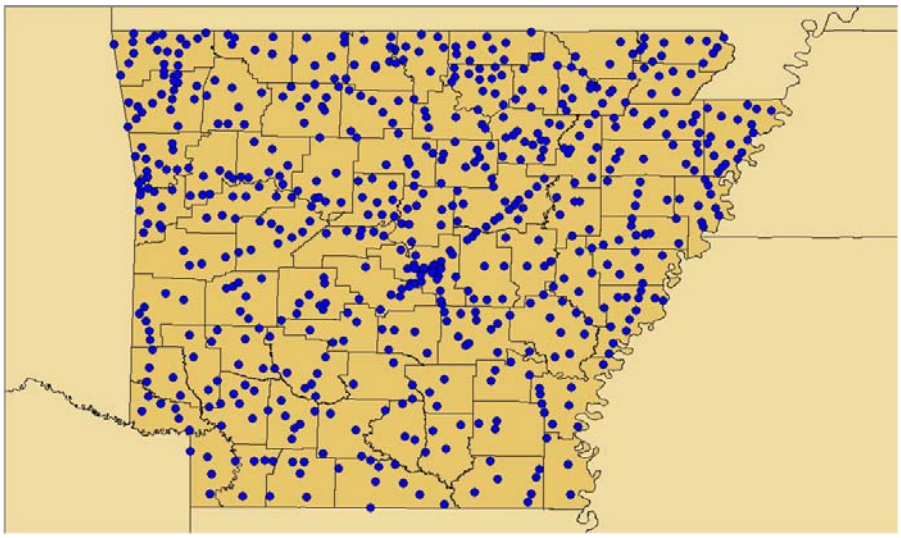
Source: Geostor

7. TV and Radio Stations
   - File Name: CULTU_RADIO_TELEVISION_STATION_AHTD_point.shp
   - Point File - 657 locations
   - ID only – No name or additional data
   - AGIO data from Geostor



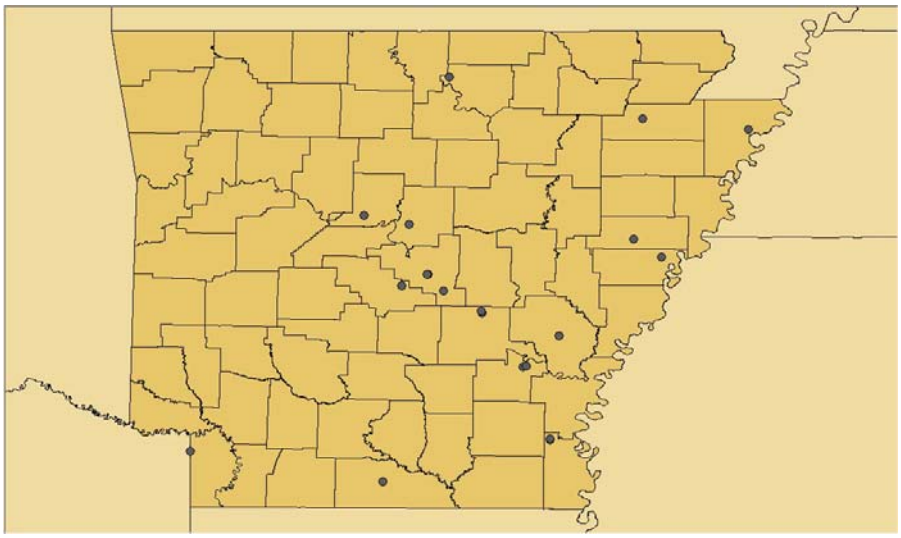
Source: Geostor

8. US Post Offices
    - File Name: STRUC_POST_OFFICES_AGIO_point.shp
    - Point File – 631 locations
    - Data includes address, city, county – No name
    - AGIO data from Geostor



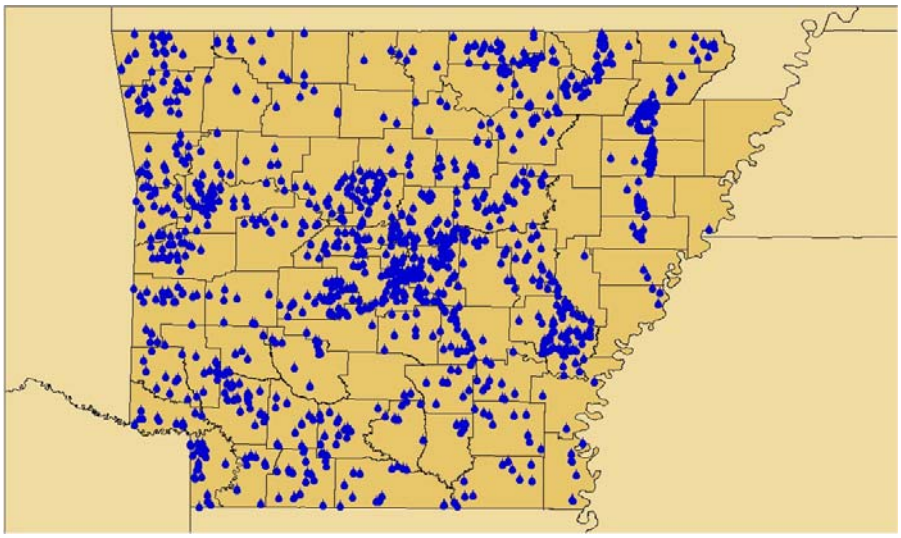
Source: Geostor

9. County or State Prisons
    - File Name: CULTU_COUNTY_STATE_PRISONS_AHTD_point.shp
    - Point File – 21 locations
    - ID only, no name and no additional data
    - AGIO data from Geostor



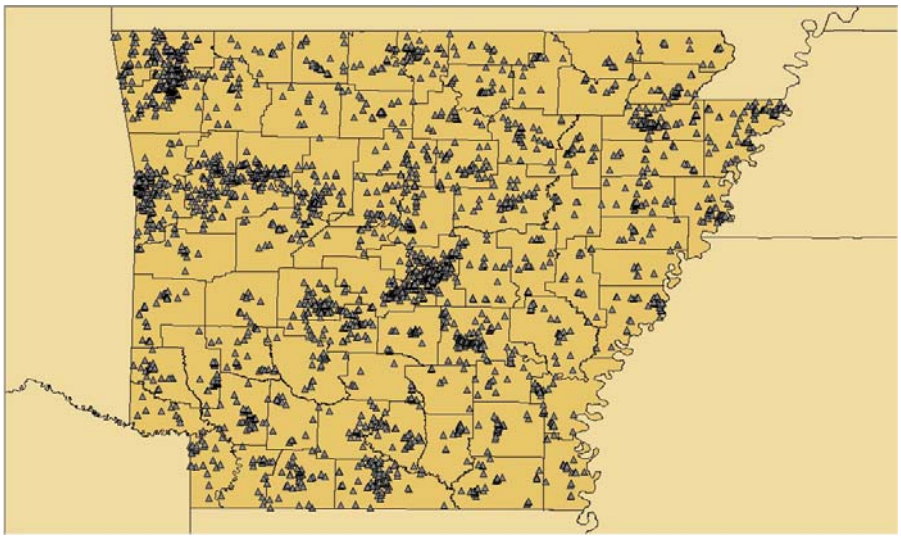
Source: Geostor

10. Dams
    - File Name: STRUC_DAMS_ANRC_point.shp
    - Point file – 1232 locations
    - Data for name, county, river, nearby city, owner, plus various statistics
    - AGIO data from Geostor



Source: Geostor

11. Environmental Facilities
    - File Name: ENVIR_FACILITIES_ADEQ_point.shp
    - Point File – 3202 locations
    - Data includes name, address, county, owner and industry
    - AGIO data from Geostor - Location data for facilities, incident sites and monitoring points at the facility level, regulated or tracked by environmental programs within the jurisdiction of the Arkansas Department of Environmental Quality

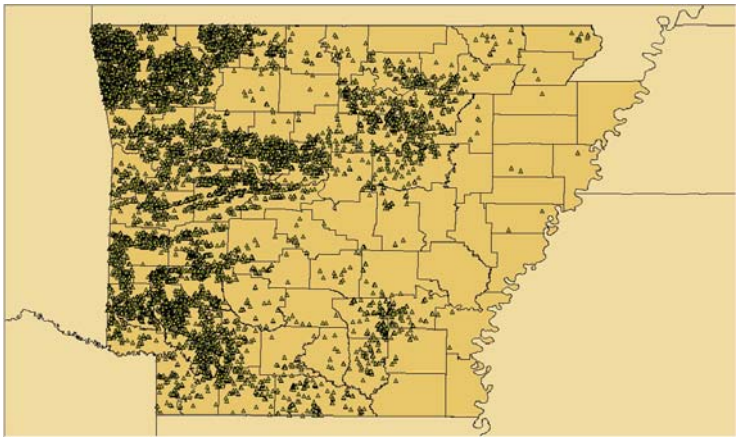


Source: Geostor

Private Businesses

The HMP Sub-Committee identified the following locations for private business across the state. From a high-level, statewide perspective, all of these locations are considered vulnerable and are included in the resulting analysis and reporting. Besides the lat/long locations data, there is no supporting information about these locations. The chicken house locations were selected as part of this baseline dataset in order to show the geographic extent of this important state industry.

1. Chicken Houses and Related Industries
   - File Name: CULTU_CHICKEN_HOUSES_AHTD_point.shp
   - Point File – 21447 locations
   - ID only - No name or additional data
   - AGIO data from Geostor



Source: Geostor

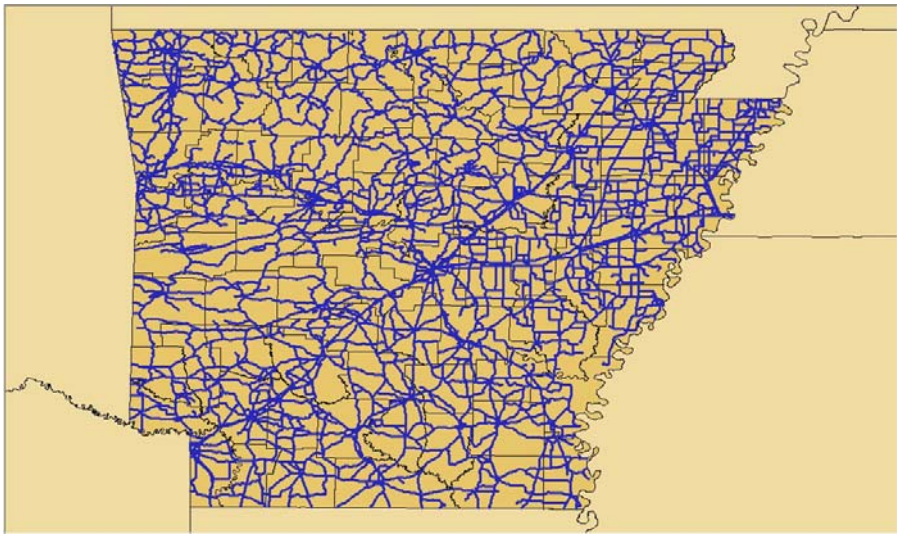
2. Houses of Worship – Churches
   - File Name: CULTU_CHURCHES_AHTD_point.shp
   - Point File – 9112 locations
   - ID only – No name or additional data
   - AGIO data from Geostor

Source: Geostor

Transportation

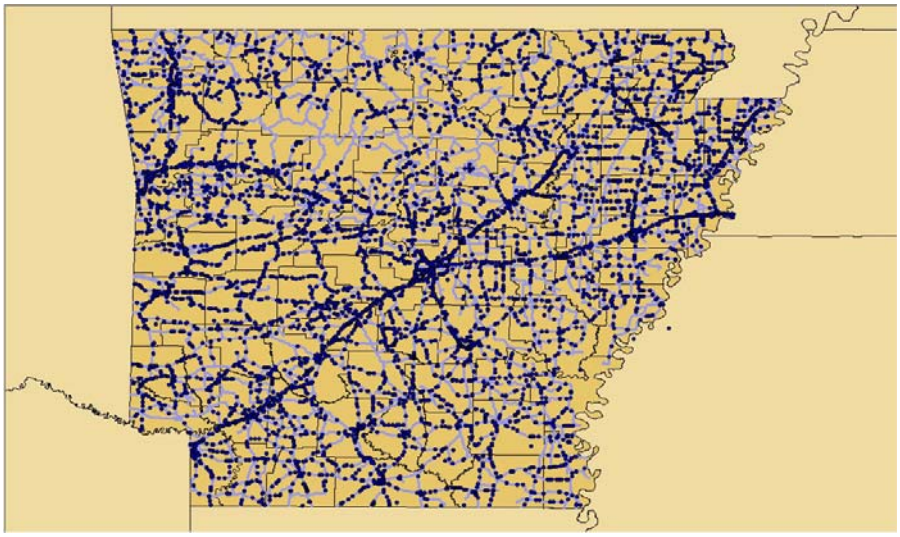
The HMP Sub-Committee identified the following locations for transportation infrastructure across the state. From a high-level, statewide perspective, all of these locations are considered vulnerable and are included in the resulting analysis and reporting.

1. Interstates and Highways
   - File Name: TRANSP_HIGHWAY_LINEAR_REF_SYSTEM_AHTD_line.shp
   - Line File – 16665 segments
   - Data for route number, number of lanes
   - AGIO data from Geostor



Source: Geostor

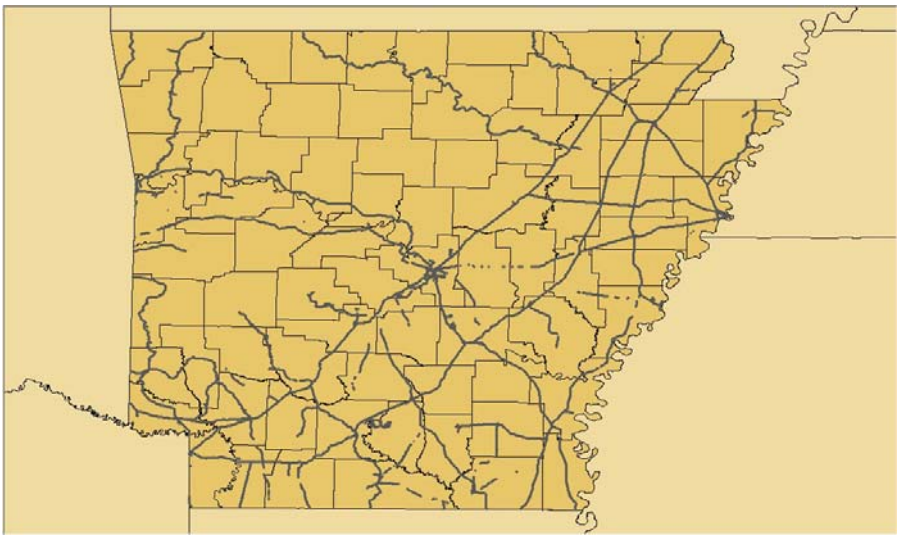
2. Bridges
   - File Name: STATE_MAINTAINED_BRIDGES.shp
   - Point File – 7019 Locations
   - Data includes the road name, waterway name, county and bridge number
   - AHTD Database formatted by AGIO



Source: Geostor

3. Railroads

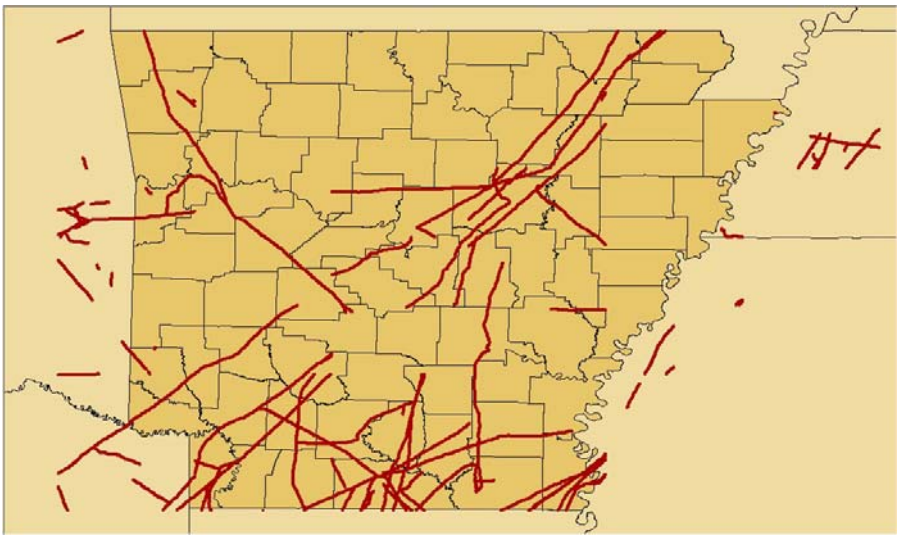
- File Name: TRANSP_RAILROADS_TIGER_2005V1_line.shp
- Line File – 16402 segments
- IDs, name, CFCC codes



Source: Geostor

4. Pipeline Networks

- File Name: PIPELINES_USGS_100K_line.shp
- Line File – 719 segments
- Various IDs – Other data fields but nothing helpful



Source: Geostor

All of the GIS data listed on the previous pages is included in the baseline for analyzing the vulnerability of the state. As better data becomes available, this baseline will be continually improved. The data from this baseline will be used for each individual hazard analysis. All of these maps are the latest on file at GeoStor.

Exposure of Cultural and Historic Sites and Objects

Through the public planning process, the HMP Sub-Committee has included information regarding cultural and historic sites and objects into the All Hazard Mitigation Plan. Throughout the state, there are a number of locations that are unique and irreplaceable and that have significant importance to citizens and tourists. In some cases the locations themselves are important while other locations store items, records, archives or documents of unique importance to the state.

The HMP Sub-Committee feels that it is important to protect the cultural and historical heritage of the state as much as possible; however, due to the large number of locations and objects, and the difficulty in placing "value" on each of these, the Sub-Committee has elected to not specifically address this issue in detail for each profiled hazard. Instead, this section serves to illustrate the importance of this subject. A number of mitigation actions are being considered to further refine this vulnerability analysis in the future. These are listed in the Mitigation Strategies Section of this plan.

The following data generally discusses the large number of locations with cultural and historical value that are considered vulnerable to natural and human-caused hazards including:

44,000 archeological sites including prehistoric and historic mounds, campsites, cemeteries, battlefields and settlements.

20,000 historical properties including houses, industrial sites, agricultural facilities and cemeteries.

A number of important archives, museums and libraries.

Each specific location is equally important to the citizens of Arkansas. Listed below are some of the better-known locations that are vulnerable to disasters:

State History Commission Archives
Old State House Museum
Arkansas Arts Center
Clinton Library and Museum
Archeological Survey Curation Facilities (11 total)
University of Arkansas-Fayetteville Museum
Arkansas History Commission Archive
University of Central Arkansas Archive
Central Arkansas Library System
University of Arkansas Mullins Library
Washington State Park
Historic Arkansas Museum
Delta Cultural Center
Toltec Mounds Archeological State Park
Parkin Archeological State Park

Prairie Grove Battlefield State Park
Old Davidsonville State Park
Old Washington State Park
Pea Ridge Civil War Battlefield
Little Rock's Central High School
Mosaic Templars Cultural Center
Cotter Bridge
Routh-Bailey House
Marion Colored High School
Abramson House
Camden Post Office
Joseph T. Robinson House
Louisiana Purchase Initial Survey Point Site
Rohwer Relocation Cemetery
Fort Smith National Historic Site
Arkansas Post National Memorial
Menard-Hodges Mounds
Bathhouse Row in Hot Springs
Old US Arsenal in Little Rock
Elkin's Ferry Battlefield
Marks' Mills Battlefield
Daisy Bates House
Centennial Baptist Church

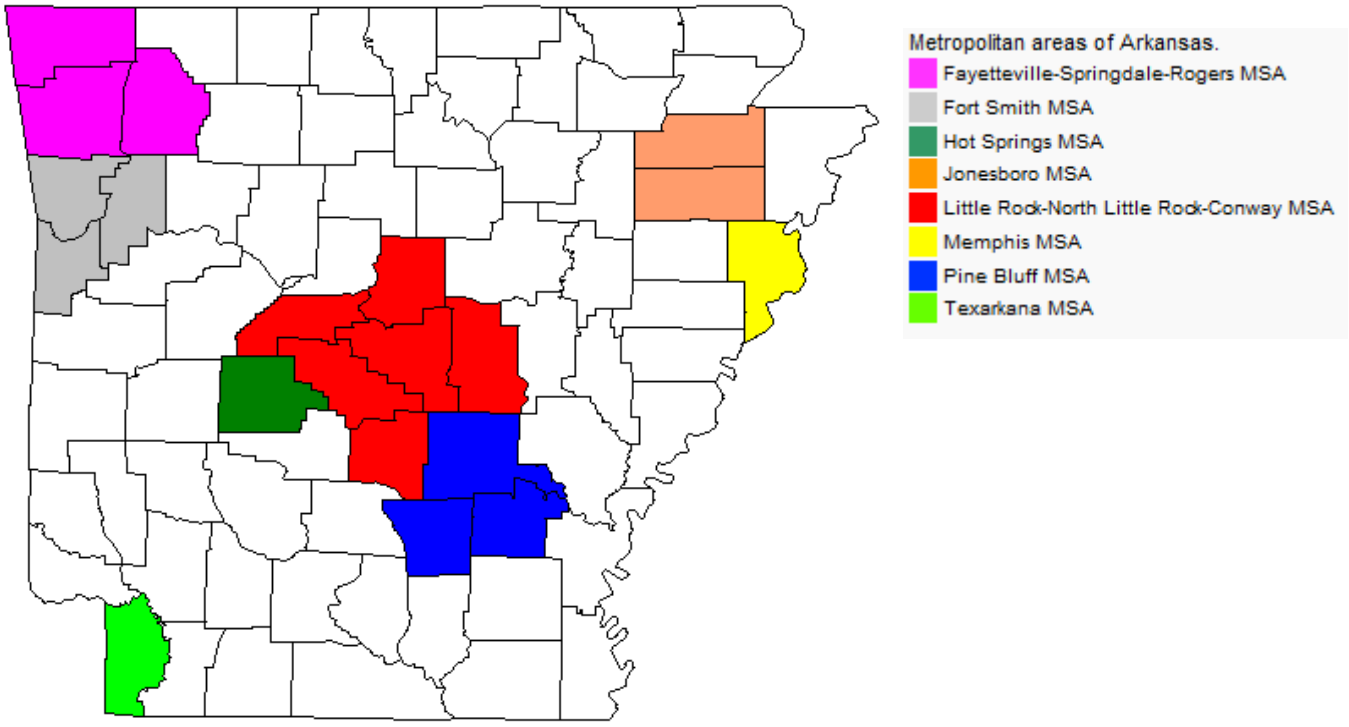
New sites are found and added daily, and due to the large number of locations, a complete listing of sites and buildings is not outlined in this plan. For more details regarding specific locations, the HMP Sub-Committee refers to the National Parks Service, the Arkansas Archeological Survey and the Department of Arkansas Heritage.

Archeological Database maintained by the Arkansas Archeological Survey office in Fayetteville. The National Register of Historic Places maintained by the National Parks Service. The National Historic Landmarks maintained by the National Parks Service. The Arkansas Register of Historic Places maintained by the Arkansas Historic Preservation Program. Arkansas Civil War Sites maintained by the Arkansas Historic Preservation Program. All of these sites are vulnerable to natural, man-made and technological hazards and any damage is likely to be irreparable and irreversible. Vulnerabilities include: Ground disturbing activities such as earthquakes, floods, human excavations and toxic contamination. Contamination by hazardous materials from methamphetamine manufacturing. Building damage from storms, tornadoes, floods, explosions, etc. Looting of sites in the wake of large-scale events. Damage to archives, documents, photographs and other objects due to hazard events.

Development in Hazard Prone Areas

Increased population growth and development can also increase the risk and vulnerability of counties as property values increase and areas that may once have been undeveloped are now developed. Since most natural hazards, with the exception of floods, wildfires, landslides and dam failure, are so wide-spread, it is difficult to project future risk based solely on population and growth. Increasing residential property value will also increase damage totals from all hazards in general. Although most counties are projected to grow, there are some that are projected to grow by a much larger amount from 2000 to 2015. These counties are mostly located in Northwest Arkansas, in the area around the Ozarks National Forest, and Central Arkansas in the area around Little Rock. The fastest growing counties have a tendency to be on the edges of existing metropolitan areas for the reason that employment opportunity increases from larger corporations bringing in business. These large corporations seem to target both metropolitan areas and any area that is considered a major tourism sector. However, the fast-paced growth of many metropolitan counties has slowed considerably in the past few years. Future plans will continue to keep track of high growth populations and note that they have the potential for higher vulnerability. The new census data will aid in providing this information when the 2013 plan data is formulated. The new census data will be used in the next plan update to determine increased risk and vulnerability with new information that may show an increase in county population.

Figure 4.3-3: Arkansas Metropolitan Areas



Source: wikipedia

The larger metropolitan areas in Arkansas are included in the map above, it should be noted that although there are metropolitan areas outside of Central and Northwest Arkansas, the most development is being experienced in the Little Rock-North Little Rock-Conway MSA, Fayetteville-Springdale-Rogers MSA, and Fort Smith MSA.

4.3.1 Assessing Tornado Vulnerability by Jurisdiction

Chapter 2, Figure 4.2.1-1 in the hazard profile section shows a map of tornado occurrences in Arkansas, by county, based on data collected between 1950 and 2010.

From January 1996 through March 2010, there have been 840 reported tornadoes throughout the state and 418 tornadoes in the last six years. There have been a total of 11 presidentially declared disasters for tornadoes from 1995 to 2010 with seven of these tornadoes being in the last 6 years. See Figure 4.2.1-4 in Chapter 2 of this plan for a break down of the Fujita scale intensities of all tornadoes in Arkansas since 1950.

The HMP Sub-Committee contacted NOAA to learn more about the National Climatic Data Centers (NCDC) Storm Events database with latitude and longitude coordinates. For the 2010 revision, latitude and longitude were unavailable and this electronic data was accessible through the internet with limited reporting capabilities.

Tornadoes are most common along an elongated zone extending from Clark County northeastward to Mississippi County (Chapter 2, Figure 4.2.1-1). Outside of this zone, only Benton County at the northwest corner has experienced significantly more tornadoes than average.

National Weather Service data suggests that there may be an area through Arkadelphia (Clark County), Malvern (Hot Spring County), Little Rock (Pulaski County), Cabot (Lonoke County), White County, Oil Trough (Independence County), and Jonesboro (Craighead County) (approximately along I-30 and U.S. 67) that is slightly more at risk to tornadoes than other parts of Arkansas, especially in a major outbreak. The mountainous terrains of the Ouachita Mountains, Arkansas Valley, and Ozark Highlands, to the northwest, force warm moist air from the low lying Gulf Coastal Plain and Mississippi Alluvial Plain upwards, and then, guide the storms northeastward along their base. A secondary parallel alley may extend from north of Morrilton (Conway County) through Wooster (Faulkner County), Greenbrier (Faulkner County), Guy Faulkner County), Quitman (Cleburne County), to Heber Springs (Cleburne County).

Tornado Impact Analysis

Tornadoes can negatively affect the State of Arkansas with a variety of impacts:

Tornadoes cause localized damage in the specific area of impact and are part of a larger storm system that affect communities with flooding, lightning, hail and straight-line winds.

Humans and animals are often injured or killed by severe tornadic activity. Most cases involve a direct impact combined with minimal shelter or protection.

Properties and facilities are often damaged by tornadic activity. The severity of the damage depends on the construction of the facility and the strength of the storm, and results can vary from minor roof damage to the complete demolition of the structure.

Buildings, facilities, and infrastructure are often impacted by the debris brought about by a tornado. Common results of tornadoes are power outages and power-line damage caused by fallen limbs and trees. This often occurs with large trees that have not been trimmed and are located near structures or power-lines.

It is not possible to identify the locations of at-risk facilities as tornadoes strike randomly throughout the State of Arkansas. The HMP Sub-Committee has deemed all state facilities and critical locations vulnerable to this hazard.

Losses due to tornadoes tend to be localized and do not tend to have many long-term effects on the economy of the affected area. After a tornadic event, there is often an increase in

economic activity as people rebuild their homes and repair additional damages. The monetary losses can be high in terms of actual damage to specific locations combined with injuries and the potential loss of life for humans and animals.

Tornadoes usually do not have a long-term impact on the environment. Extreme damage may occur in a localized area, but long-term effects on the flora and fauna in the surrounding areas are not typical.

Electricity and other essential services to local areas can be disrupted during storm events and tornadic activity. In severe cases, power can be lost for several days or weeks. In most cases however, disruptions in power are usually short-term and service is quickly restored by repair crews and responders.

HAZUS-MH2 Analysis

Based upon National Weather Service data from the past 54 years, the following counties appear to be at highest risk for tornadoes: Pulaski, White, Lonoke, Jackson, Faulkner, Mississippi, Independence, Poinsett, Craighead, Hot Spring, Clark, Saline, and Woodruff Counties in central to northeast Arkansas, and Benton County in northwest Arkansas. Of these 14 high tornado-risk counties, eight – Pulaski, Benton, Faulkner, Saline, Craighead, White, Lonoke, and Mississippi – are within the top 15 counties in the state in population, building stock, and lifeline exposure (Table 4.3-3). These eight jurisdictions are considered to be the most vulnerable to a tornado hazard within Arkansas. Pulaski County, with the highest tornado recurrence interval, population density, building stock, and lifeline exposure, is considered most at risk.

The following table shows the overall exposure for these high risk counties based on the 2007 HAZUS-MH2 data.

Table 4.3.1-1: 2007 HAZUS-MH2 Tornado Analysis

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Benton	153,406	58,212	$15,341,645	$1,371,340	$965,847	$17,678,832
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Craighead	82,148	32,301	$8,156,237	$913,854	$734,106	$9,804,197
Faulkner	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
Independence	34,233	13,467	$3,097,289	$878,415	$452,748	$4,428,452
Jackson	18,418	6,971	$1,580,775	$912,604	$619,336	$3,112,715
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Mississippi	51,979	19,349	$4,226,460	$2,171,344	$1,214,781	$7,612,585
Poinsett	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Woodruff	8,741	3,531	$678,476	$834,977	$327,468	$1,840,921
Totals	**1,079,448**	**420,785**	**111,456,458**	**17,482,214**	**10,571,229**	**139,509,901**

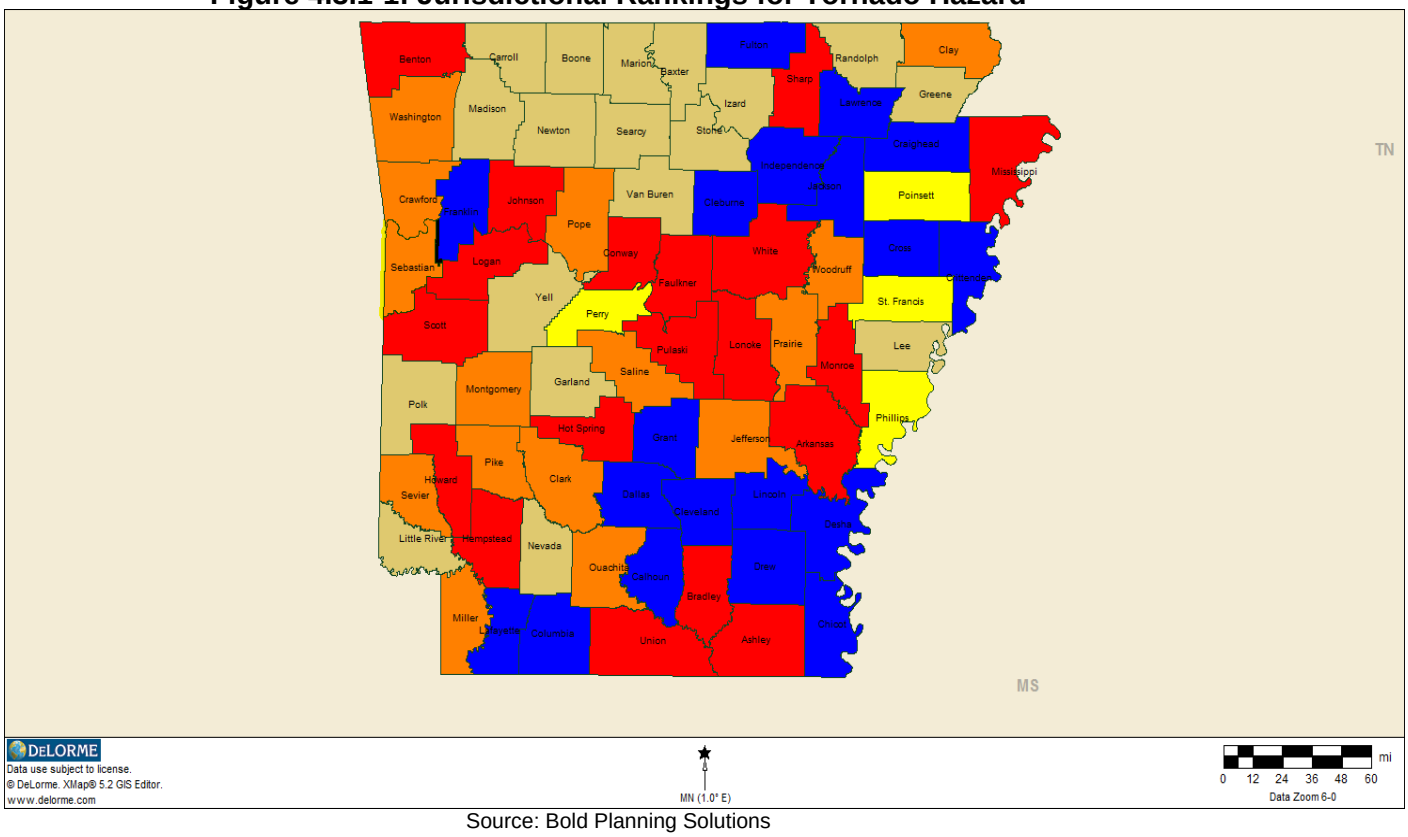
Although the data in Table 4.3.1-1 does indicate that tornado risk varies on a statewide scale, the limited dataset (50 years) should preclude any attempt to map out specific parts of local jurisdictions more or less at risk to tornadoes than other parts of that jurisdiction.

Local Plan Integration

As of January 2010, sixty-two (62) Local Mitigation Plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the tornado hazard. Note that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.1-1: Jurisdictional Rankings for Tornado Hazard



Source: Bold Planning Solutions

Tornado Hazard totals:

High Risk Jurisdictions	19
Medium-High Risk Jurisdictions	15
Medium Risk Jurisdictions	4
No Hazard Score	24

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January, 2010, sixty-two local natural hazard mitigation plans had been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from the sixty-two Arkansas FEMA approved mitigation plans is collated in the table below.

Table 4.3.1-2: Local Plan Integration Data

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	High	29	$ 6,938,000	0	21	N/A	N/A	N/A	55
Ashley County	High	24	$ 518,129,152	3	3,700	N/A	N/A	N/A	N/A
Benton County	High	17	$ 19,293,000	0	12	N/A	2	$ 332,638	58
Bradley County	High	17	$ 30,400,000	7	53	6	6	$ 608,584	N/A
Calhoun County	N/A	12	N/A	N/A	1	N/A	N/A	N/A	N/A
Chicot County	N/A	23	$ 5,620,000	1	41	7	1	$ 116,983	N/A
City of Foreman	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	57
Clark County	Medium-High	29	$ 130,235,500	N/A	N/A	N/A	8	N/A	54
Clay County	Medium-High	15	$ 16,450,000	1	1	4	2	$ 237,550	N/A
Cleburne County	N/A	25	$ 63,353,000	3	32	12	N/A	$ 1,195,339	53
Cleveland County	N/A	8	$ 53,000	0	2	N/A	N/A	$ 1,040	53
Columbia County	N/A	24	$ 7,083,000	3	18	1	N/A	$ 138,882	51
Conway County	High	24	$ 7,403,100	3	N/A	N/A	14	$ 139,681	53
Craighead County	N/A	27	$ 36,100,000	37	616	21	2	$ 707,650	53
Crawford County	Orange (MH)	14	$ 150,790,000	0	75	0	1	$ 3,500,000	43
Crittenden County	N/A	14	$ 356,476	6	122	3	1	$ 44,559	8
Cross County	N/A	18	$ 9,860,000	5	24	N/A	N/A	$ 176,143	56
Dallas County	N/A	20	$ 1,130,000	1	6	N/A	5	N/A	58
Desha County	N/A	18	$ 1,130,000	0	5	N/A	N/A	$ 20,545	55
Drew County	N/A	9	$ 3,600,000	1	4	5	0	$ 19,400	53
Faulkner County	High	47	N/A	10	N/A	8	2	N/A	56
Franklin County	N/A	17	$ 3,491,000	0	8	N/A	2	$ 74,276	47
Fulton County	N/A	19	$ 808,000	4	28	N/A	N/A	$ 17,191	47

Grant County	N/A	16	$ 4,400,000	0	2	5	1	$ 81,481	54
Hempstead County	High	21	$ 17,200,000	5	11	12	3	$ 373,461	46
Hot Spring County	High	29	$ 32,755,000	N/A	N/A	N/A	13	$ 606,574	54
Howard County	High	25	$ 6,233,000	10	42	1	3	$ 115,425	54
Independence County	N/A	37	$ 60,386,000	8	52	N/A	N/A	$ 1,078,321	56
Jackson County	N/A	46	$ 72,900,000	5	105	15	2	$ 1,376,079	53
Jefferson County	Orange (MH)	23	$ 10,900,000	1	11	12	1	$ 218,840	50
Johnson County	High	30	$ 8,478,000	2	135	N/A	1	N/A	54
Lafayette County	N/A	8	$ 1,475,000	0	0	N/A	9	$ 36,875	40
Lawrence County	N/A	22	$ 2,491,000	1	15	N/A	N/A	$ 49,820	50
Lincoln County	N/A	14	$ 3,500,000	5	23	7	0	$ 19,000	34
Little Rock/ L.R. North	Red (H)	27	$ 125,148,000	13	371	0	6	$ 2,317,600	55
Logan County	Red (H)	19	$ 1,836,000	1	12	0	1	$ 34,641	53
Lonoke County	Red(H)	59	N/A	N/A	N/A	N/A	3	N/A	N/A
Marmaduke ISD	N/A	25	$ 31,554,000	2	62	N/A	N/A	$ 563,464	56
City of Mena	High	27	$ 53,500,000	1	30	N/A	N/A	$ 1,138,297	47
Miller County	Medium-High	21	$ 11,253,200	0	6	6	1	$ 239,429	N/A
Mississippi County	High	39	$ 29,600,000	5	148	4	1	$ 548,941	54
Monroe County	Highest	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium-High	6	$ 55,000	N/A	N/A	N/A	N/A	N/A	50
City of Mountain View	Medium-High	18	$ 6,333,000	5	11	N/A	N/A	N/A	56
Ouachita County	Medium-High	16	$ 5,553,000	0	24	N/A	N/A	N/A	57
Perry County	Medium	14	$ 4,400,000	0	0	0	2	N/A	53
Phillips County	Medium	15	$ 3,935,000	0	7	N/A	N/A	N/A	47
Pike County	Medium-High	15	$ 280,000	0	2	N/A	3	N/A	56
Poinsett County	Medium	30	$ 60,000,000	8	98	19	2	N/A	51
Pope County	Medium-High	N/A	N/A	N/A	N/A	N/A	7	N/A	56
Prairie County	Medium-High	22	$ 38,780,000	0	0	N/A	N/A	$ 1,760,000	55
Pulaski County	High	62	$ 125,148,000	13	371	N/A	6	$ 2,317,600	52
Saline County	Medium-High	32	N/A	N/A	N/A	N/A	1	N/A	56
Scott County	High	6	$ 55,000	0	2	N/A	1	N/A	58

Sebastian County	Medium-High	25	$ 159,344,000	16	334	0	1	$ 3,400,000	54
Sevier County	Medium-High	15	$ 3,505,000	0	8	N/A	1	N/A	54
Sharp County	High	17	N/A	N/A	N/A	N/A	N/A	N/A	50
St. Francis County	Medium	17	$ 26,377,000	5	136	N/A	N/A	N/A	50
Union County	High	29	$ 34,035,000	3	30	N/A	N/A	N/A	57
Washington County	Medium-High	27	$ 4,460,500	N/A	N/A	N/A	N/A	N/A	53
White County	High	58	$ 14,770,000	59	427	N/A	N/A	N/A	55
Woodruff County	Medium-High	30	$ 7,228,000	32	219	N/A	19	N/A	56
Totals		**1377**	**$ 1,973,152,928**	**285**	**7,442**	**148**	**134**	**$23,606,315**	

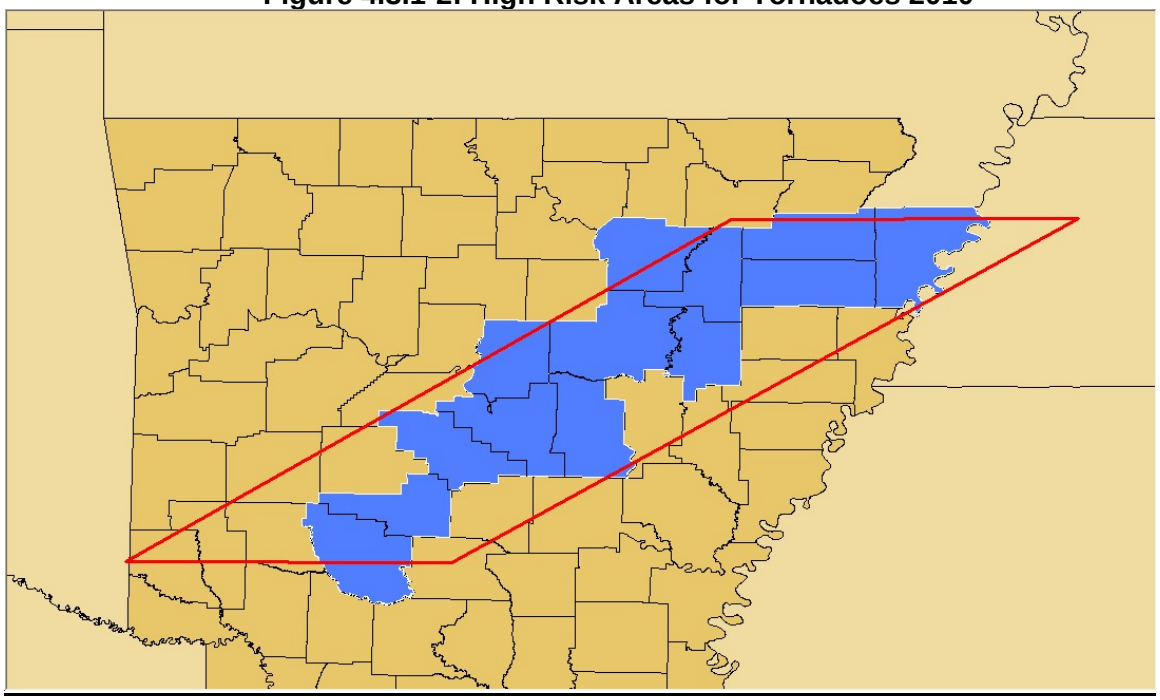
* - Years of data used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future Revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.1-2

GIS Baseline Dataset

Based on the geographic extents determined in the hazard profile, the counties in blue have the highest risk factor with respect to tornadoes. The corridor outlined in red marks the extent of this high risk area.

Figure 4.3.1-2: High Risk Areas for Tornadoes 2010



Source: Geostor

Using the baseline dataset, the following summarizes the details of the overall region's vulnerability to tornadoes.

Table 4.3.1-3: Regions Vulnerability to Tornadoes

Arkansas Counties	**33 records**
Population	340166 Total
Housing Units	150848 Total
Fire Stations	398 records
Law Enforcement	186 records
Armories	86 records
Church Camps	16 records
Safe Rooms	26 records
Fairgrounds / Speedways	40 records
Public Schools	376 records
Private Schools	87 records
Universities and Colleges	13 records
Hospitals	44 records
EMS / Ambulance	67 records
Veteran's Affairs Medical Facilities	6 records
Local Health Dept Units	33 records
Long Term Healthcare	205 records
Hospices and related medical facilities	124 records
Rural Health Clinics	9 records
Bridges	2419 records
Airports	22 records
AWIN Towers	33 records
Environmental Facilities	1001 records
Intermodel Terminals	20 records
Electricity Providers	11 records
Power Plants	9 records
Power Substations	152 records
Radio / TV Stations	183 records
Post Offices	182 records
Prisons	9 records
Dams	435 records

4.3.2 Assessing Severe Winter Weather Vulnerability by Jurisdiction

Severe winter weather events do not occur with the same frequency within all parts of Arkansas. As discussed in Chapter 2, Section 4.2.2, the northwest corner of the state experienced the most severe winter events between 1981 and 2010. All counties found within this area of the state experienced 33 or more events over the past 30 years. The southern and eastern part of the state experienced the fewest severe winter events. Counties in these areas of the state were affected by 23 or fewer events.

From January 1996 through March 2010, 310 severe winter events have been recorded by the NCDC. These events affected most counties; however the area in the northwest continues to be at higher risk to this hazard.

Winter Storm Impact Analysis
Winter storms will negatively affect the State of Arkansas with a variety of impacts:

Winter storms affect the northwest corner of the state more often and more severely than the southeast areas, however, the entire state is susceptible to damaging winter weather storms. Snowstorms and severe winter events are considered hazard, the impacts resulting from ice storm events are historically more severe in regards to human and economic losses.

Deaths and injuries have occurred in the past from winter storm events. Deaths and injuries have resulted from various accidents including automobile collisions due to poor driving conditions or hypothermia resulting from insufficient heat.

Emergency medical response can be severely hindered from the effects of a winter storm event. Roads and highways are most vulnerable to the effects of winter storms. Roads frequently become iced over resulting in accidents, injuries, deaths, and traffic congestion.

Roads can be heavily damaged due to winter weather events. Potholes and cracks can be found on roadways after a winter weather event resulting in the need for repairs causing further economic losses to the local area.

Electrical transmission lines are highly vulnerable to severe winter weather. Trees frequently are felled by heavy amounts of ice accumulating on branches. Trees falling on nearby power lines result in disruption of power service, resulting in additional costs for repairs and maintenance.

Other impacts resulting from winter storms include damage to plumbing, sewers and waterlines, as well as minor roof damage and house fires caused by from portable heaters.

First responders are increasingly at risk as they respond to traffic incidents and calls for medical attention. They are vulnerable to the same transportation dangers as other citizens, but often have to go out into the elements when ordinary citizens would not.

Four ice storms in Arkansas have received a presidential declaration by FEMA. These events occurred in 1994, 2000, 2003, and one in 2009. They resulted in high economic damages to homes and state infrastructure.

During a winter storm and the days that follow, many people do not travel due to the road conditions. The absenteeism of workers impacts the overall continuity of the state government.

Severe winter storms can result in localized environmental changes such as downed trees and flash flooding due to large amounts of ice and melting snow.

Historically, winter storms are felt most severely in the northwest corner of Arkansas. This area of Arkansas also contains the highest concentration of poultry facilities.

The poultry industry is a significant portion of the economy for Arkansas therefore winter storm events that impact this area are considered high risks. Winter storm events could result in damage to poultry facilities and large loss of life to animals.

HAZUS-MH2 Analysis

Based on National Weather Service data over the past 26 years, the following counties are most likely to be affected by severe winter weather: Benton, Carroll, Boone, Madison, Marion, Washington, Newton, Searcy, Fulton, and Izard Counties in the northwest corner of the state; and Pulaski and Van Buren in the central part of the state. Pulaski, Benton and Washington Counties are the three most populated counties, and have the highest infrastructure dollar exposures within Arkansas. These three counties are considered to have the highest vulnerability to severe winter weather within the state. Other counties experiencing frequent severe winter weather and having above average populations and infrastructure include Lonoke, Baxter, Boone and Carroll Counties. These four counties are also deemed to have a high vulnerability to the effects of severe winter weather.

The following table shows the overall exposure for these high risk counties based on the 2007 HAZUS-MH2 data.

Table 4.3.2-1: 2007 HAZUS-MH2 Winter Storm Analysis Maximum Peak Ground Acceleration data and exposure data for the 14 highest winter storm risk counties in Arkansas.

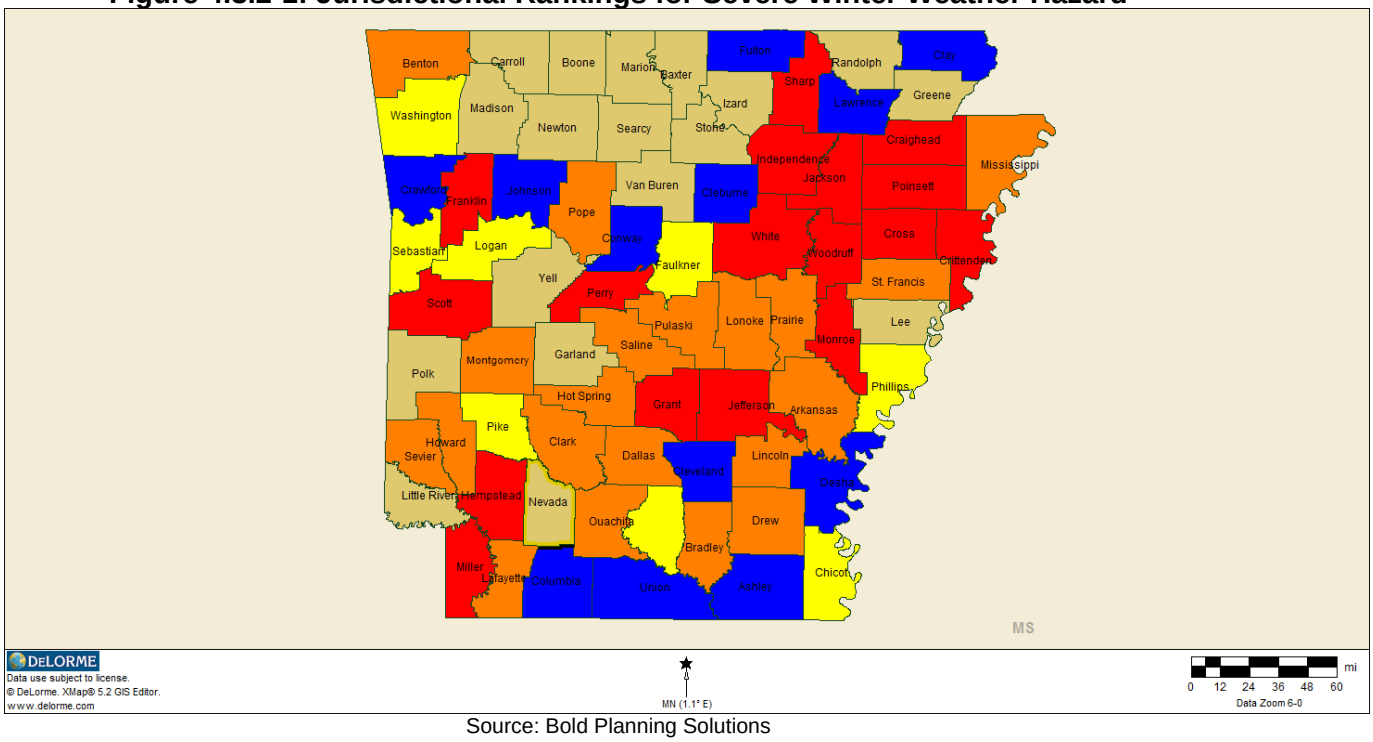
County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Baxter	38,386	17,052	$3,783,546	$954,706	$261,435	$4,999,687
Benton	153,406	58,212	$15,341,645	$1,371,340	$965,847	$17,678,832
Boone	33,948	13,851	$3,185,271	$910,572	$116,232	$4,212,075
Carroll	25,357	10,189	$2,331,319	$969,171	$414,642	$3,715,132
Fulton	11,624	4,810	$1,045,832	$833,949	$116,058	$1,995,839
Izard	13,249	5,440	$1,055,007	$737,243	$376,623	$2,168,873
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Madison	14,243	5,463	$1,088,498	$984,759	$59,064	$2,132,321
Marion	16,140	6,776	$1,505,908	$630,457	$173,826	$2,310,191
Newton	8,608	3,500	$854,540	$515,993	$144,942	$1,515,475
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Searcy	8,261	3,523	$644,909	$651,931	$174,000	$1,470,840
Van Buren	16,192	6,825	$1,565,684	$793,475	$347,826	$2,706,985
Washington	157,715	60,151	$15,034,068	$1,975,733	$321,456	$17,331,257
Totals	**873,045**	**345,944**	**93,212,822**	**14,736,536**	**5,878,353**	**113,827,711**

Local Plan Integration

As of January 2010, sixty-two (62) Local Mitigation Plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the Severe Winter Weather hazard. Note that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.2-1: Jurisdictional Rankings for Severe Winter Weather Hazard



Source: Bold Planning Solutions

Winter Weather Hazard totals:

High Risk Jurisdictions	17
Medium-High Risk Jurisdictions	20
Medium Risk Jurisdictions	8
No Score	17

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January, 2010, sixty-two local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table below.

Table 4.3.2-2: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs*.
Arkansas County	Medium-High	9	$ 5,000,000	2	0	N/A	N/A	N/A	55
Ashley County	N/A	6	$ 2,315,000	0	0	N/A	N/A	$ 42,090	55
Benton County	Medium-High	34	$ 67,970,000	0	0	N/A	2	$ 2,955,217	23
Bradley County	Medium-High	8	$ 4,920,000	2	0	22	2	$ 59,204	36
Calhoun County	Medium	9	$ 500,000	2	0	1	2	$ 8,620	58
Chicot County	Medium	5	$ 4,550,000	0	0	14	0	$ 325,000	14
City of Foreman	N/A	9	$ 525,950,000	0	0	N/A	N/A	N/A	58
Clark County	Medium-High	12	N/A	2	0	N/A	N/A	N/A	56
Clay County	N/A	11	$ 22,900,000	1	0	2	1	$ 2,291,000	54
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	High	11	$ 23,900,000	1	0	5	1	$ 2,394,800	10
Crawford County	N/A	19	$ 1,354,000	N/A	N/A	N/A	1	N/A	42
Crittenden County	High	8	$ 17,000,000	0	0	3	2	N/A	9
Cross County	High	13	$ 12,667,000	0	0	N/A	3	$ 904,785	14
Dallas County	Medium-High	11	$ 500,000	2	0	N/A	2	N/A	9
Desha County	N/A	8	N/A	2	0	N/A	N/A	N/A	55
Drew County	Medium-High	8	$ 4,900,000	2	0	21	2	$ 58,838	N/A
Faulkner County	Medium	14	N/A	N/A	N/A	2	2	N/A	N/A
Franklin County	High	13	$ 10,500,000	N/A	N/A	N/A	2	N/A	14
Fulton County	N/A	20	$ 10,000,000	3	0	N/A	N/A	N/A	13
Grant County	High	13	$ 7,600,000	2	0	7	1	$ 762,500	10

Hempstead County	High	9	$ 528,000,000	0	0	7	2	N/A	3
Hot Spring County	Medium-High	12	$ 5,000,000	2	0	N/A	N/A	N/A	56
Howard County	Medium-High	10	$ 525,950,000	0	0	N/A	N/A	N/A	58
Independence County	High	16	$ 13,680,000	3	0	N/A	N/A	N/A	11
Jackson County	High	16	$ 17,400,000	3	0	12	3	$ 1,741,500	10
Jefferson County	High	13	$ 7,600,000	3	0	8	2	$ 762,500	10
Johnson County	Medium-High	14	$ 10,000,000	3	0	N/A	N/A	N/A	9
Lafayette County	Medium-High	6	$ 525,450,000	0	0	N/A	N/A	N/A	10
Lawrence County	N/A	13	$ 22,212,000	1	0	N/A	N/A	$ 1,708,615	12
Lincoln County	Medium-High	7	$ 5,000,000	2	0	21	2	$ 58,838	5
Little Rock/ L.R. North	N/A	32	N/A	N/A	N/A	0	1	N/A	27
Logan County	Medium	15	$ 10,000,000	1	0	0	1	N/A	7
Lonoke County	Medium-High	14	$ 10,000,000	3	N/A	N/A	N/A	N/A	12
Marmaduke ISD	Medium-High	16	$ 22,229,000	1	0	N/A	N/A	N/A	56
City of Mena	High	24	$ 10,500,000	2	0	0	1	N/A	14
Miller County	High	7	$ 528,000,000	0	0	8	2	N/A	8
Mississippi County	Medium-High	12	$ 27,400,000	1	0	3	2	N/A	10
Monroe County	High	12	$ 10,000,000	2	0	0	1	N/A	10
Montgomery County	Medium-High	14	$ 10,000,000	2	0	N/A	N/A	N/A	8
City of Mountain View	High	19	$ 19,180,000	2	0	N/A	N/A	$ 1,475,384	13
Ouachita County	Medium-High	9	$ 500,000	2	0	N/A	N/A	N/A	13
Perry County	High	20	$ 10,500,000	3	0	N/A	N/A	N/A	14
Phillips County	Medium	8	$ 7,160,000	0	0	N/A	N/A	$ 550,769	13
Pike County	Medium-High	12	N/A	2	0	N/A	N/A	N/A	56
Poinsett County	High	13	$ 27,000,000	1	0	19	2	N/A	13
Pope County	Medium-High	14	N/A	N/A	N/A	N/A	1	N/A	8
Prairie County	Medium-High	14	N/A	N/A	N/A	N/A	1	N/A	N/A
Pulaski County		30	N/A	N/A	N/A	N/A	1	N/A	25
Saline County	Medium-High	15	$ 10,000,000	2	0	N/A	2	N/A	56
Scott County	High	15	N/A	2	N/A	N/A	1	N/A	12
Sebastian County	Medium	11	N/A	0	N/A	N/A	1	N/A	54
Sevier County	Medium-High	10	$ 525,950,000	0	0	N/A	N/A	N/A	12

Sharp County	High	29	$ 19,180,000	N/A	N/A	N/A	6	$ 342,500	56
St. Francis County	Medium-High	13	$ 12,667,000	0	0	N/A	N/A	N/A	14
Union County	n/a	n/a	$ 525,450,000	N/A	N/A	N/A	N/A	$ 58,300,000	9
Washington County	Medium	6	$ 12,325,000	N/A	N/A	N/A	1	N/A	8
White County	High	15	$ 13,680,000	3	0	N/A	N/A	$ 1,234,636	11
Woodruff County	High	16	$ 14,180,000	2	0	N/A	N/A	$ 1,090,769	13
Totals		**763**	**$4,203,719,000**	**67**	**0**	**155**	**56**	**$77,067,566**	

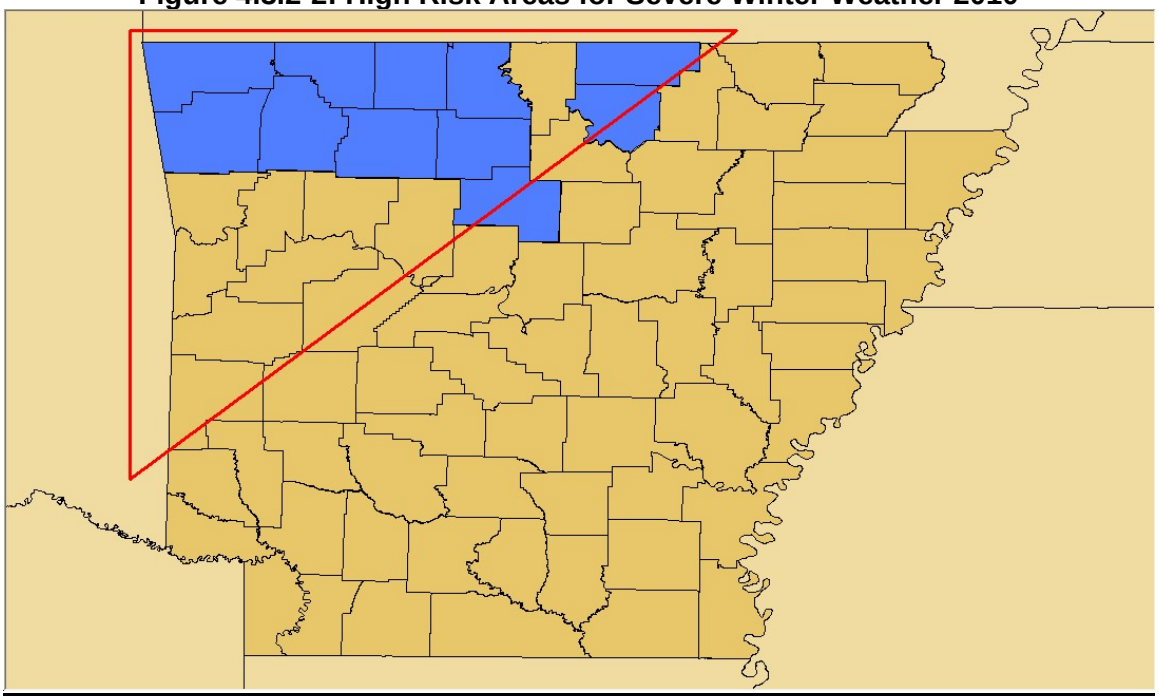
* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.2-2.

GIS Baseline Dataset

Based on the geographic extents determined in the hazard profile, the counties in blue have the highest risk factor with respect to Severe Winter Weather. The corridor outlined in red marks the extent of this high risk area.

Figure 4.3.2-2: High Risk Areas for Severe Winter Weather 2010



Source: GeoStor

Using the baseline dataset, the following summarizes the details of the overall region's vulnerability to severe winter weather.

Table 4.3.2-3: Regional Vulnerability to Severe Winter Weather

Vulnerable Locations	Number of Records
Arkansas Counties	29
Population	328980
Housing Units	139356
Fire Stations	446
Law Enforcement	125
Armories	21
Church Camps	1
Safe Rooms	25
Fairgrounds / Speedways	23
Military Installations	2
Public Schools	330
Private Schools	51
Universities and Colleges	4
Hospitals	31
EMS / Ambulance	59
Veteran's Affairs Medical Facilities	4
Local Health Dept Units	26
Long Term Healthcare	136
Hospices and related medical facilities	94
Rural Health Clinics	22
Bridges	1595
Airports	27
AWIN Towers	26
Environmental Facilities	981
Intermodel Terminals	7
Electricity Providers	11
Power Plants	11
Power Substations	144
Radio / TV Stations	224
Post Offices	206
Prisons	1
Dams	261

4.3.3 Assessing Flood Vulnerability by Jurisdiction

Based on NCDC reporting statistics, 2,064 flooding events occurred in the state from January 1996 through March 2010. These events are distributed evenly throughout the state with 252 events reported having property damage of at least $100,000.

From January 1996 through March 2010, 1,584 of the 2,064 reported floods were flash floods. The remaining 480 events were riverine with a number of events occurring in October through December of 2009. Note that over this period of time, riverine floods were most common at the western and northeastern part of the state. Although not indicated in this period, riverine flooding is known to be common in all jurisdictions adjacent to all of the state's major rivers (Mississippi, Arkansas, White, Red, St. Francis, and Ouachita Rivers). Over the past 11 years, flash flooding was most common in the northwest corner of the state in the Ozark plateaus and least common in the Mississippi Alluvial Plain of east central Arkansas.

Flood Impact Analysis

Floods and flash flooding will negatively affect the State of Arkansas with a variety of impacts:

People, facilities and infrastructure located within the floodplains in Arkansas are susceptible to flood impacts.

Areas with poor drainage (e.g., fast growing municipalities that lack adequate storm drainage management) are more susceptible to the short-term effects of flash flooding.

Injuries and deaths have resulted in the past from flooding events. Most cases involved automobile accidents during dangerous conditions.

The flooding situation created by Hurricane Katrina showed the worst case scenario resulting in long-term, significant flooding. The impacts included severe property damage, severe damage to cars and other equipment, water system contamination, wastewater treatment disruptions, civil unrest and evacuation issues. Arkansas does not expect to face a flooding event of this magnitude.

Flooding, and particularly flash flooding, has caused traffic accidents and congestion that has resulted in short-term impacts on the transportation infrastructure.

Property damaged by a flooding event often results in a mold infestation that can require cleaning and repairs. The mold can also create health issues for people in contact with it.

Responders are often put at risk during flood events as they respond to calls for assistance. Their risks can range from sickness due to exposure to inclement weather, to performing dangerous rescue missions for stranded citizens. Most responders, however, are not at a great health and safety risk from flooding events.

Flooding, as a localized event, does not pose a significant effect on the state's ability to maintain normal operations. During major flooding events, state resources directed by ADEM would be mobilized to assist in the response and recovery and this can cause a re-prioritization of the short and medium-term government agenda. However, this hazard should not cause any major disruptions to essential government services.

Flooding is usually the result of fast moving, severe storm systems and often includes other hazards including tornadoes, lightning, straight-line winds and hail. The impact from these related hazards will compound the response and recovery issues related directly to flooding.

The eastern boundary of the State of Arkansas is established by the Mississippi River. A significant flood of this river will severely impact the state. The Mississippi River is constantly monitored and an intricate series of flood-related levees helps to regulate its water levels.

There would be some advanced notice of any major flooding and this would reduce the impact especially to human and animal life. In the event of a 500-year flood on the river, there would be significant impact to all of the localized areas including homes, business facilities, water transportation locations, boating equipment, and agricultural areas.

HAZUS-MH2

Based on this information, Crittenden, Jefferson, Pulaski, Sebastian, and Union Counties have the largest number of households (>10,000) in the 1%-annual-chance floodplain. Clark, Columbia, Craighead, Garland, Greene, Miller, Ouachita, Phillips, Poinsett, and White Counties also have a significant number (5,000-10,000) of households within the regulatory floodplain.

The following table shows the overall exposure for these high risk counties based on the 2007 HAZUS-MH2 data.

Table 4.3.3-1: 2007 HAZUS-MH2 Exposure for Flooding Analysis Maximum Peak Ground Acceleration data and exposure data for the 15 highest flood risk counties in Arkansas.

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Clay	17,609	7,417	$1,574,149	$721,963	$581,665	$2,877,777
Columbia	25,603	9,981	$2,037,015	$1,042,009	$378,694	$3,457,718
Craighead	82,148	32,301	$8,156,237	$913,854	$734,106	$9,804,197
Crittenden	50,886	18,471	$4,358,456	$1,648,511	$521,913	$6,528,880
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Greene	37,331	14,750	$3,391,720	$690,119	$327,729	$4,409,568
Jefferson	84,278	30,555	$7,512,310	$15,421,946	$677,112	$23,611,368
Miller	40,443	15,637	$3,028,753	$1,045,446	$175,122	$4,249,321
Ouachita	28,790	11,613	$2,261,900	$946,103	$356,961	$3,564,964
Phillips	26,445	9,711	$1,830,095	$631,642	$502,764	$2,964,501
Poinsett	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Sebastian	115,071	45,300	$12,255,589	$764,711	$707,380	$13,727,680
Union	45,629	17,989	$4,174,282	$928,430	$734,454	$5,837,166
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Totals	**1,096,554**	**434,654**	**112,770,216**	**30,752,166**	**9,653,224**	**153,175,606**

From data collected from the National Inventory of Dams in 2003-2004, there were 1,174 classified dams in Arkansas. Based on the dam database provided by the AGIO in 2007, there are 1232 dams within the state. Classified dams are located within every county in Arkansas except Marion, Mississippi, and Woodruff Counties. Pulaski, Arkansas, Saline, Faulkner, Conway, White, Garland, Poinsett, and Hempstead Counties all have more than 27 dams.

The following table shows the overall exposure for these high risk counties based on the 2007 HAZUS-MH2 data.

Table 4.3.3-2: 2007 HAZUS-MH2 Exposure for Dams Analysis Maximum Peak Ground Acceleration data and exposure data for the 9 highest dams risk counties in Arkansas.

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Crawford	53,247	19,702	$4,161,626	$1,162,819	$265,315	$5,589,760
Faulkner	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Logan	22,486	8,693	$1,832,764	$568,467	$394,032	$2,795,263
Poinsett	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
Sebastian	115,071	45,300	$12,255,589	$764,711	$707,380	$13,727,680
Sharp	17,119	7,211	$1,638,420	$617,077	$174,000	$2,429,497
Washington	157,715	60,151	$15,034,068	$1,975,733	$321,456	$17,331,257
Yell	21,139	7,922	$1,645,708	$812,038	$319,890	$2,777,636
Totals	**1,031,476**	**408,420**	**108,816,563**	**12,408,389**	**6,694,049**	**127,919,001**

In 2003-2004, there were 173 dams classified as high hazards, 213 dams as significant hazards, and 791 dams as low hazards. In 2007, there were 161 classified as high hazards, 226 listed as significant, and 845 with a low hazard ranking. In 2010, there were 170 dams classified as high hazards, 227 listed as significant, and 832 with a low hazard ranking. The Sub-Committee agreed that these changes in numbers would not significantly alter the vulnerability to the jurisidictions therefore, the current analysis remains valid.

Pulaski, Sharp, Faulkner, Garland, Poinsett, Sebastian, Yell, Saline, Logan, Washington, and Crawford Counties all have more than five high hazard dams.

Hazard classification is updated continually based on development and changing demographics upstream and downstream. The hazard classification is not an indicator of the adequacy of the dam or its physical integrity, but a measure of the risk posed to property and facilities in the drainage area. Of the 170 high hazard dams, 42 dams (24%) are considered unsafe by the Arkansas National Resources Commission (ANRC). The largest number of unsafe high hazard dams (8) is located in Pulaski County.

The National Inventory of Dams information will be provided to local jurisdictions to assist in developing a local vulnerability analysis. The analysis will contain an estimate of the value and number of households and state facilities in the drainage area for each dam. Local jurisdictions will be required to provide detailed estimates of the damage potential of dams rated as high, significant and low hazard.

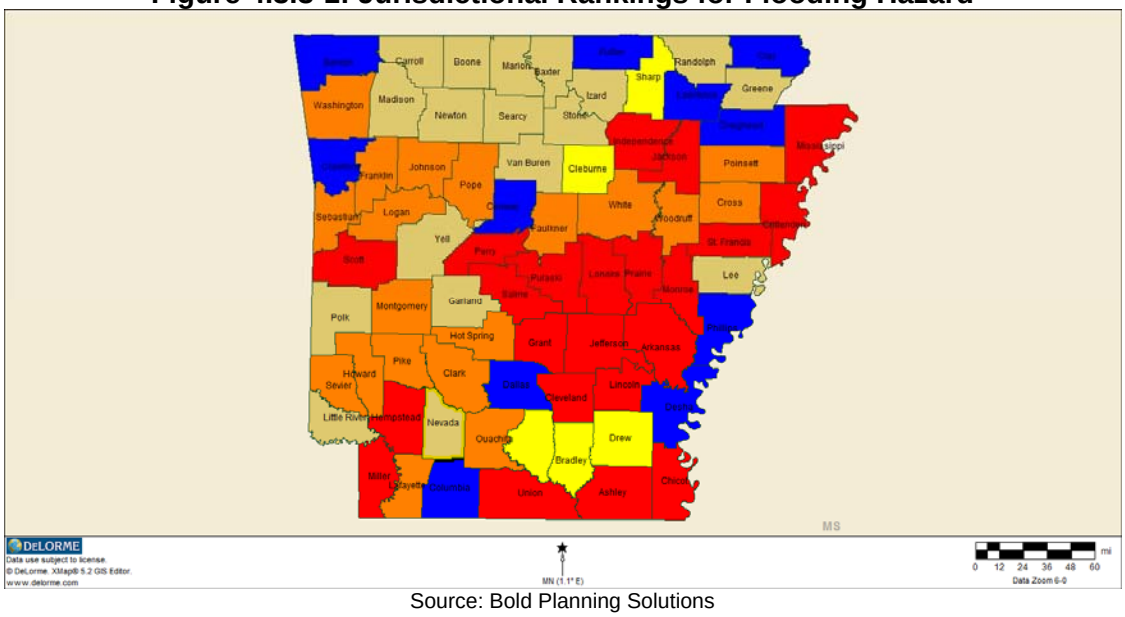
Assessment of areas that may present exacerbated flood hazards is in progress under the guidance of the Hazard Mitigation Planning Sub-Committee. Detailed analysis of FIRMs, FISs, topographic maps, geologic maps and HAZUS analyses will be performed by local jurisdictions and included in the State Hazard Mitigation Plan. Detailed maps will be produced for each local jurisdiction and a summary of flood attributes, by county, will be produced. As local county plans are created and approved by the state, the results will be included in the vulnerability analysis of this state plan.

Local Plan Integration

As of January 2010, sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the flooding hazard. Note, that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.3-1: Jurisdictional Rankings for Flooding Hazard



Source: Bold Planning Solutions

Flood Hazard totals:

High Risk Jurisdictions	22
Medium-High Risk Jurisctions	19
Medium Risk Jurisdictions	5
No Hazard Score/Listing	11

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January, 2010, sixty-two local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative. Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table below.

Table 4.3.3-3: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	High	15	$ 10,000	0	0	N/A	N/A	N/A	55
Ashley County	High	12	$ 144,000	0	0	N/A	N/A	N/A	55
Benton County	N/A	41	$ 2,715,000	0	0	N/A	4	N/A	23
Bradley County	Medium	13	$ 1,370,000	0	0	6	2	$ 52,692	7
Calhoun County	Medium	14	$ 64,000	0	0	N/A	2	$ 4,000	12
Chicot County	High	12	$ 1,400,000	0	0	6	1	$ 175,000	8
City of Foreman	N/A	3	$ 55,000	0	0	N/A	N/A	$ 948	58
Clark County	Medium-High	16	$ 50,000	N/A	N/A	12	1	N/A	10
Clay County	N/A	11	$ 7,900,000	N/A	N/A	7	3	$ 1,128,571	53
Cleburne County	Medium	20	$ 3,000,000	0	0	N/A	15	N/A	N/A
Cleveland County	High	10	N/A	0	0	N/A	N/A	N/A	55
Columbia County	N/A	15	$ 131,245,000	0	0	N/A	9	N/A	N/A
Conway County	N/A	9	N/A	N/A	N/A	N/A	14	N/A	N/A
Craighead County	N/A	13	$ 8,700,000	N/A	N/A	26	4	N/A	N/A
Crawford County	N/A	40	$ 1,473,000	0	0	N/A	1	$ 67,000	22
Crittenden County	High	9	$ 6,500,000	0	0	6	3	$ 169,844	3
Cross County	Medium-High	5	$ 218,000	0	0	N/A	N/A	N/A	N/A
Dallas County	N/A	13	$ 50,000	0	0	N/A	5	N/A	13
Desha County	N/A	14	$ 5,000,000	0	0	N/A	N/A	N/A	55
Drew County	Medium	17	$ 1,370,000	0	0	5	1	N/A	N/A
Faulkner County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Franklin County	Medium-High	39	$ 670,000	0	0	N/A	6	N/A	15
Fulton County	N/A	9	N/A	N/A	N/A	N/A	1	N/A	11
Grant County	High	7	$ 800,000	0	0	2	1	$ 100,000	6
Hempstead County	High	16	$ 3,000,000	0	0	12	5	$ 253,917	11
Hot Spring County	Medium-High	11	N/A	N/A	N/A	N/A	14	N/A	11
Howard County	Medium-High	13	$ 1,365,000	0	0	0	6	N/A	56
Independence County	Medium	20	N/A	0	0	N/A	N/A	N/A	56
Jackson County	High	15	$ 5,800,000	N/A	N/A	17	4	N/A	7
Jefferson County	High	18	$ 3,242,000	0	0	9	1	N/A	11
Johnson County	Medium-High	29	$ 21,000	1	0	N/A	N/A	N/A	58
Lafayette County	Medium-High	9	$ 30,000	0	0	N/A	N/A	N/A	4
Lawrence County	N/A	10	$ 1,187,000	0	0	N/A	N/A	N/A	7
Lincoln County	High	10	$ 4,500,000	0	0	12	2	$ 295,800	N/A
Little Rock/ L.R. North	Medium-High	17	$ 60,000	N/A	N/A	N/A	N/A	$ 6,000	10
Logan County	Medium-High	12	$ 55,000	0	0	0	1	N/A	11
Lonoke County	High	9	$ 52,000	0	0	N/A	5	N/A	11
Marmaduke ISD	High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	N/A	10	$ 3,500	0	0	0	1	N/A	15
Miller County	High	14	$ 2,500,000	0	0	10	2	$ 180,643	12
Mississippi County	High	12	$ 4,500,000	?	?	4	1	N/A	11
Monroe County	High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium-High	11	N/A	N/A	N/A	0	2	N/A	9
City of Mountain View	Medium-High	15	N/A	0	0	N/A	N/A	N/A	7
Ouachita County	Medium-High	16	$ 762,000	0	0	0	8	N/A	57
Perry County	High	20	$ 1,247,000	0	0	0	3	N/A	10
Phillips County	n/a	6	N/A	N/A	N/A	N/A	N/A	N/A	n/a
Pike County	Medium-High	10	N/A	N/A	N/A	N/A	2	N/A	13
Poinsett County	Medium-High	8	$ 7,630,000	0	0	19	3	N/A	10
Pope County	Medium-High	13	$ 50,000	N/A	N/A	N/A	9	N/A	10
Prairie County	High	6	N/A	0	0	N/A	N/A	N/A	7
Pulaski County	High	18	$ 60,000	N/A	N/A	N/A	5	$ 6,000	10
Saline County	High	15	N/A	0	0	N/A	N/A	N/A	8
Scott County	High	21	$ 465,000	N/A	N/A	N/A	N/A	N/A	15

Sebastian County	Medium-High	33	$ 710,000	N/A	N/A	N/A	N/A	N/A	54
Sevier County	Medium-High	11	$ 115,000	0	0	N/A	N/A	N/A	58
Sharp County	Medium	33	$ 17,975,000	2	3	N/A	9	$ 27,000	58
St. Francis County	High	7	$ 209,000	0	0	N/A	N/A	N/A	10
Union County	High	14	$ 275,000	0	0	N/A	N/A	N/A	12
Washington County	Medium-High	8	$ 8,105,000	N/A	N/A	N/A	N/A	N/A	11
White County	High	23	$ 10,000	0	0	N/A	N/A	N/A	55
Woodruff County	Medium-High	7	$ 32,000	0	0	N/A	N/A	N/A	10
Totals		**862**	**$236,684,500**	**3**	**3**	**153**	**156**	**$2,467,415**	

* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.3-3.

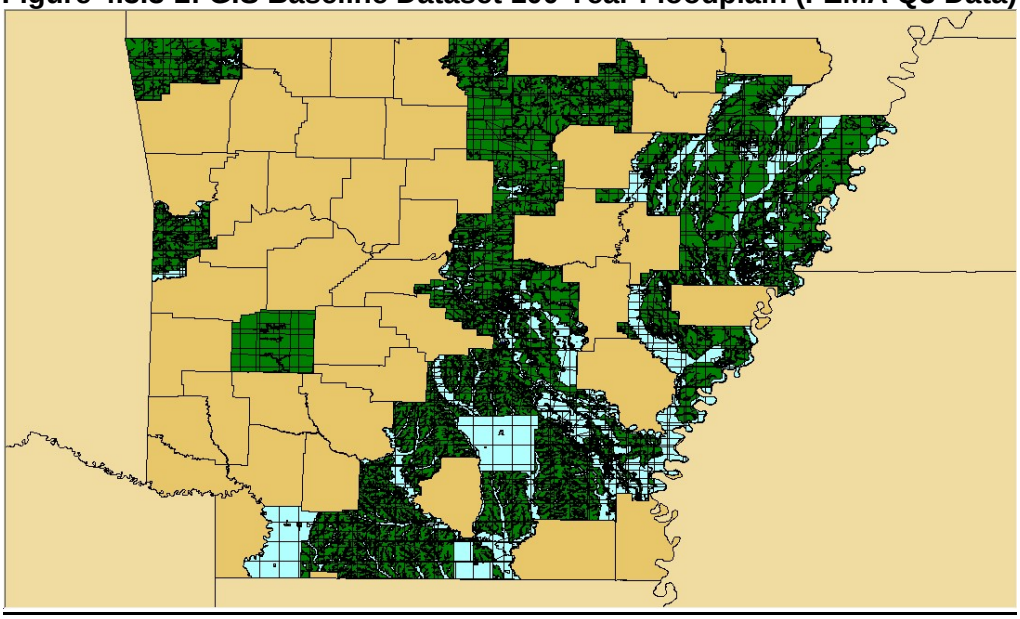
Development in hazard prone areas

The National Flood Insurance Program (NFIP) addresses land development in flood hazard areas of communities that are participants in the NFIP. Based on local plan information, Columbia, Craighead, Clay, Sharp, and Washington counties list the largest loss statistics for flooding in the state. All of these counties are participants in the NFIP as of July 2010; therefore any future development in the floodplains should meet floodplain management ordinances, which requires first floor elevations to be built a certain level above the base flood elevation according to state guidelines. It should also be noted that of the five counties mentioned only one (Washington) is located in the area discussed in the Development in Hazard Prone Areas section at the beginning of this chapter. The Fayetteville-Springdale-Rogers MSA extends into Washington County in the Northwest region of Arkansas. Washington County does not have any Q3 data at this time, but there are map modifications underway, as illustrated in the following maps. The exact amount of development for this area is unknown; therefore it would not impact the overall vulnerability assessment for this hazard.

GIS Baseline Dataset

The geographic extents for flooding are best represented by the FEMA Q3 digital floodplain maps. These maps are considered the best available data currently for 100-year and 500-year floodplain areas. There are currently 33 of the 76 counties that have Q3 data in existence. The HMP Sub-Committee recognizes the limitations due to the lack of data for 43 counties as well as the on-going necessity to update and maintain the maps for the 33 counties. The vulnerability for both the 100-year and the 500-year floodplain areas has been analyzed for the counties with available Q3 data. The map on the following page (Figure 4.3.3-2) shows the areas in the 100-year floodplain in light blue.

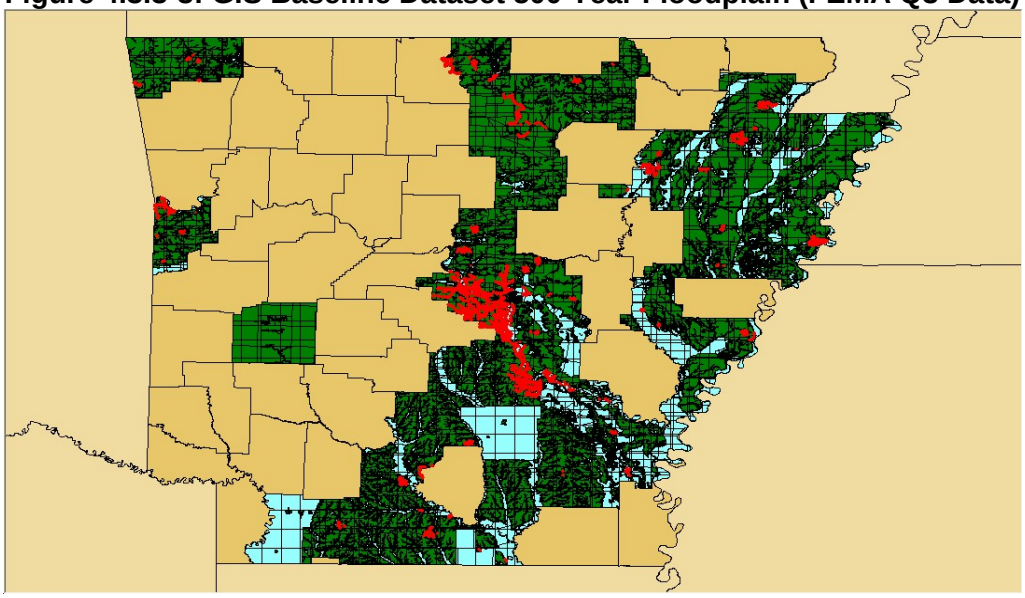
Figure 4.3.3-2: GIS Baseline Dataset 100 Year Floodplain (FEMA Q3 Data)



Source: GeoStor

The following map shows the areas in the 500-year floodplain as demarcated by the FEMA Q3 data.

Figure 4.3.3-3: GIS Baseline Dataset 500 Year Floodplain (FEMA Q3 Data)

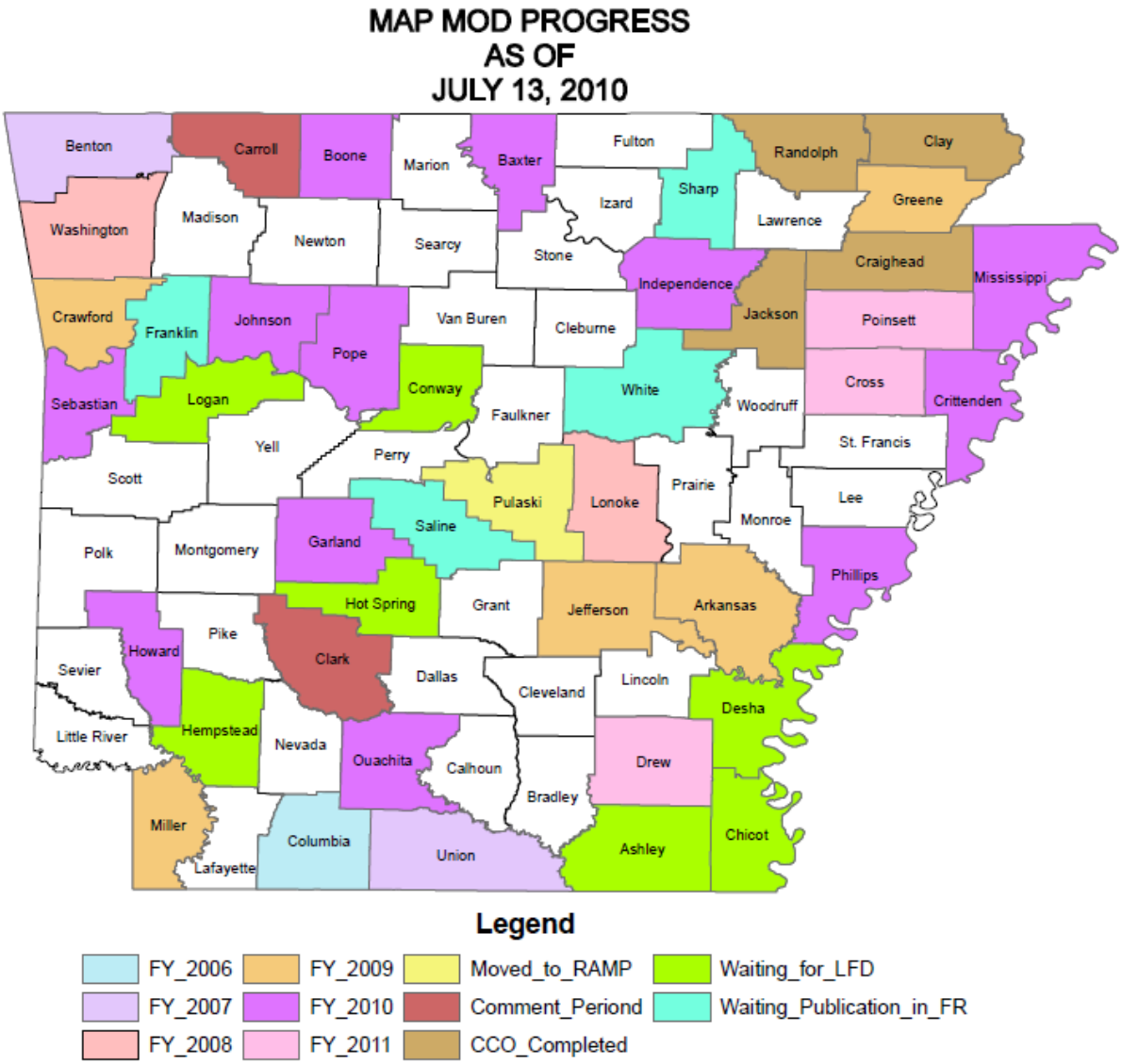


Source: GeoStor

Due to the lack of Q3 data across the state and a lack of technical GIS resources, the HMP Sub-Committee did not run the GIS baseline analysis for the 100-year and 500-year floodplain areas as part of the 2010 update processes. As more digital flood data becomes available, the sub-committee is committed to conducting more detailed vulnerability analyses as part of future updates to this plan. At the time of the 2010 revision, this Q3 data has not been updated and still remains the most current data for the State of Arkansas. Therefore, this GIS baseline still remains valid for the purpose of determing vulnerability to the individual jurisdictions.

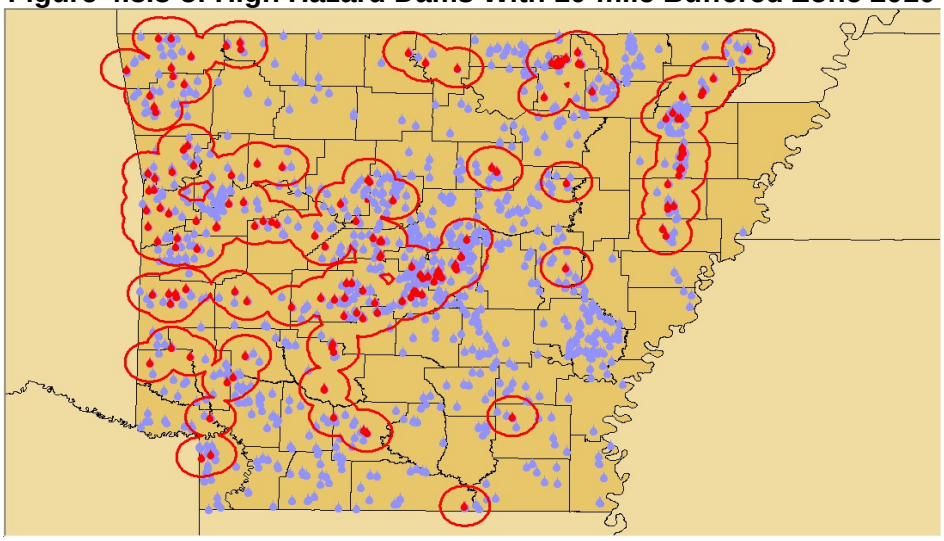
For the 2010 update, the planning team coordinated with the Arkansas Natural Resources Commission to obtain a map illustrating all map modifications in progress throughout the state. The results are shown below.

Figure 4.3.3-4: Map Modifications in Progress throughout the State



The following map shows the High Hazard dams with a 10-mile buffered zone around each location.

Figure 4.3.3-5: High Hazard Dams With 10-mile Buffered Zone 2010



Source: GeoStor

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to the high hazard dams.

Table 4.3.3-4: Regional Vulnerability for Flood

Vulnerability	Number of Records
Arkansas Counties	62
Fire Stations	658
Law Enforcement	281
Armories	108
Church Camps	17
Safe Rooms	41
Fairgrounds / Speedways	61
Military Installations	4
Public Schools	611
Private Schools	125
Universities and Colleges	13
Hospitals	77
EMS / Ambulance	100
Veteran's Affairs Medical Facilities	12
Local Health Dept Units	54
Long Term Healthcare	332
Hospices and related medical facilities	213

Rural Health Clinics	13
Bridges	340
Airports	45
AWIN Towers	42
Environmental Facilities	1767
Intermodel Terminals	19
Electricity Providers	22
Power Plants	18
Power Substations	258
Radio / TV Stations	324
Post Offices	263
Prisons	8
Dams	748

4.3.4 Assessing Earthquake Vulnerability by Jurisdiction

Historically, earthquakes of some magnitude have occurred in almost all counties in Arkansas. Because of the location of the New Madrid Fault in relation to the geographic area of the State of Arkansas, it is understood that all counties are vulnerable to the effects of an earthquake event. It is clear from earthquake epicenter and earthquake hazard; however, that northeast Arkansas has the highest risk of the earthquake hazard. This higher risk is due to the proximity of this area to the New Madrid Seismic Zone and the thick alluvial soils that underlie this area.

Based upon probabilistic peak ground accelerations (PGA) from the USGS Seismic Hazard Map, 27 counties were identified as being most vulnerable to earthquakes (Table 4.3.4-1). Each of the at-risk counties listed in Table 4.3.4-1 has a maximum PGA of 9%g or more with a 10% probability of exceedance in 50 years (9%g is equivalent to Mercalli Intensity damages of VI to VII (see Chapter 2, Table 4.2.4-1).

Earthquake Impact Analysis

Earthquakes will negatively affect the State of Arkansas with a variety of impacts:

It is expected that a major event along the New Madrid Fault will result in a large number of human injuries and deaths. After the initial event, people may still be impacted as a result of impassable roads thereby slowing down the ability of medical personnel to respond and provide medical attention. Special populations are especially vulnerable to death or injury from an earthquake event due to their requirements for special medical attention.

Responders will be extremely busy after an earthquake as they deal with medical issues, traffic control issues, damage assessments, and overall emergency coordination. These responders will be at risk in a variety of ways as they try to respond.

Older buildings made from poor seismic construction such as multi-story buildings and un-reinforced masonry will be impacted more than facilities with better construction. The damage to these building will result in significant financial losses, as resources must be allocated to inspect the locations, make necessary repairs, and demolish structures that are beyond repair.

After a major event, the local area will most likely experience disruption of primary services such as electricity and water. The local government could become overwhelmed and short-handed due to employees who are injured or dead. Unless Little Rock and other areas with a large concentration of state government staff is directly impacted, the HMP Sub-Committee does not believe that an earthquake will have an impact on the state government's ability to maintain continuity and the delivery of essential services.

An earthquake will create a number of secondary events such as fires and HAZMAT releases. These residual events will have impacts on human health, financial losses and the environment.

HAZUS-MH2

In addition to being at risk to earthquakes, several at-risk counties have significant exposure and are therefore highly vulnerable to earthquake damage. Mississippi, Craighead, and Crittenden Counties, three of the four highest PGA counties, all have populations over 50,000 and total exposures of over 5 billion dollars. Other counties with large exposure include White, Lonoke, Faulkner and Pulaski.

Table 4.3.4-1: 2007 HAZUS-MH2 Earthquake Analysis Maximum Peak Ground Acceleration data and exposure data for the 27 highest earthquake risk counties in Arkansas.

County	Maximum PGA With 10% Probability of Exceedance 50 yrs	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Mississippi	45	51,979	19,349	$4,226,460	$2,171,344	$1,214,781	$7,612,585
Craighead	43	82,148	32,301	$8,156,237	$913,854	$734,106	$9,804,197
Poinsett	43	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Crittenden	40	50,886	18,471	$4,358,456	$1,648,511	$521,913	$6,528,880
Greene	32	37,331	14,750	$3,391,720	$690,119	$327,729	$4,409,568
Clay	30	17,609	7,417	$1,574,149	$721,963	$581,665	$2,877,777
St. Francis	24	29,329	10,043	$2,138,818	$950,083	$750,723	$3,839,624
Jackson	22	18,418	6,971	$1,580,775	$912,604	$619,336	$3,112,715
Lawrence	22	17,774	7,108	$1,452,704	$974,861	$522,774	$2,950,339
Woodruff	21	8,741	3,531	$678,476	$834,977	$327,468	$1,840,921
Randolph	19	18,195	7,265	$1,445,881	$449,940	$292,729	$2,188,550
Lee	17	12,580	4,182	$660,998	$501,439	$231,942	$1,394,379
Independence	16	34,233	13,467	$3,097,289	$878,415	$452,748	$4,428,452
White	14	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Monroe	13	10,254	4,105	$876,557	$1,083,840	$202,971	$2,163,368
Sharp	13	17,119	7,211	$1,638,420	$617,077	$174,000	$2,429,497
Prairie	12	9,539	3,894	$920,317	$1,009,934	$289,797	$2,220,048

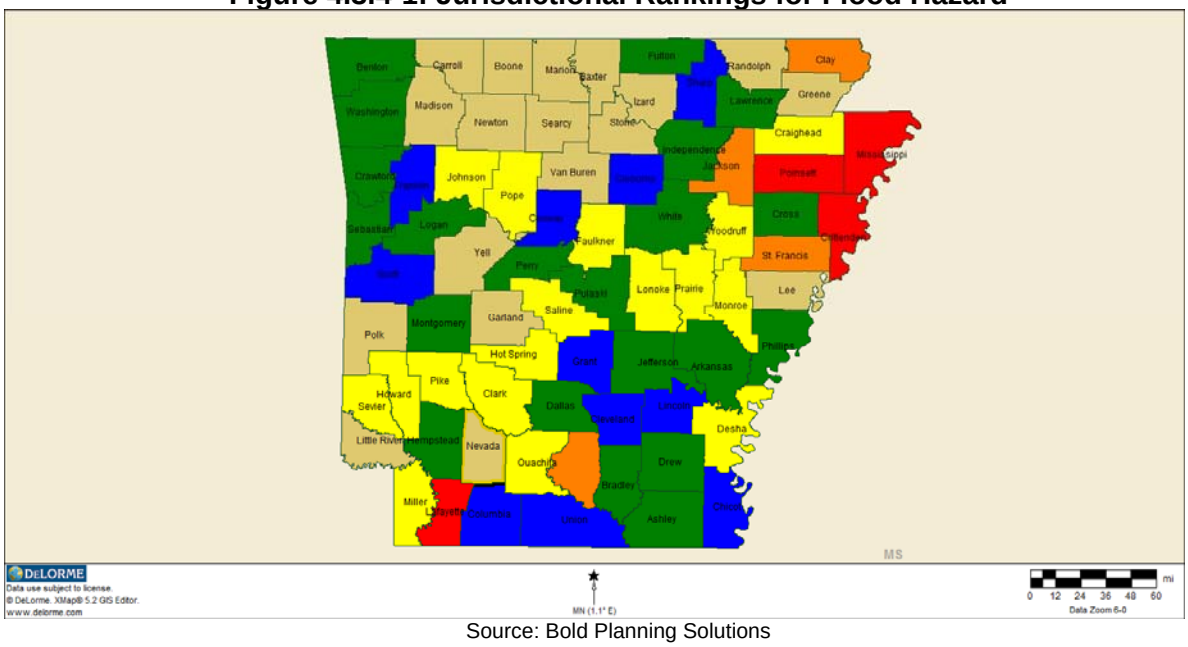
Cleburne	11	24,046	10,190	$2,841,804	$603,242	$145,116	$3,590,162
Fulton	11	11,624	4,810	$1,045,832	$833,949	$116,058	$1,995,839
Phillips	11	26,445	9,711	$1,830,095	$631,642	$502,764	$2,964,501
Izard	10	13,249	5,440	$1,055,007	$737,243	$376,623	$2,168,873
Lonoke	10	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Stone	10	11,499	4,768	$970,125	$445,230	$87,174	$1,502,529
Arkansas	9	20,749	8,457	$1,959,105	$819,062	$376,884	$3,155,051
Faulkner	9	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Pulaski	9	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Van Buren	9	16,192	6,825	$1,565,684	$793,475	$347,826	$2,706,985
Totals		**1,133,034**	**444,526**	**113,862,650**	**26,770,832**	**13,724,980**	**154,358,462**

Local Plan Integration

As of January 2010, sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the flooding hazard. Note that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.4-1: Jurisdictional Rankings for Flood Hazard



Source: Bold Planning Solutions

Earthquake Hazard totals:

High Risk Jurisdictions	4
Medium-High Risk Jurisctions	4
Medium Risk Jurisdictions	17
Low Risk Jurisdictions	21
No Hazard Score	11

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January, 2010, sixty-two local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table below.

Table 4.3.4-2: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ashley County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	55
Benton County	Low	0	N/A	0	0	0	0	N/A	N/A
Bradley County	Low	0	N/A	N/A	N/A	0	0	N/A	N/A
Calhoun County	Medium-Low	0	N/A	0	0	0	0	N/A	N/A
Chicot County	N/A	0	N/A	N/A	N/A	0	0	N/A	N/A
City of Foreman	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clark County	Medium	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clay County	Medium-High	N/A	N/A	N/A	N/A	0	0	N/A	53
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	Medium	200	N/A	N/A	N/A	0	0	N/A	N/A
Crawford County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crittenden County	High	200	N/A	N/A	N/A	0	0	N/A	N/A

Cross County	Low	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dallas County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Desha County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drew County	Low	1	N/A	N/A	N/A	0	0	N/A	N/A
Faulkner County	Medium	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grant County	N/A	0	N/A	0	0	0	0	N/A	N/A
Hempstead County	Low	0	N/A	N/A	N/A	0	0	N/A	N/A
Hot Spring County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Howard County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Independence County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackson County	Medium-High	200	N/A	N/A	N/A	0	0	N/A	N/A
Jefferson County	Low	5	N/A	N/A	N/A	0	0	N/A	N/A
Johnson County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lafayette County	High	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	Low	1	N/A	N/A	N/A	0	0	N/A	N/A
Lincoln County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Little Rock/ L.R. North	Low	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	Medium	3	N/A	N/A	N/A	N/A	N/A	N/A	18
Marmaduke ISD	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	Medium	0	N/A	N/A	N/A	0	0	N/A	N/A
Mississippi County	High	800	N/A	N/A	N/A	0	0	N/A	N/A
Monroe County	Medium	4	N/A	N/A	N/A	N/A	N/A	N/A	16
Montgomery County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	Medium	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ouachita County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perry County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phillips County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pike County	Medium	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	High	200+	N/A	N/A	N/A	0	0	N/A	N/A
Pope County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Prairie County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pulaski County	Low	8	N/A	N/A	N/A	N/A	N/A	N/A	50+
Saline County	Medium	2	N/A	N/A	N/A	N/A	N/A	N/A	56

Scott County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sebastian County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sharp County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
St. Francis County	Medium-High	10	N/A	N/A	N/A	N/A	N/A	N/A	62
Union County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Washington County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
White County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Woodruff County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals		**1546**		**0**	**0**	**0**	**0**	**$ -**	

* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.4-2.

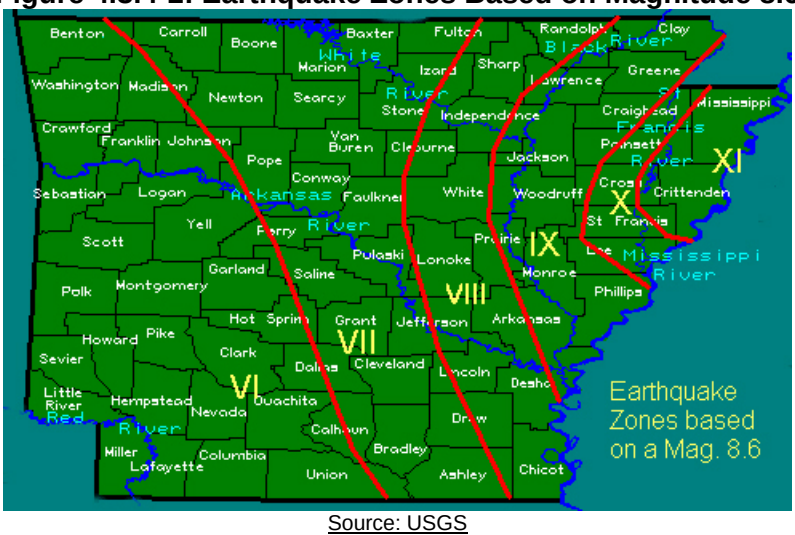
Development in hazard prone areas:

Although development in the northeastern region of Arkansas experiences the most seismic activity, new development standards require structures to be built to codes that lessen the damage to these structures. It is unclear of the extent of development occurring in this higher risk area, but it can be assumed that the urban areas will experience more development resulting in an increasing number of vulnerable structures. None of the highest risk counties are located in the areas discussed in the Development in Hazard Prone Area section at the beginning of this chapter. This does not mean that these areas are not experiencing growth; this just means the development pressures are not as heavy in this area. The exact amount of development in the northeast area is unknown and as such, this will not significantly impact the over all vulnerability assessment for this hazard.

GIS Baseline Dataset

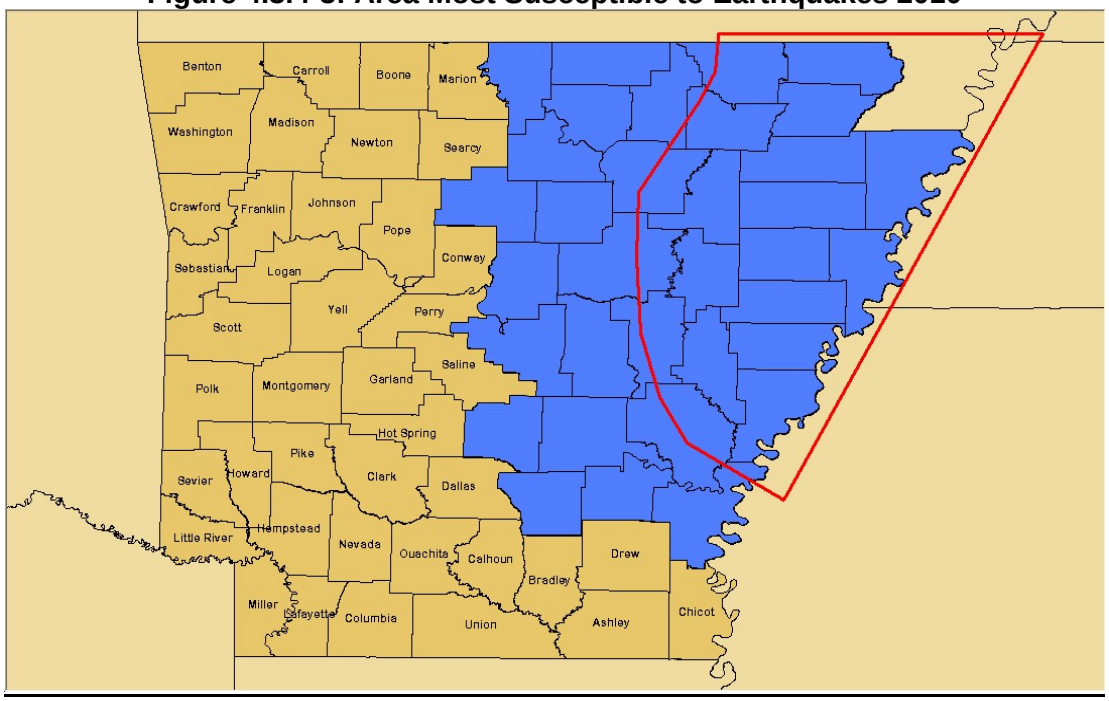
The area in the northeast of the state is most susceptible to earthquakes due to the New Madrid Fault Zone. The high risk counties as identified by ADEM have been noted in blue (Figure 4.3.4-3). The region with the highest risk is shown with the red line and used for the modeling and the development of the following report of Vulnerable Locations. The red line model is based on the Modified Mercalli Index (MMI) regions in the map on the following page with an index level greater than nine (IX).

Figure 4.3.4-2: Earthquake Zones Based on Magnitude 8.6



Source: USGS

Figure 4.3.4-3: Area Most Susceptible to Earthquakes 2010



Source: GeoStor

Using the baseline dataset, the following summarizes the details of the overall region's vulnerability to earthquakes.

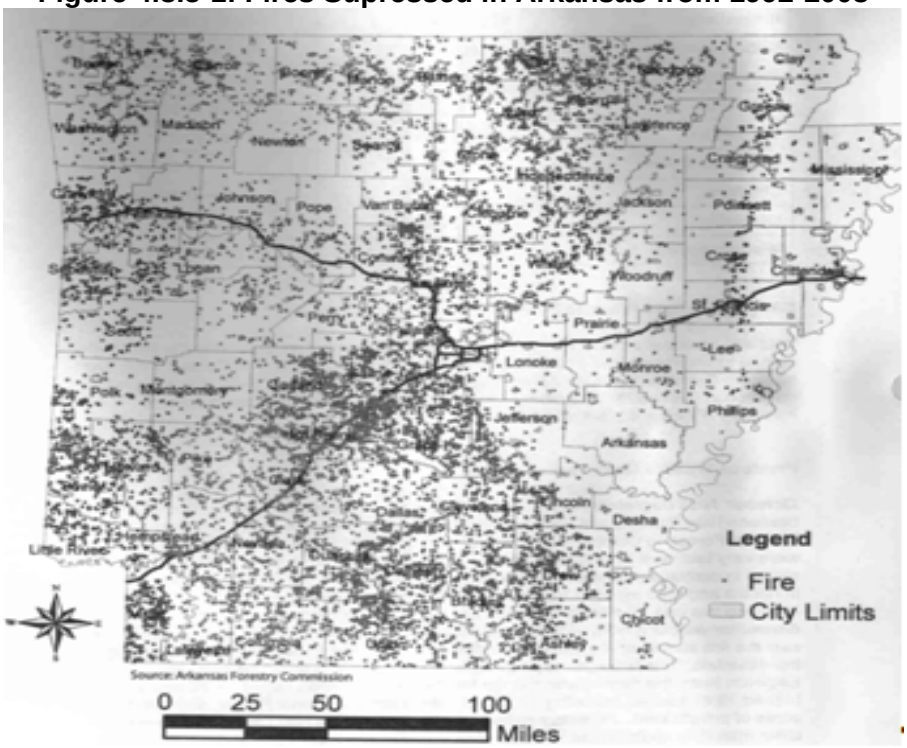
Table 4.3.4-3: Regional Vulnerability to Earthquakes

Vulnerability	Number of Records
Arkansas Counties	21
Population	220465
Housing Units	91365
Fire Stations	207
Law Enforcement	114
Armories	18
Church Camps	21
Safe Rooms	21
Fairgrounds / Speedways	12
Military Installations	1
Public Schools	208
Private Schools	28
Universities and Colleges	2
Hospitals	17
EMS / Ambulance	46
Veteran's Affairs Medical Facilities	2
Local Health Dept Units	26
Long Term Healthcare	92
Hospices and related medical facilities	67
Rural Health Clinics	21
Bridges	1784
Airports	24
AWIN Towers	20
Environmental Facilities	516
Intermodel Terminals	27
Electricity Providers	11
Power Plants	4
Power Substations	104
Radio / TV Stations	128
Post Offices	164
Prisons	5
Dams	232

4.3.5 Assessing Wildfire Vulnerability by Jurisdiction

As described in Chapter 2, Section 4.2.5, wildfires are most common in the south central to southwest part of the state within the heavily forested Gulf Coastal Plain and southern Ouachita Mountains provinces (Figures 4.2.5-1 and 4.2.5-2). Fires are least common in the agricultural Mississippi Alluvial Plain Province in eastern Arkansas (Figures 4.2.5-1 and 4.2.5-2). The Arkansas Forestry Commission did not have an update to this map at the time of this revision.

Figure 4.3.5-1: Fires Supressed in Arkansas from 1992-2003



Source: Arkansas Forestry Commission

Wildfire Impact Analysis

Wildfires will negatively affect the State of Arkansas with a variety of impacts:

Forested lands and any surrounding urban areas (WUI - wild land-urban interface) are most at risk to wildfires. Potential risks include destruction of land, property and structures as well as injuries and loss of life. Although rare, deaths and injuries usually occur at the beginning stages of wildfires when sudden flare-ups occur from high wind conditions. In most situations, people have the opportunity to evacuate the area and avoid bodily harm.

Responders are most at risk during the process of fire suppression. Responders put themselves in harms way to contain the fire and save lives and property. Firefighters are often trapped by fires that either grow or suddenly change directions.

All facilities near fire fuel areas are at risk of fire damage. Clearing debris near structures is an important step in mitigating the risks of wildfires. Most state facilities are located in urban areas and are therefore not particularly at risk from fire impact. Fire experts often disagree about the short and long-term effects of large-scale fires on the overall environment. The case of the

Yellowstone Park wildfire is the most notable event where experts initially thought long-term damage would result from the massive fires. After some years, however, the environment regenerated itself and experts now believe that the fire was actually beneficial to the long-term health of the area.

Wildfires are usually small and quickly contained in Arkansas. The state government does not expect any events to result in the loss of the ability to delivery essential services or continue the day-to-day government business. Financial losses related to wildfires include destroyed or damaged houses, barns, private facilities and equipment, loss of commercial timber supplies, and local and state costs for response and recovery.

Table 4.3.5-1: 2007 HAZUS-MH2 Analysis Maximum Peak Ground Acceleration data and exposure data for the 12 highest wildfire risk counties in Arkansas.

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Conway	20,336	7,967	$1,867,754	$753,888	$203,919	$2,825,561
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
Independence	34,233	13,467	$3,097,289	$878,415	$452,748	$4,428,452
Izard	13,249	5,440	$1,055,007	$737,243	$376,623	$2,168,873
Marion	16,140	6,776	$1,505,908	$630,457	$173,826	$2,310,191
Ouachita	28,790	11,613	$2,261,900	$946,103	$356,961	$3,564,964
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
Searcy	8,261	3,523	$644,909	$651,931	$174,000	$1,470,840
Sharp	17,119	7,211	$1,638,420	$617,077	$174,000	$2,429,497
Union	45,629	17,989	$4,174,282	$928,430	$734,454	$5,837,166
Totals	**409,253**	**164,493**	**37,344,539**	**9,779,773**	**4,906,756**	**52,031,068**

For the 2010 revision and update, the HMP Sub-Committee researched data about recent fire events. The NCDC database only listed seven fire events between 2006 and 2009. Of these events four were large enough to report significant property damage. These seven events were in Ashley County, Montgomery County, Stone County, Sebastian County, Saline County, Jackson County, and Pulaski County.

Table 4.3.5-2: NCDC Wildfire Data

7 WILD & FOREST FIRE event(s) were reported in **Arkansas** between **01/01/2006** and **11/30/2009**.

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Arkansas								
Location or County	**Date**	**Time**	**Type**	**Mag**	**Dth**	**Inj**	**PrD**	**CrD**
1 ARZ074	01/08/2006	12:00 PM	Wildfire	N/A	0	0	800K	1.0M
2 ARZ041	03/14/2006	04:00 AM	Wildfire	N/A	0	0	0	0
3 ARZ014	03/16/2006	04:00 AM	Wildfire	N/A	0	0	0	0
4 ARZ029	01/29/2008	12:00 PM	Wildfire	N/A	0	1	0K	0K
5 ARZ043	01/17/2009	12:25 PM	Wildfire	N/A	0	0	10K	0K
6 ARZ025	01/22/2009	15:30 PM	Wildfire	N/A	0	0	60K	0K
7 ARZ044	02/05/2009	13:10 PM	Wildfire	N/A	0	0	50K	0K
				TOTALS:	0	1	920K	1.000M

The HMP Sub-committee has coordinated with the Arkansas Forestry Commission in order to obtain more detailed reporting for fire events and magnitude. The Forestry Commission maintains an on-going database of all wildland fires in the state and this data was analyzed. The numbers below reflect statewide data.

- 2004 - There were 1,654 reported fires with a total of 22,612 acres burned.
- 2005 - There were 2,674 reported fires with a total of 34,907 acres burned.
- 2006 - There were 2,964 reported fires with a total of 42,042 acres burned.
- 2007 - There were 1,222 reported fires with a total of 17,123 acres burned.
- 2008 - There were 846 reported fires with a total of 10,636 acres burned.
- 2009 - There were 1,047 reported fires with a total of 16,156 acres burned.
- 2010 - There were 794 reported fires with a total of 11,737 acres burned from January to June of 2010.

Wildland-Urban Interface

The knowledge of the number of fires and acreage burned is important in assessing vulnerability by jurisdiction, but does not consider the vulnerability of human development (structures, infrastructure, lifelines, etc.) to wild land fires. To assess jurisdictions most at risk to wild land fires, one must consider the wild land-urban interface.

Population movement trends in the US have resulted in rapid development in the outlying fringes of metropolitan areas and in the rural areas with attractive recreational and aesthetic amenities, such as forests. This demographic change is increasing the size of the wild land-urban interface (WUI), defined as the area where structures and other human development meet or intermingle with undeveloped wild land. The expansion of the WUI in recent decades has significant implications for wildfire management and impact. The WUI creates an environment for fire to move readily between vegetation fuels such as brush or forests and structural fuels such as houses and buildings. The WUI expansion has therefore increased the likelihood that wildfires will threaten residential structures and people.

The U.S. Department of Agriculture Forest Service and the University of Wisconsin (Madison) recently released new scientific maps depicting the communities and lands within the wild land-urban interface (WUI). This is the first consistent nationwide representation of the WUI as defined in the Federal Register (Volume 66:751, 2001) and makes mapping and analysis a reality at the national, state and local levels. WUI maps are intended to illustrate where the WUI was located in 2000. Two types of WUI were mapped: *intermix* and *interface*. Intermix WUI are areas where housing and vegetation intermingle; interface WUI are areas with housing in close proximity to contiguous wild land vegetation. A map depicting the interface and intermix WUI in Arkansas is presented in Figure 4.3.5-3.

The U.S. Forest Service-University of Wisconsin WUI study also made available county-level WUI statistical data. Based on this statistical data, the number of square miles in each county in Arkansas determined to be WUI was calculated. This analysis found that counties in the populated central part of the state (Pulaski, Garland, Saline, and Faulkner) were found to have the largest areas within the WUI. The table on the following pages shows the total area of WUI for each county and the corresponding map correlates to these figures.

Table 4.3.5-3: Wildfire Urban Interface for each County

County	High Density Interface	High Density Intermix	Low Density Interface	Low Density Intermix	Medium Density Interface	Medium Density Intermix	Non-WUI
Arkansas County		7818	3592240	16553395	454151	1492284	2516220616
Ashley County	421528.3	16001	10747271	141095071	20762556	3074658	2209285995
Baxter County	1358203.7	36988	52805870	397471241	26656656	31428221	926038414
Benton County	957070.6	113233	144232183	391133073	28725713	87807180	1538159670
Boone County	15032.2	13228	66012242	157287429	3472413	3892133	1300458604
Bradley County	291962.0	7746	4114065	53619418	10255773	1881634	1614860170
Calhoun County	1515.6	3776	2496224	48518530	4702068	1542311	1569529205
Carroll County	214961.6		45315442	133855167	5327319	12872754	1434825057
Chicot County			7735368	1606815	69647	909781	1653703496
Clark County	1158674	347320	19053362	154902443	9104904	10925602	2045993045
Clay County	12054	6424	2558674	14399198	373475	335871	1638098118
Cleburne County	395094	94982	46384225	367576362	8707828	24426585	984814098
Cleveland County	31716		2143941	68599349	2107295	3722653	1471546182
Columbia County	1264806	279493	13519375	171949779	10385114	13336890	1773434421
Conway County	9704	499871	50572112	162884094	1982804	7403877	1217081505
Craighead County	1684932	241267	40717318	104952906	21755991	17702042	1653497224
Crawford County	29537	22638	47431075	224803655	6942019	2677841	1260161213
Crittenden County		24222		558778		965079	1578363267
Cross County	171963	4172	22694797	54780598	4498064	282557	1512376061
Dallas County	201867	4751	2610950	45477456	7708105	3785294	1668839633
Desha County	13631		2557428	1204428	771947	50071	1975289696
Drew County	478563		14748835	110402725	14918784	3037814	2001178253
Faulkner County	2809211	376789	121731889	434827279	30903269	30764166	1055282312
Franklin County	88393	436	15565190	42301345	2836982	359468	1517174701
Fulton County	186736	12359	14362415	84485635	5853698	3986904	1492135009
Garland County	5129387	3301288	54749600	486398714	26252987	102474922	1075707555
Grant County	65230	29094	19955896	181879550	7551828	7830401	1418973532
Greene County	11881	42062	57553036	189255377	8180766	1927764	1238757320
Hempstead County	2630	208907	35340112	104939860	2146499	7320735	1737577541
Hot Spring County	761393	806211	61126600	342920859	8623080	15010796	1163357957
Howard County	229904	224771	16015749	34668229	5439071	2302616	1462503171
Independence County	638735	395553	70532094	222114623	12276770	12835624	1659311606
Izard County	147541	197660	24250932	82615482	4889266	12654551	1379216467
Jackson			7564122	23702758	97113	122095	1608626852

County							
Jefferson County	3050822	12237	13287149	343361117	41887650	27643823	1861352760
Johnson County		5100	38062845	132944375	435438	698164	1542873292
Lafayette County	131616	86991	6116722	62717562	5075937	7078567	1282430512
Lawrence County	65293		13946940	44050447	2891525	1380000	1456782179
Lee County			1596528	5489031	132553	279898	1550524431
Lincoln County	90614	1164	10328996	71464162	2913163	5131623	1363513671
Little River County	59420	39075	38432043	81682164	8922688	6273045	1241581096
Logan County	451785	8260	52334173	103226094	15007210	2020971	1665494151
Lonoke County	472017	31061	53600314	115909870	13176949	24529337	1769608554
Madison County	3716		20823783	41758534	527788	806031	2103428667
Marion County	121971	51886	21019281	162070834	6881478	10581750	1347311858
Miller County	18568	901393	37029005	204331973	8176106	14858202	1350656684
Mississippi County			6040952	28308	793269	3002	2316617074
Monroe County	168414		9702041	6763373	4084019	651348	1548777870
Montgomery County	59846	41034	28068813	99953165	2730318	5144666	1886605195
Nevada County	13869		15311939	40791937	684401	181431	1548707227
Newton County	13952		13856273	63641629	925155	846034	2052214164
Ouachita County	1299521	2399	15372278	217616238	23741250	10896644	1626476611
Perry County	31364	46587	33322829	78024015	4674237	5210564	1305644938
Phillips County	2398436	27936	20645737	11988683	9923082	6487356	1741158567
Pike County	185884		26556383	131503648	6689867	4233491	1391578298
Poinsett County	146590		24393308	51987523	5135683	1197619	1877750270
Polk County	566376	2228	89453518	182549010	9287825	6865387	1937067864
Pope County	1583529	1034533	119164610	315227002	16658112	26770708	1622387354
Prairie County	192577	26278	9768587	16132212	3706991	1016094	1638242582
Pulaski County	22145611	844500	72294502	520257665	132690671	89326646	1157782242
Randolph County	1129	11860	20569113	122857917	654597	3097825	1541031302
Saline County	2913961	388240	41490004	482108444	50869380	88811148	1206943748
Scott County	15720		46796019	32843123	2544344	639673	2232302478
Searcy County	39852		12871122	35552427	1252212	2024925	1676178994
Sebastian County	395642	33035	116758110	117749659	11757512	10337507	1131628284
Sevier County	150529	43887	47735183	97526609	8708763	6867560	1299476806
Sharp County	54385	54509	27537309	113692181	6497909	26826760	1390612495
St. Francis County	1750617		25574297	54542568	13550725	13983134	1531957248
Stone County	65234	44936	12392934	127991005	5159114	2864381	1422550501
Union County	3962290	24082	4271834	303412991	30154572	16952357	2331512708

Van Buren County	204068	56613	27632875	181621255	4551993	14516260	1614033098
Washington County	92724	41640	80537109	329629406	8729341	16236841	2024506004
White County	1402878	199248	131783342	329752730	14103525	12993542	2187814616
Woodruff County	112149		426645	1476426	2001621	144444	1511081976
Yell County	689703	29672	61690695	158801309	8225979	6604027	2166796460

Figure 4.3.5-2: Area (Square Miles) of each Arkansas County within the Wildland-Urban Interface (WUI)

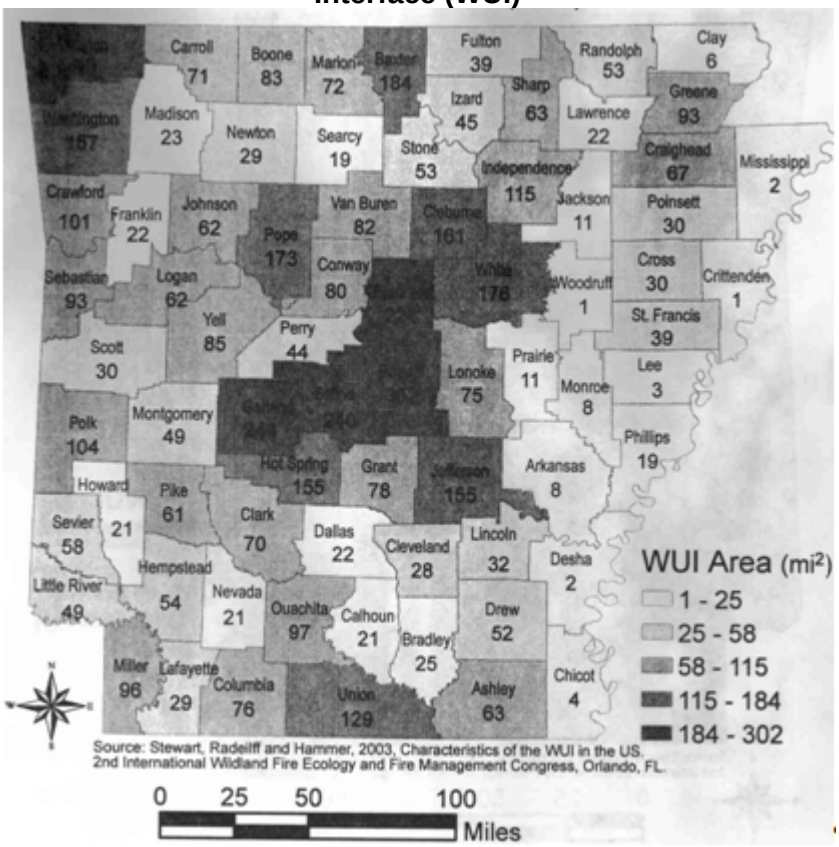
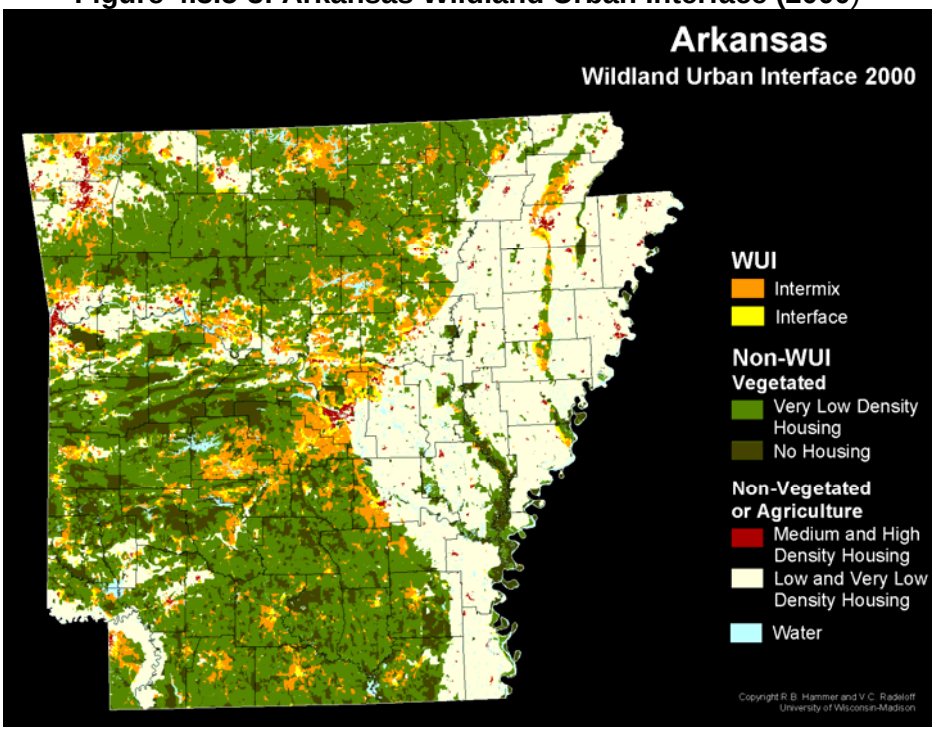


Figure 4.3.5-3: Arkansas Wildland Urban Interface (2000)



Source: University of Wisconsin: WUI Study

In 2010, this WUI study has not been updated by the University of Wisconsin; therefore the HMP Sub-Committee has agreed to use the existing data for the WUI for this vulnerability analysis.

General wildfire hazard vulnerability by jurisdiction has been developed that takes into consideration the number of fires, the acreage burned, and area of WUI per county. After ranking each county for each of these factors (1 = highest risk and 75 = lowest risk) and summing the three ranks, an overall ranking was developed. Based on this analysis, Saline County was found to have the highest vulnerability to wildfires in Arkansas.

Table 4.3.5-4: Ranking vulnerability of jurisdictions to wildfire hazard based on the number of fires, the number of acres burned, and the area within the wild land-urban interface. The 40 most vulnerable counties are shown.

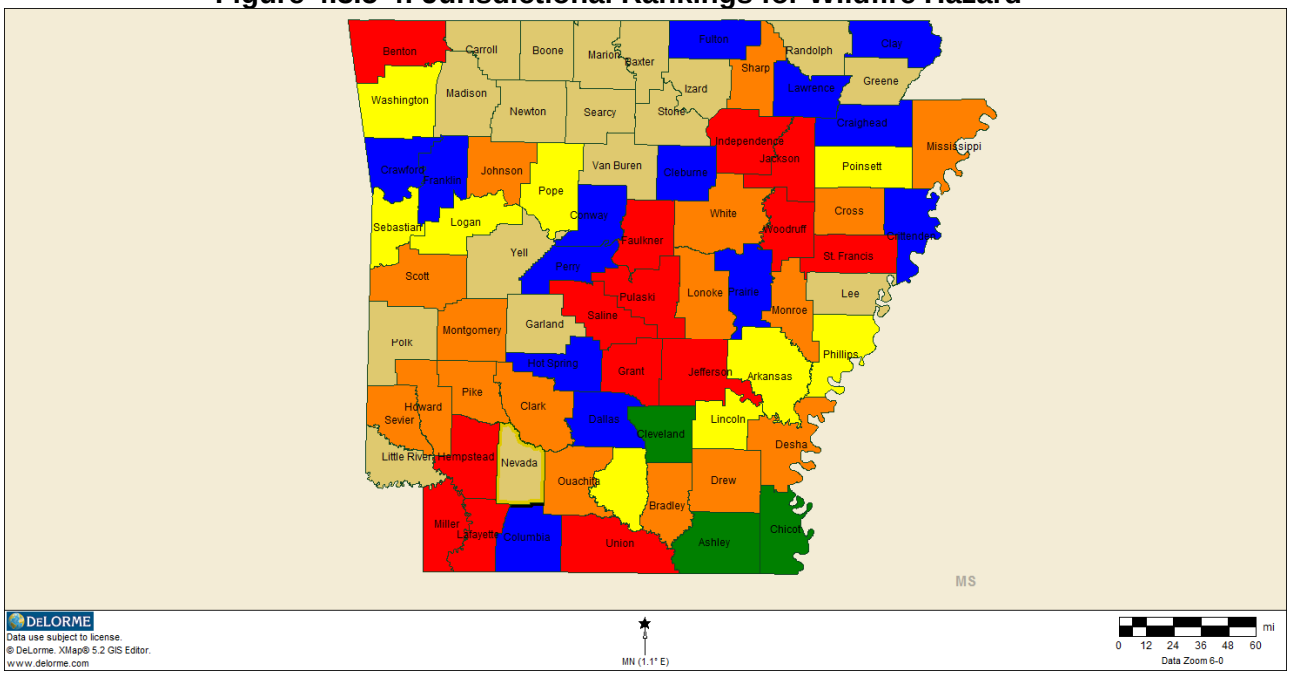
County	Number of Fires Rank	Acres Burned Rank	WUI Area Rank	Overall Vulnerability Rank (pts.)
Saline	3	15	3	1 (21)
Hot Spring	1	17	11	2 (29)
Union	5	14	13	3 (32)
Independence	16	6	14	4 (36)
Miller	10	8	18	5 (36)
White	24	10	7	6 (41)
Clark	4	9	30	7 (43)
Conway	18	5	24	8 (47)
Sharp	15	3	33	9 (51)
Garland	6	46	2	10 (54)
Pulaski	36	18	1	11 (55)
Ouachita	2	36	17	12 (55)
Marion	27	1	28	13 (56)
Jefferson	21	27	12	14 (60)
Grant	7	28	25	15 (60)
Polk	22	25	15	16 (62)
Izard	17	2	44	17 (63)
Columbia	20	19	26	18 (65)
Sevier	12	16	37	19 (65)
Fulton	8	11	47	20 (66)
Ashley	13	23	32	21 (68)
Crawford	25	29	16	22 (70)
Hempstead	11	26	38	23 (75)
Carroll	34	13	29	24 (76)
Faulkner	37	37	5	25 (79)
Drew	9	35	41	26 (85)
Stone	42	7	39	27 (88)
Randolph	28	20	40	28 (88)
Bradley	19	21	55	29 (95)
Cleburne	47	41	9	30 (97)
Calhoun	14	22	61	31 (97)
Searcy	30	4	63	32 (97)
Pike	31	31	36	33 (98)
Boone	50	30	22	34 (102)
Baxter	55	42	6	35 (103)
Benton	58	44	4	36 (106)
Washington	49	48	10	37 (107)
Yell	40	47	21	38 (108)
Little River	33	32	43	39 (108)
Pope	44	57	8	40 (109)

Local Plan Integration

As of January 2010, sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the wild fire hazard. Note that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.5-4: Jurisdictional Rankings for Wildfire Hazard



Source: Bold Panning Solutions

Wildfire Hazard totals:

High Risk Jurisdictions	14
Medium-High Risk Jurisctions	17
Medium Risk Jurisdictions	9
Low Risk Jurisdictions	3
No Hazard Score	14

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January 2010, sixty-two local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table below.

Table 4.3.5-5: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	55
Ashley County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	55
Benton County	High	76	N/A	N/A	N/A	N/A	0	N/A	7
Bradley County	Medium-High	270	N/A	0	0	0	0	N/A	N/A
Calhoun County	Medium	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chicot County	Low	21	N/A	0	0	0	0	N/A	7
City of Foreman	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clark County	Medium-High	867	N/A	N/A	N/A	N/A	N/A	N/A	14
Clay County	N/A	19	N/A	0	0	0	0	N/A	53
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	263	N/A	N/A	N/A	N/A	N/A	N/A	8
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	N/A	31	N/A	0	0	0	0	N/A	N/A
Crawford County	N/A	2251	N/A	N/A	N/A	N/A	N/A	N/A	8
Crittenden County	N/A	6	N/A	0	0	0	0	N/A	N/A
Cross County	Medium-High	68	N/A	0	0	N/A	N/A	N/A	7
Dallas County	N/A	8	N/A	N/A	N/A	N/A	N/A	N/A	8
Desha County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	55
Drew County	Medium-High	420	N/A	0	0	0	0	N/A	11

Faulkner County	High	833	N/A	N/A	N/A	N/A	N/A	N/A	11
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	421	N/A	N/A	N/A	N/A	N/A	N/A	8
Grant County	High	435	N/A	0	0	0	0	N/A	11
Hempstead County	High	366	N/A	0	0	0	0	N/A	7
Hot Spring County	N/A	12	$ 5,000,000	2	0	N/A	N/A	N/A	56
Howard County	Medium High	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Independence County	High	464	N/A	0	0	N/A	N/A	N/A	14
Jackson County	High	80	N/A	0	0	0	0	N/A	N/A
Jefferson County	High	252	N/A	0	0	0	0	N/A	7
Johnson County	Medium-High	22	N/A	N/A	N/A	N/A	N/A	N/A	15
Lafayette County	High	56	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	N/A	96	N/A	N/A	N/A	N/A	N/A	N/A	8
Lincoln County	Medium	156	N/A	N/A	N/A	0	0	N/A	8
Little Rock/ L.R. North	N/A	169	N/A	N/A	N/A	N/A	N/A	N/A	11
Logan County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	Medium-High	45	N/A	N/A	N/A	N/A	N/A	N/A	12
Marmaduke ISD	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	56
City of Mena	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	High	419	N/A	0	0	0	0	N/A	8
Mississippi County	Medium-High	5	N/A	0	0	0	0	N/A	8
Monroe County	Medium-High	58	N/A	N/A	N/A	N/A	N/A	N/A	12
Montgomery County	Medium-High	197	N/A	N/A	N/A	N/A	N/A	N/A	24
City of Mountain View	High	144	N/A	N/A	N/A	N/A	N/A	N/A	8
Ouachita County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perry County	N/A	103	N/A	N/A	N/A	N/A	N/A	N/A	8
Phillips County	Medium	25	N/A	N/A	N/A	N/A	N/A	N/A	8
Pike County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	Medium	20	N/A	N/A	N/A	0	0	N/A	7
Pope County	Medium	197	N/A	N/A	N/A	N/A	N/A	N/A	24
Prairie County	N/A	24	N/A	N/A	N/A	N/A	N/A	N/A	12
Pulaski County	High	169	N/A	N/A	N/A	N/A	N/A	N/A	12
Saline County	High	833	N/A	N/A	N/A	N/A	N/A	N/A	10

Scott County	Medium-High	13	N/A	N/A	N/A	N/A	N/A	N/A	8
Sebastian County	Medium	203	N/A	N/A	N/A	N/A	N/A	N/A	10
Sevier County	Medium-High	334	N/A	N/A	N/A	N/A	N/A	N/A	8
Sharp County	Medium-High	306	N/A	N/A	N/A	N/A	N/A	N/A	7
St. Francis County	High	56	N/A	N/A	N/A	N/A	N/A	N/A	8
Union County	High	481	N/A	N/A	N/A	N/A	N/A	N/A	8
Washington County	Medium	178	N/A	N/A	N/A	N/A	N/A	N/A	11
White County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	55
Woodruff County	High	11	N/A	N/A	N/A	N/A	N/A	N/A	8
Totals		**11515**	**$ 5,000,000**	**2**	**0**	**0**	**0**	**$**	

* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved mitigation plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.5-5.

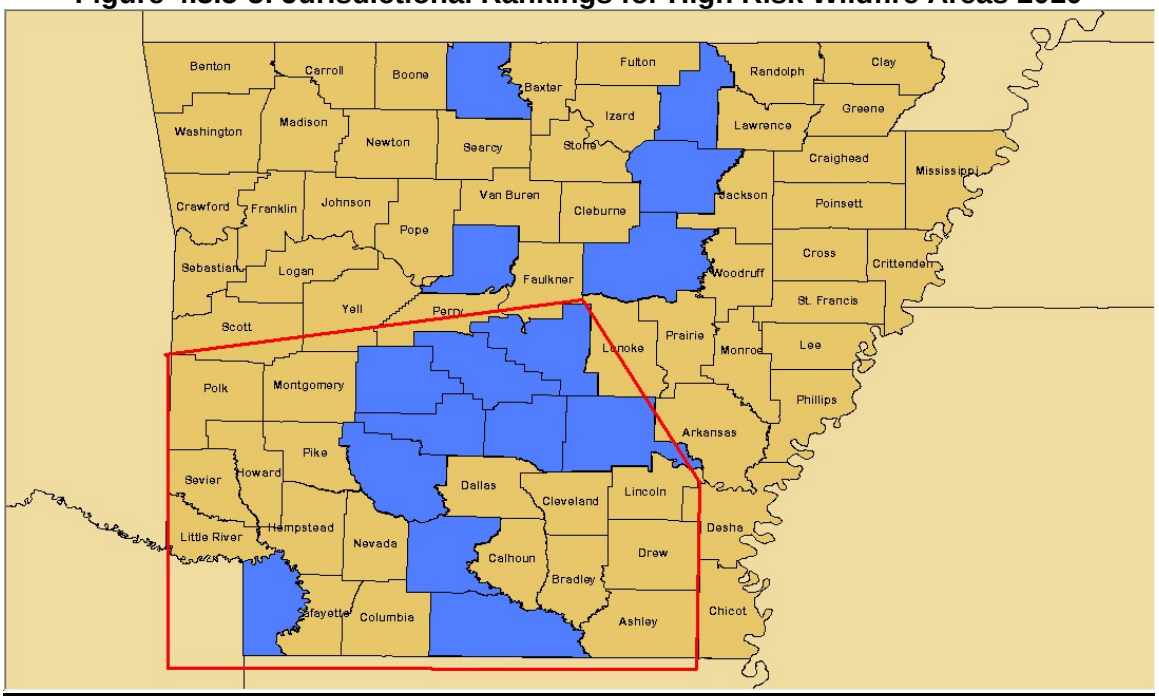
Development in hazard prone areas:

Areas that fall within the Wildland-Urban Interface (WUI) are at the highest risk to wildfires. Therefore any development that may take place within the WUI will place more property and people in the hazard prone areas of the state. However there are no up to date maps to illustrate the WUI for the state, so it is unknown what development is taking place in the areas most prone to wildfires.

GIS Baseline Dataset

The area in the southwest of the state is most susceptible to wildfires due to the topography and the higher amounts of forest and timber. The 15 high risk counties have been noted in blue based on the rankings from Figure 4.3.5-5 on the next page. Based on the overall geographic risk, the high risk region in the southwest is shown with the red line and this region is used for this GIS baseline vulnerability analysis. The HMP Sub-Committee researched this hazard and found that the area shown on the map remains at the highest risk to this hazard therefore this GIS baseline dataset remains valid for the purpose of assessing vunerability by jurisdiction.

Figure 4.3.5-5: Jurisdictional Rankings for High Risk Wildfire Areas 2010



Source: GeoStor

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to wildfires.

Table 4.3.5-6: Regional Vulnerability to Wildfires

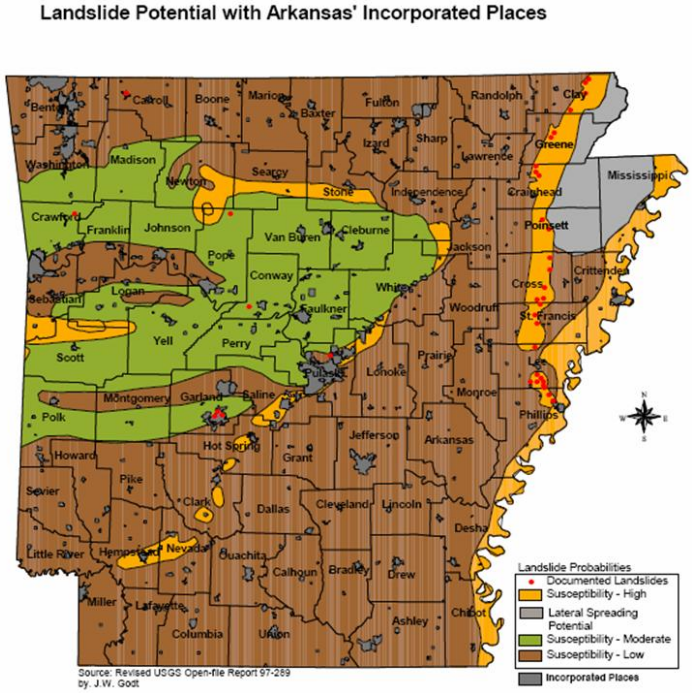
Vulnerability	Number of Records
Arkansas Counties	35
Population	275758
Housing Units	122523
Fire Stations	485
Law Enforcement	199
Armories	84
Church Camps	15
Safe Rooms	4
Fairgrounds / Speedways	43
Military Installations	3
Public Schools	392
Private Schools	89
Universities and Colleges	11
Hospitals	47
EMS / Ambulance	69
Veteran's Affairs Medical Facilities	8

Local Health Dept Units	37
Long Term Healthcare	227
Hospices and related medical facilities	158
Rural Health Clinics	10
Bridges	2759
Airports	29
AWIN Towers	46
Environmental Facilities	1283
Intermodel Terminals	18
Electricity Providers	12
Power Plants	9
Power Substations	196
Radio / TV Stations	239
Post Offices	187
Prisons	10
Dams	526

4.3.6 Assessing Landslide Vulnerability by Jurisdiction

The map on the next page (Figure 4.3.6-1) shows the probability of landslides in populated areas of Arkansas. Areas delineated on the map include landslide susceptibility ratings (i.e., high, moderate, and low), documented landslides, and liquefaction.

Figure 4.3.6-1: Probability of Landslides in Populated Areas of Arkansas



As described in Chapter 2, Section 4.2.6, landslide susceptibility estimates the amount of land subject to failure due to existing favorable conditions. The two other delineated areas are parts of the state where landslides and liquefaction (which can promote lateral spreading) have occurred in the past. The HMP Sub-Committee has researched this hazard as part of the 2010 revision and has found that the basic geology of the state has remained unchanged in the last three years. Also, no new data on this subject was developed from 2007-2010. The Sub-Committee has determined that using census data for 2000 and the existing maps is still valid for this vulnerability analysis. Updates were made where needed to reflect changes in the vulnerability analysis.

Using this map as a guide and available 2000 census data, the estimated number of Arkansans living within areas of a high to moderate susceptibility to landslides and lateral spreads, or in areas that have already experienced a slide, is approximately 1,063,696, or 43 percent of the total population. This number also represents about 61 percent of the state's population living in the 43 counties that have a high-moderate rating. However, it should be noted that due to the generalized nature, the population actually exposed to landsliding will be different once a more accurate and Arkansas-specific study is performed (e.g., none of the population in the counties along the border with Missouri were included although slope failures are known to exist there). The remainder of the state's population lives in an area categorized as having low landslide susceptibility. Table 4.3.6-1 lists the number of persons in Arkansas estimated to be exposed to each degree of landslide susceptibility.

Table 4.3.6-1: Number of persons in Arkansas exposed to each degree of landslide susceptibility.

Landslide Susceptibility Rating	Number of Persons Exposed	Percent of Exposed County Population	Percent of Total State Population
High	426,204	24%	17%
Moderate	637,492	37%	26%
Low	1,420,073	----	57%

The US Census Bureau has released the 2008 population estimates and they are detailed at the beginning of this vulnerability section. Based on these 2008 estimates, the population of the State of Arkansas has changed approximately 2%. This is not a material difference for this analysis.

Landslide Impact Analysis

Landslides will negatively affect the State of Arkansas with a variety of impacts:

A large part of the state and the state's population are vulnerable to landslides. Landslide activity, however, is a localized event that affects only small areas at a time.

Landslide impacts are closely associated with other natural hazards such as heavy storms, flooding and earthquakes. In most cases, landslide activity is triggered by one of these other events.

People are rarely injured or killed by landslides. In most cases, the areas where landslides occur are remote and uninhabited.

Responders are not specifically at risk from landslides except as part of their responsibilities to respond to larger disasters such as floods and earthquakes. Responders could be asked to assist in a rescue operation that could put them at risk.

The most likely impacts from landslides are property damage to homes and buildings or road damage requiring repairs and maintenance.

Compared to other identified hazards, the potential impacts from landslides as a “stand-alone” hazard are negligible on a localized level and practically non-existent at the state level.

HAZUS-MH2

Based in Figure 4.2.6-5, specific counties with areas of high to moderate susceptibility to landslides are listed in Table 4.3.6-2. Counties with highest vulnerability to landslides are those with high landslide susceptibility and high exposure.

Table 4.3.6-2: 2007 HAZUS-MH2 Analysis - The 44 counties in Arkansas at risk to landslides, listed in order of highest to lowest exposure.

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Washington	157,715	60,151	$15,034,068	$1,975,733	$321,456	$17,331,257
Sebastian	115,071	45,300	$12,255,589	$764,711	$707,380	$13,727,680
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Faulkner	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Craighead	82,148	32,301	$8,156,237	$913,854	$734,106	$9,804,197
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Mississippi	51,979	19,349	$4,226,460	$2,171,344	$1,214,781	$7,612,585
Pope	54,469	20,701	$5,179,873	$968,461	$555,713	$6,704,047
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Crittenden	50,886	18,471	$4,358,456	$1,648,511	$521,913	$6,528,880
Crawford	53,247	19,702	$4,161,626	$1,162,819	$265,315	$5,589,760
Independence	34,233	13,467	$3,097,289	$878,415	$452,748	$4,428,452
Greene	37,331	14,750	$3,391,720	$690,119	$327,729	$4,409,568
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
St. Francis	29,329	10,043	$2,138,818	$950,083	$750,723	$3,839,624
Poinsett	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Cleburne	24,046	10,190	$2,841,804	$603,242	$145,116	$3,590,162
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Hempstead	23,587	8,959	$1,689,613	$1,149,661	$414,642	$3,253,916
Jackson	18,418	6,971	$1,580,775	$912,604	$619,336	$3,112,715
Phillips	26,445	9,711	$1,830,095	$631,642	$502,764	$2,964,501
Clay	17,609	7,417	$1,574,149	$721,963	$581,665	$2,877,777
Conway	20,336	7,967	$1,867,754	$753,888	$203,919	$2,825,561
Johnson	22,781	8,738	$1,765,691	$827,011	$209,696	$2,802,398

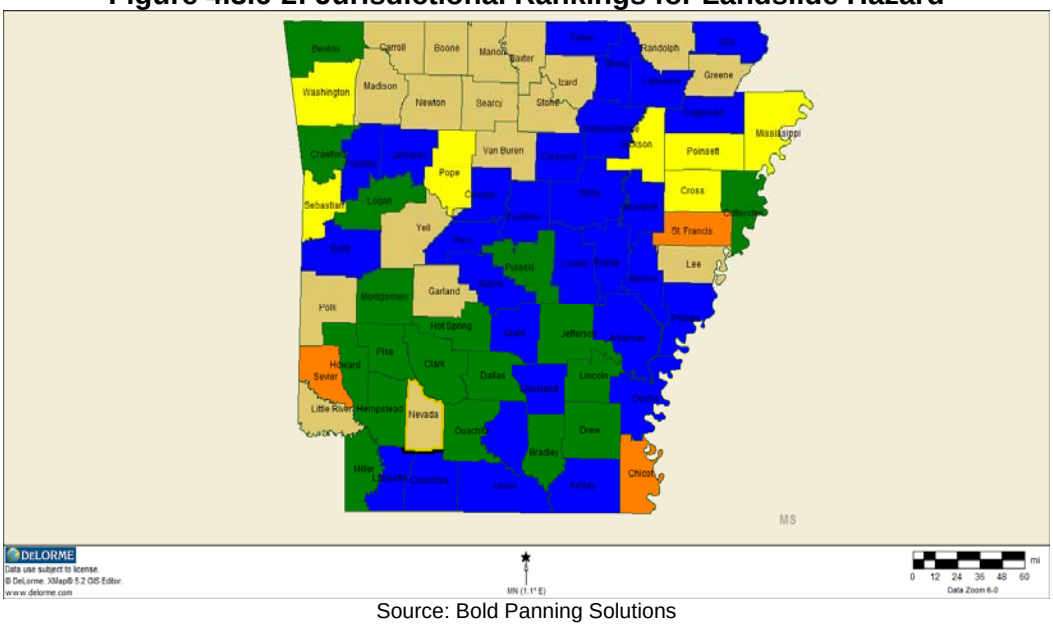
Logan	22,486	8,693	$1,832,764	$568,467	$394,032	$2,795,263
Yell	21,139	7,922	$1,645,708	$812,038	$319,890	$2,777,636
Van Buren	16,192	6,825	$1,565,684	$793,475	$347,826	$2,706,985
Cross	19,526	7,391	$1,483,817	$830,815	$290,058	$2,604,690
Polk	20,229	8,047	$1,455,330	$872,440	$233,064	$2,560,834
Franklin	17,771	6,882	$1,452,041	$585,923	$290,563	$2,328,527
Desha	15,341	5,922	$1,308,846	$582,976	$347,826	$2,239,648
Prairie	9,539	3,894	$920,317	$1,009,934	$289,797	$2,220,048
Madison	14,243	5,463	$1,088,498	$984,759	$59,064	$2,132,321
Chicot	14,117	5,205	$968,683	$926,061	$203,058	$2,097,802
Scott	10,996	4,323	$789,013	$953,781	$117,006	$1,859,800
Montgomery	9,245	3,785	$804,599	$782,797	$231,768	$1,819,164
Nevada	9,955	3,893	$704,325	$926,367	$89,932	$1,720,624
Newton	8,608	3,500	$854,540	$515,993	$144,942	$1,515,475
Stone	11,499	4,768	$970,125	$445,230	$87,174	$1,502,529
Searcy	8,261	3,523	$644,909	$651,931	$174,000	$1,470,840
Lee	12,580	4,182	$660,998	$501,439	$231,942	$1,394,379
Perry	10,209	3,989	$867,114	$436,122	$57,942	$1,361,178
Totals	**1,890,157**	**737,162**	**182,664,139**	**42,088,866**	**19,226,964**	**243,979,969**

Local Plan Integration

As of January 2010, sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the landslide hazard. Note that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.6-2: Jurisdictional Rankings for Landslide Hazard



Source: Bold Panning Solutions

Landslide Hazard totals:

Medium-High Risk Jurisctions	3
Medium Risk Jurisdictions	37
Low Risk Jurisdictions	18
No Hazard Score	30

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January, 2010, sixty-two local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table below.

Table 4.3.6-3: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ashley County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benton County	Low	0	N/A	0	0	N/A	N/A	N/A	23
Bradley County	Low	N/A	N/A	0	0	0	0	N/A	36
Calhoun County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chicot County	Medium-Low	N/A	N/A	0	0	0	0	N/A	N/A
City of Foreman	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clark County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	56
Clay County	N/A	4	N/A	0	0	0	0	N/A	54
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	N/A	3	N/A	0	0	0	0	N/A	N/A
Crawford County	Low	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crittenden County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Cross County	Medium	6	N/A	0	0	N/A	N/A	N/A	N/A

Dallas County	-Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Desha County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drew County	Low	0	N/A	0	0	0	0	N/A	N/A
Faulkner County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grant County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hempstead County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Hot Spring County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Howard County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Independence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackson County	Medium	N/A	N/A	0	0	0	0	N/A	N/A
Jefferson County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Johnson County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lafayette County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Little Rock/ L.R. North	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marmaduke ISD	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Mississippi County	Medium	N/A	N/A	0	0	0	0	N/A	N/A
Monroe County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ouachita County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perry County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phillips County	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pike County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	Medium	2	N/A	N/A	N/A	0	0	N/A	N/A
Pope County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Prairie County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pulaski County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Saline County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scott County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Sebastian County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sharp County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
St. Francis County	Medium-High	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Union County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Washington County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
White County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Woodruff County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals		**18**	**$ -**	**0**	**0**	**0**	**0**	**$ -**	

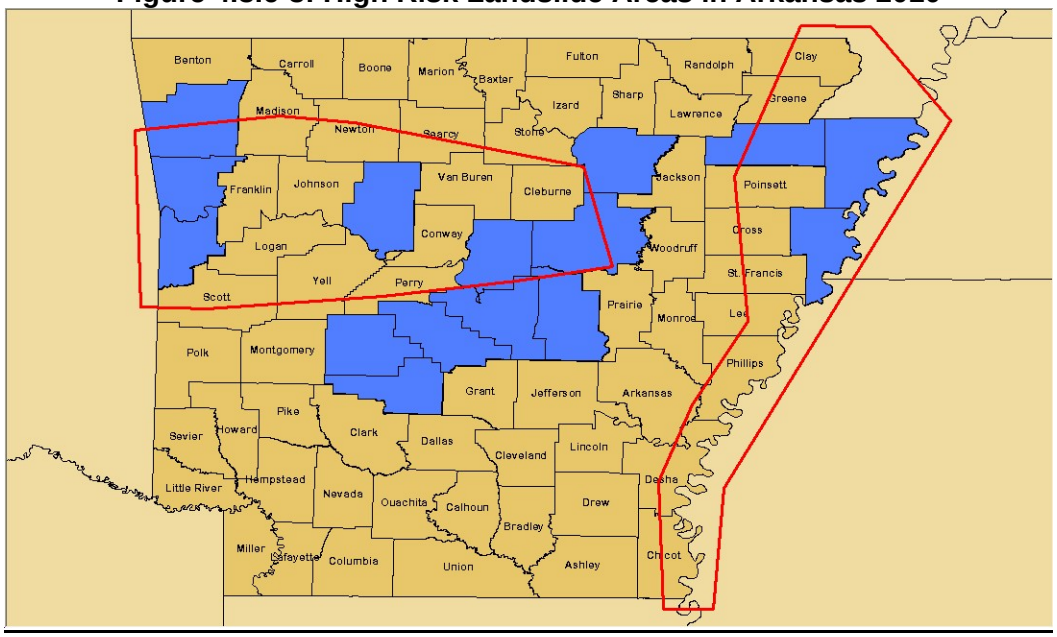
* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.6-3.

GIS Baseline Dataset

The area along the eastern border of the state along the Mississippi River is most susceptible to landslides due to the basic geology and topography. The 15 high exposure counties have been noted in blue based on the rankings from Figure 4.3.6.1. Based on the overall geographic risk, the high risk region along the eastern border and in the area along the Arkansas River Valley and the Ouachita Mountain range is shown with the red line and this region is used for this GIS baseline vulnerability analysis.

Figure 4.3.6-3: High Risk Landslide Areas in Arkansas 2010



Source: GeoStor

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to Landslides.

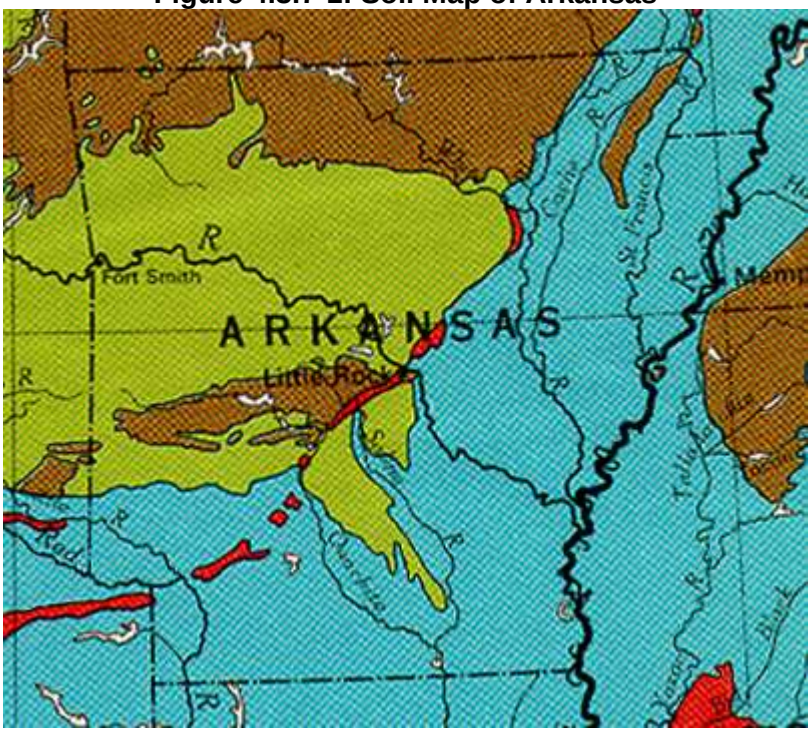
Figure 4.3.6-4: Regional Vulnerability to Landslides

Vulnerability	Number of Records
Arkansas Counties	37
Population	268274
Housing Units	110161
Fire Stations	425
Law Enforcement	175
Armories	33
Church Camps	17
Safe Rooms	46
Fairgrounds / Speedways	36
Military Installations	4
Public Schools	367
Private Schools	61
Universities and Colleges	7
Hospitals	36
EMS / Ambulance	67
Veteran's Affairs Medical Facilities	3
Local Health Dept Units	35
Long Term Healthcare	166
Hospices and related medical facilities	115
Rural Health Clinics	31
Bridges	2357
Airports	28
AWIN Towers	33
Environmental Facilities	1124
Intermodel Terminals	34
Electricity Providers	14
Power Plants	7
Power Substations	143
Radio / TV Stations	173
Post Offices	220
Prisons	5
Dams	410

4.3.7 Assessing Expansive Soil/Land Subsidence Vulnerability by Jurisdiction

As described in Chapter 2, Section 4.2.7, expansive soils in Arkansas are abundant in the southeastern part of the state within the Mississippi Alluvial Plain and Gulf Coastal Plain Physiographic Provinces (Figure 4.2.7-1). The northern part of the state (northern Ozark Plateaus) and the central Ouachita Mountains are least affected by expansive soils. Expansive soil damage in Arkansas has only been documented from the Mississippi Alluvial Plain and the Gulf Coastal Plains Provinces (approximately the yellow and red areas on Figure 4.3.7-1).

Figure 4.3.7-1: Soil Map of Arkansas



MAP LEGEND

- Unit contains abundant clay having high swelling potential
- Part of unit (generally less than 50%) consists of clay having high swelling potential
- Unit contains abundant clay having slight to moderate swelling potential
- Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential
- Unit contains little or no swelling clay
- Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost states only)

Jurisdictions within these provinces can therefore be considered at risk to damage from expansive soil. The 47 Arkansas counties having significant amounts of clay with swelling potential are listed in Table 4.3.7-1.

Expansive Soil Impact Analysis

The impacts related to the expansive soil hazard are relatively minor and difficult to document. This hazard is a long-term, slow moving hazard that does not result in any sudden impact to people, state government, or overall infrastructure of the state. Though a large area is vulnerable to this soil movement, any issues relating to this will be localized in nature with no sudden damage or likelihood of injury or death. The most likely impact from this hazard is financial in nature since maintenance and repairs will be required for roads and buildings. The HMP Sub-Committee does not consider this a high priority hazard and feels that any impact will be minor in nature. Due to data limitations for this hazard, the Sub-Committee determined that the previous analysis is still current for the 2010 revision process.

HAZUS-MH2

The 47 counties in Arkansas at risk to expansive soils listed in order of highest to lowest exposure. Counties with an asterisk (*) are partly underlain by a unit with abundant clay having high swelling potential (red color on Figure 4.3.7-1).

Table 4.3.7-1: 2007 HAZUS-MH2 Analysis for Expansive Soil

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Jefferson	84,278	30,555	$7,512,310	$15,421,946	$677,112	$23,611,368
Craighead	82,148	32,301	$8,156,237	$913,854	$734,106	$9,804,197
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Mississippi	51,979	19,349	$4,226,460	$2,171,344	$1,214,781	$7,612,585
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Crittenden	50,886	18,471	$4,358,456	$1,648,511	$521,913	$6,528,880
Union	45,629	17,989	$4,174,282	$928,430	$734,454	$5,837,166
Independence	34,233	13,467	$3,097,289	$878,415	$452,748	$4,428,452
Greene	37,331	14,750	$3,391,720	$690,119	$327,729	$4,409,568
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
Miller	40,443	15,637	$3,028,753	$1,045,446	$175,122	$4,249,321
St. Francis	29,329	10,043	$2,138,818	$950,083	$750,723	$3,839,624
Poinsett	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Ouachita	28,790	11,613	$2,261,900	$946,103	$356,961	$3,564,964
Ashley	24,209	9,384	$2,079,308	$1,033,710	$407,839	$3,520,857
Columbia	25,603	9,981	$2,037,015	$1,042,009	$378,694	$3,457,718
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Hempstead	23,587	8,959	$1,689,613	$1,149,661	$414,642	$3,253,916
Arkansas	20,749	8,457	$1,959,105	$819,062	$376,884	$3,155,051
Jackson	18,418	6,971	$1,580,775	$912,604	$619,336	$3,112,715
Phillips	26,445	9,711	$1,830,095	$631,642	$502,764	$2,964,501
Lawrence	17,774	7,108	$1,452,704	$974,861	$522,774	$2,950,339

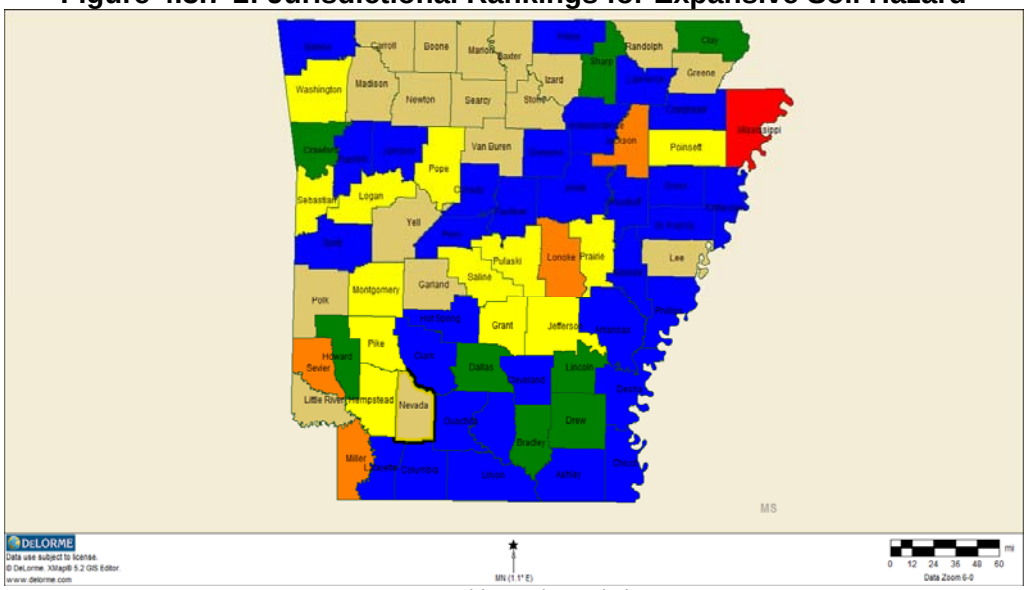
Clay	17,609	7,417	$1,574,149	$721,963	$581,665	$2,877,777
Cross	19,526	7,391	$1,483,817	$830,815	$290,058	$2,604,690
Drew	18,723	7,337	$1,552,496	$711,165	$174,174	$2,437,835
Grant	16,464	6,241	$1,279,753	$795,183	$174,174	$2,249,110
Desha	15,341	5,922	$1,308,846	$582,976	$347,826	$2,239,648
Prairie	9,539	3,894	$920,317	$1,009,934	$289,797	$2,220,048
Randolph	18,195	7,265	$1,445,881	$449,940	$292,729	$2,188,550
Howard	14,300	5,471	$1,058,845	$876,166	$232,203	$2,167,214
Monroe	10,254	4,105	$876,557	$1,083,840	$202,971	$2,163,368
Chicot	14,117	5,205	$968,683	$926,061	$203,058	$2,097,802
Sevier	15,757	5,708	$1,089,374	$678,002	$289,710	$2,057,086
Woodruff	8,741	3,531	$678,476	$834,977	$327,468	$1,840,921
Little River	13,628	5,465	$1,129,972	$385,969	$289,797	$1,805,738
Nevada	9,955	3,893	$704,325	$926,367	$89,932	$1,720,624
Pike	11,303	4,504	$961,598	$575,156	$174,000	$1,710,754
Bradley	12,600	4,834	$992,949	$587,155	$116,058	$1,696,162
Dallas	9,210	3,519	$797,958	$660,375	$202,971	$1,661,304
Lincoln	14,492	4,265	$899,908	$538,284	$174,861	$1,613,053
Lafayette	8,559	3,434	$647,857	$551,756	$329,365	$1,528,978
Calhoun	5,744	2,317	$429,651	$804,551	$289,884	$1,524,086
Lee	12,580	4,182	$660,998	$501,439	$231,942	$1,394,379
Cleveland	8,571	3,273	$626,923	$498,190	$173,826	$1,298,939
Totals	**1,571,548**	**608,991**	**146,862,445**	**57,117,663**	**20,352,162**	**224,332,270**

Local Plan Integration

As of January, 2010 sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the expansive soil hazard. The map displays jurisdictional rankings for the landslide hazard. Note that this map does not include City or School District Plans

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.7-2: Jurisdictional Rankings for Expansive Soil Hazard



Source: Bold Panning Solutions

Expansive Soil/Land Subsidence Hazard totals:

High Risk Jurisdiction	1
Medium-High Risk Jurisdiction	4
Medium Risk Jurisdiction	13
Low Risk Jurisdictions	8
No Analysis for Hazard	31

Over time, the information on the following page will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January, 2010, sixty-two local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table on the next page.

Table 4.3.7-2: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ashley County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benton County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bradley County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Calhoun County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chicot County	N/A	N/A	N/A	0	0	0	0	N/A	N/A
City of	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Foreman									
Clark County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clay County	Low	N/A	N/A	0	0	0	0	N/A	53
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	N/A	N/A	N/A	0	0	0	0	N/A	N/A
Crawford County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crittenden County	N/A	N/A	N/A	0	0	0	0	N/A	N/A
Cross County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dallas County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Desha County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drew County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Faulkner County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grant County	Medium	N/A	N/A	0	0	0	0	N/A	N/A
Hempstead County	Medium	N/A	N/A	0	0	0	0	N/A	N/A
Hot Spring County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Howard County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Independence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackson County	Medium-High	N/A	N/A	0	0	0	0	N/A	N/A
Jefferson County	Medium	N/A	N/A	0	0	0	0	N/A	N/A
Johnson County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lafayette County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	Low	N/A	N/A	0	0	0	0	N/A	N/A
Little Rock/ L.R. North	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marmaduke ISD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	Medium-High	N/A	N/A	0	0	0	0	N/A	N/A

Mississippi County	High	N/A	N/A	0	0	0	0	N/A	N/A
Monroe County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ouachita County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perry County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phillips County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pike County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pope County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Prairie County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pulaski County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Saline County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scott County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sebastian County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	54
Sevier County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sharp County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
St. Francis County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Union County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Washington County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
White County	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Woodruff County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals		**0**	**$ -**	**0**	**0**	**0**	**0**	**$ -**	

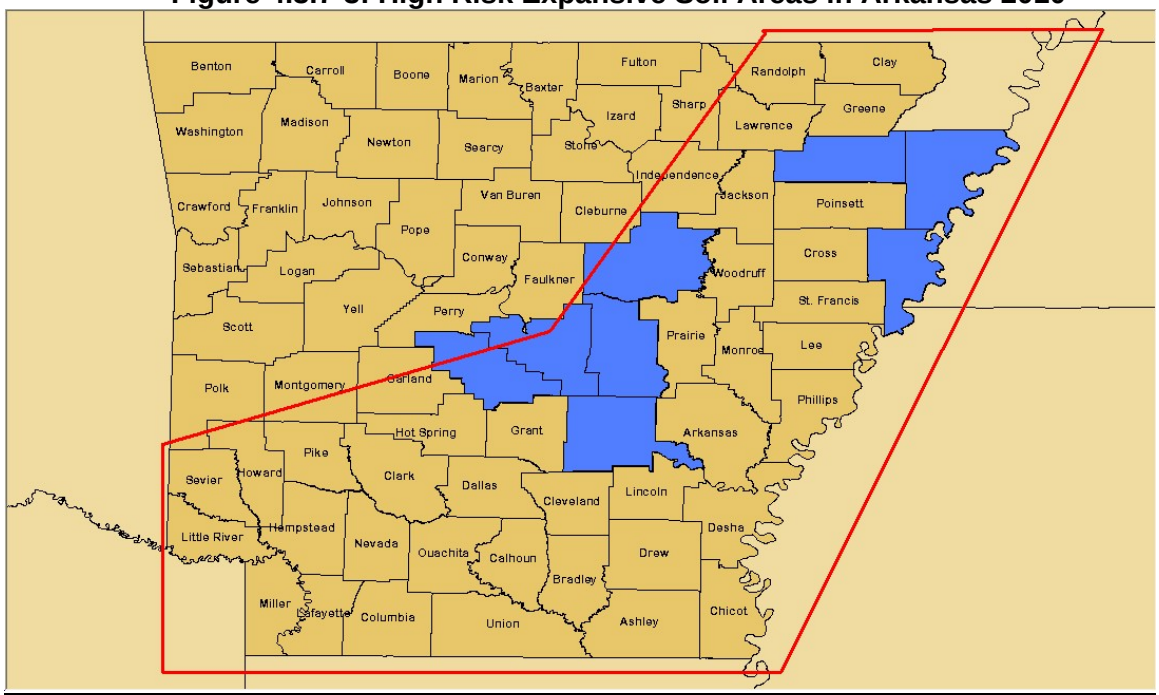
* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.7-2.

GIS Baseline Dataset

The area in the southeastern part of the state within the Mississippi Alluvial Plain and Gulf Coastal Plain Physiographic Provinces is most susceptible to expansive soils due to the basic geology and topography. The 9 counties have been noted in blue based on their proximity to the high risk geological area rankings from Figure 4.3.7-3. Based on the overall geographic risk, the high risk region in the southeast of the state is shown with the red line and this region is used for this GIS baseline vulnerability analysis. Due to lack of reported data and occurences for this hazard, the Sub-Committee determined the GIS baseline and all subsequent data to still be valid for this hazard.

Figure 4.3.7-3: High Risk Expansive Soil Areas in Arkansas 2010



Source: GeoStor

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to Expansive Soils.

Table 4.3.7-3: Regional Vulnerability to Expansive Soils

Vulnerability	Number of Records
Arkansas Counties	53
Population	297573
Housing Units	129154
Fire Stations	717
Law Enforcement	333
Armories	107
Church Camps	38
Safe Rooms	28
Fairgrounds / Speedways	60
Military Installations	4
Public Schools	632
Private Schools	126
Universities and Colleges	14
Hospitals	68
EMS / Ambulance	123
Veteran's Affairs Medical Facilities	9
Local Health Dept Units	73

Long Term Healthcare	346
Hospices and related medical facilities	238
Rural Health Clinics	41
Bridges	4633
Airports	59
AWIN Towers	67
Environmental Facilities	1892
Intermodel Terminals	50
Electricity Providers	22
Power Plants	14
Power Substations	310
Radio / TV Stations	378
Post Offices	367
Prisons	18
Dams	780

4.3.8 Assessing Straight-line Wind Vulnerability by Jurisdiction

As discussed in Chapter 2, Section 4.2.8, all counties in Arkansas have experienced severe (>58 mph) straight-line winds and straight-line wind damage, although the counties have not been evenly affected. Data shows that the northwest corner and central part of the state are most often affected by severe straight-line winds, whereas the eastern part of the state is the least affected.

From January 1996 through March 2010, there have been 754 reported high wind events. 47 of the 75 reporting some property damage with one event reporting $750,000 in damages in Benton County. There have also been 140 thunderstorm events that reported winds of 65 knots or greater.These events across the state have been random and most counties experienced a wind event during the period of the 2010 plan update. The counties that experienced the highest levels of damage from January 1996 – March 2010 are listed below:

- Benton County - $750,000
- Ashley County - $700,000
- Carroll County - $300,000
- Madison County - $300,000
- Benton County - $250,000
- Chicot County - $200,000
- Benton County - $200,000
- Monroe County - $200,000

Straight-line Wind Impact Analysis

Straight-line winds occur throughout Arkansas during severe thunderstorm activity. These winds can become very strong and cause significant damage as part of the larger more

comprehensive storm system. Straight-line winds often occur in conjunction with rain, lightning, tornadoes and hail. The impacts associated with strong straight-line winds are similar to those associated with tornadoes. The most likely impacts of straight-line winds are property damage particularly to roofs and unstable structures. For further details regarding the impacts for straight-line winds, please refer to the tornado section for impacts by tornadoes.

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Over 1500 high wind events occurred since 1983 in Arkansas, affecting Pulaski County and White County in central Arkansas, and Benton, Washington, and Sebastian Counties in northwestern Arkansas (Figure 4.2.8-1). Lee, Calhoun, Cross, Phillips, Greene, Bradley, Randolph, St. Francis, Lawrence, Lincoln and Chicot Counties in eastern Arkansas were all affected by fewer than 50 events over this same time period. The twenty counties most often affected by high straight-line wind events are listed in Table 4.3.8-1. 15 of the top 20 counties in Arkansas in terms of total dollar exposure (Pulaski through Hot Spring Counties on table 4.3.8-1) are at high risk to straight-line wind events. Therefore these 15 counties are the most vulnerable to straight-line wind damage.

Table 4.3.8-1: 2007 HAZUS-MH2 Straight Line Wind Analysis

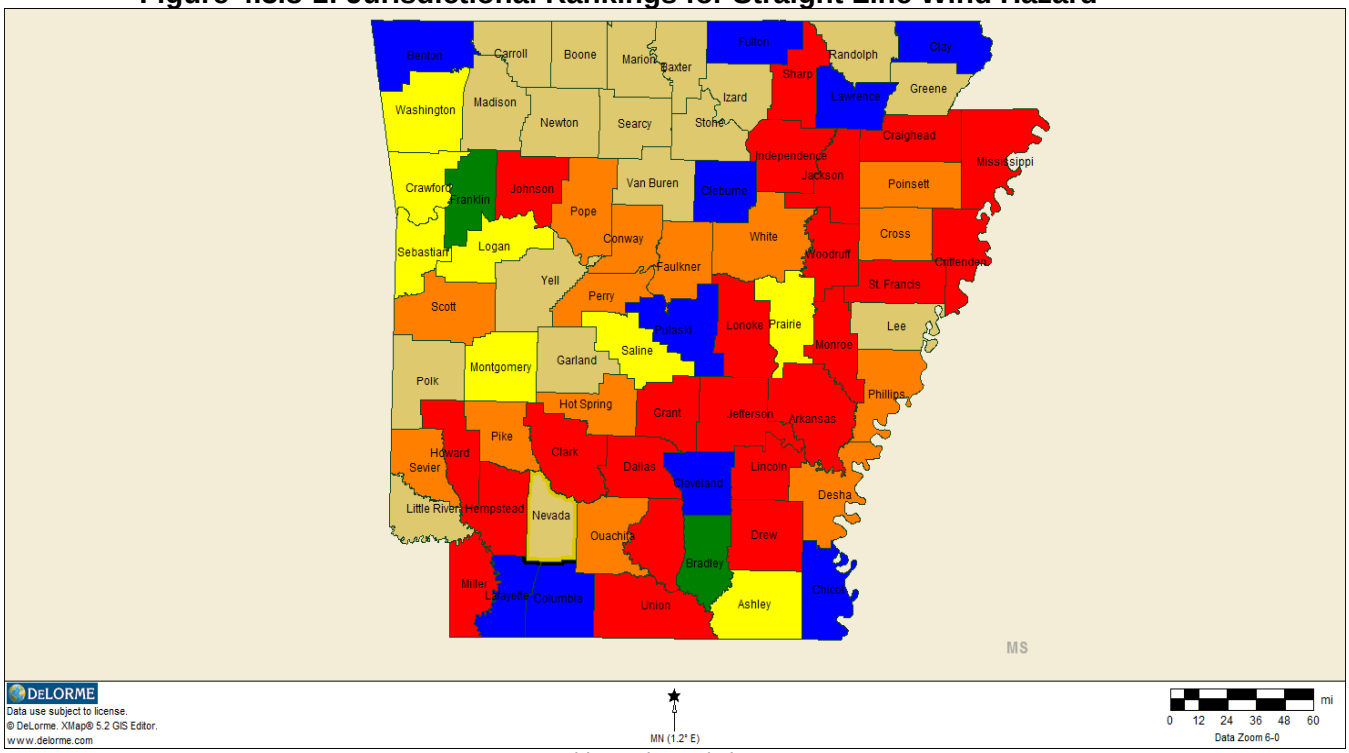
County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Benton	153,406	58,212	$15,341,645	$1,371,340	$965,847	$17,678,832
Washington	157,715	60,151	$15,034,068	$1,975,733	$321,456	$17,331,257
Sebastian	115,071	45,300	$12,255,589	$764,711	$707,380	$13,727,680
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Jefferson	84,278	30,555	$7,512,310	$15,421,946	$677,112	$23,611,368
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
Faulkner	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Crawford	53,247	19,702	$4,161,626	$1,162,819	$265,315	$5,589,760
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Madison	14,243	5,463	$1,088,498	$984,759	$59,064	$2,132,321
Franklin	17,771	6,882	$1,452,041	$585,923	$290,563	$2,328,527
Miller	40,443	15,637	$3,028,753	$1,045,446	$175,122	$4,249,321
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Pope	54,469	20,701	$5,179,873	$968,461	$555,713	$6,704,047
Howard	14,300	5,471	$1,058,845	$876,166	$232,203	$2,167,214
Baxter	38,386	17,052	$3,783,546	$954,706	$261,435	$4,999,687
Hempstead	23,587	8,959	$1,689,613	$1,149,661	$414,642	$3,253,916
Totals	**1,559,893**	**608,826**	**156,746,727**	**37,477,190**	**11,192,191**	**205,416,108**

Local Plan Integration

As of January 2010, sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the straight-line winds hazard. Note that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.8-1: Jurisdictional Rankings for Straight Line Wind Hazard



Source: Bold Panning Solutions

High Wind Hazard totals:

High Risk Jurisdictions	23
Medium-High Risk Jurisdictions	14
Medium Risk Jurisdictions	8
Low Risk Jurisdiction	2
No Hazard Score	10

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January 2010, sixty-two natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table below.

Table 4.3.8-2: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	High	122	$ 173,000	1	5	N/A	N/A	N/A	55
Ashley County	Medium	91	$ 497,000	0	4	N/A	N/A	$ 9,036	55
Benton County	N/A	240	$ 9,025,000	1	9	N/A	0	$ 392,391	23
Bradley County	Low	65	$ 180,000	0	2	0	0	$ 1,449	53
Calhoun County	High	52	$ 55,000	0	2	0	0	$ 1,078	51
Chicot County	N/A	62	$ 820,000	0	2	0	0	$ 14,909	50
City of Foreman	Medium-High	20	$ 140,000	0	0	N/A	N/A	N/A	58
Clark County	High	147	$ 181,000	1	2	N/A	N/A	N/A	54
Clay County	N/A	75	$ 3,960,000	0	0	1	1	$ 84,255	53
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	High	143	$ 3,780,000	0	2	10	0	N/A	49
Crawford County	Medium	16	$ 530,000	N/A	N/A	N/A	N/A	N/A	37
Crittenden County	High	98	$ 1,400,000	0	5	1	0	N/A	53
Cross County	Medium-High	59	$ 1,155,000	1	10	N/A	N/A	N/A	40
Dallas County	High	114	$ 101,000	0	3	N/A	N/A	N/A	33
Desha County	Medium-High	77	$ 206,000	0	1	N/A	N/A	N/A	56
Drew County	High	71	$ 206,000	0	1	0	0	$ 4,204	53
Faulkner County	Medium-High	198	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	Low	65	$ 280,000	0	0	N/A	N/A	N/A	46

Fulton County	N/A	81	$ 130,000	0	4	N/A	N/A	N/A	50
Grant County	High	115	$ 107,000	0	3	0	1	N/A	53
Hempstead County	High	145	$ 4,300,000	1	9	8	1	N/A	55
Hot Spring County	Medium-High	149	N/A	N/A	N/A	N/A	N/A	N/A	47
Howard County	High	151	$ 2,945,000	0	0	N/A	N/A	N/A	58
Independence County	High	81	$ 611,000	0	0	N/A	N/A	N/A	20
Jackson County	High	133	$ 3,000,000	0	5	8	1	$ 63,061	N/A
Jefferson County	High	207	$ 2,580,000	2	10	7	1	N/A	49
Johnson County	High	154	$ 163,000	0	0	N/A	N/A	N/A	57
Lafayette County	N/A	105	$ 675,000	0	3	N/A	N/A	N/A	50
Lawrence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	High	59	$ 2,800,000	0	2	7	0	$ 58,787	47
Little Rock/ L.R. North	N/A	233	$ 406,000	N/A	N/A	N/A	N/A	$ 21,368	20
Logan County	Medium	61	$ 8,000	0	0	N/A	N/A	N/A	10
Lonoke County	High	195	$ 697,000	0	12	N/A	N/A	N/A	57
Marmaduke ISD	N/A	70	$ 659,000	0	0	N/A	N/A	N/A	56
City of Mena	High	18	$ 10,000	0	0	N/A	N/A	N/A	50
Miller County	High	158	$ 1,950,000	1	3	2	1	$ 43,311	54
Mississippi County	High	130	$ 2,260,000	0	2	1	0	N/A	50
Monroe County	High	73	N/A	N/A	N/A	N/A	N/A	N/A	50
Montgomery County	Medium	94	$ 10,000	0	4	N/A	N/A	N/A	56
City of Mountain View	High	74	$ 721,000	0	0	N/A	N/A	N/A	37
Ouachita County	Medium-High	123	$ 131,000	N/A	N/A	N/A	N/A	N/A	57
Perry County	Medium-High	100	$ 662,000	1	0	N/A	N/A	N/A	53
Phillips County	Medium-High	51	$ 1,477,000	1	4	N/A	N/A	N/A	46
Pike County	Medium-High	117	$ 236,000	0	1	N/A	N/A	N/A	56
Poinsett County	Medium-High	92	$ 3,350,000	0	5	7	1	$ 64,423	52
Pope County	Medium-High	100	N/A	N/A	N/A	N/A	N/A	N/A	54
Prairie County	Medium	102	$ 266,000	0	4	N/A	N/A	N/A	57
Pulaski County	N/A	328	$ 406,000	N/A	N/A	N/A	N/A	N/A	47
Saline County	Medium	183	$ 251,000	1	4	N/A	N/A	N/A	56
Scott County	Medium-High	86	$ 6,000	0	0	N/A	N/A	N/A	46
Sebastian County	Medium	50	$ 250,000	N/A	N/A	N/A	N/A	N/A	54

Sevier County	Medium-High	116	$ 2,412,000	0	1	N/A	N/A	N/A	58
Sharp County	High	81	$ 1,631,000	1	1	N/A	N/A	N/A	58
St. Francis County	High	73	$ 655,000	0	6	N/A	N/A	N/A	38
Union County	High	99	$ 1,249,000	0	5	N/A	N/A	N/A	52
Washington County	Medium	55	$ 2,413,300	0	0	N/A	N/A	N/A	54
White County	Medium-High	15	$ 13,680,000	3	0	N/A	N/A	N/A	55
Woodruff County	High	71	$ 112,000	0	3	N/A	N/A	$ 4,307	27
Totals		**5921**	**$ 75,735,300**	**14**	**134**	**52**	**7**	**$ 762,580**	

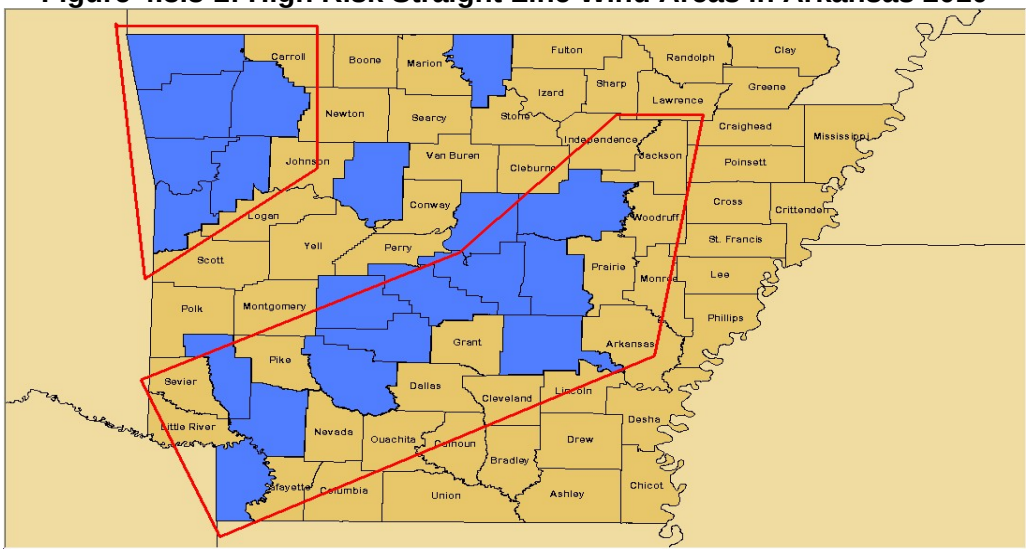
* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.8-2.

GIS Baseline Dataset

The area in the northwestern part of the state is particularly susceptible to straight-line wind in conjunction with strong thunderstorms. Also the corridor form the southwest to the northeast also experiences a large number of wind events. The 20 counties have been noted in blue based on the historic number of high wind events over the past 25 years as defined in Figure 4.3.8-1. Each of the counties has experienced at least 100 high wind events thereby placing the county in an area of high risk to this hazard. Based on the overall geographic risk, the high risk region in the northwest of the state is shown outlined with the red line and this region is used for this GIS baseline vulnerability analysis. For the 2010 update, the Sub-Committee researched NCDC data on this hazard and found that the areas highlighted on the map on the next page (Figure 4.3.8-2) were still the highest risk regions in the state; therefore the GIS baseline for this hazard remains valid.

Figure 4.3.8-2: High Risk Straight Line Wind Areas in Arkansas 2010



Source: GeoStor

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to straight-line winds.

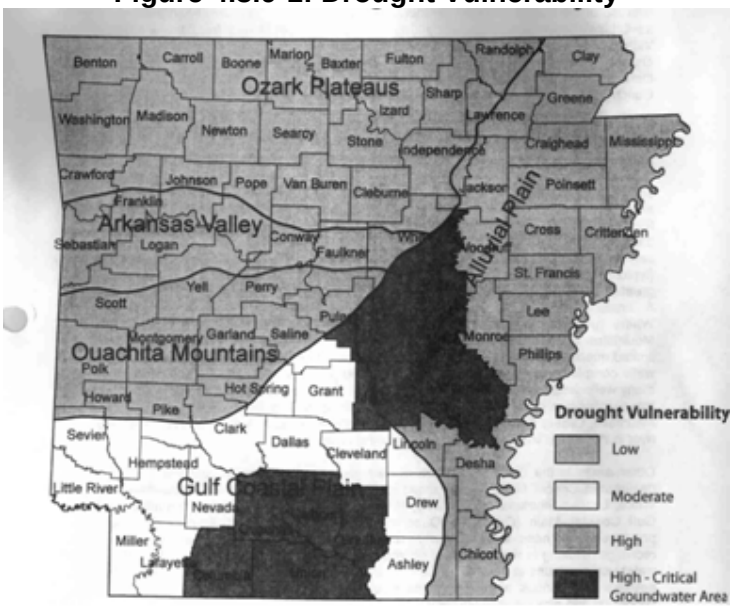
Table 4.3.8-3: Regional Vulnerability to Straight-line Winds

Vulnerability	Number of Records
Arkansas Counties	51
Population	252549
Housing Units	111210
Fire Stations	701
Law Enforcement	291
Armories	106
Church Camps	12
Safe Rooms	44
Fairgrounds / Speedways	61
Military Installations	5
Public Schools	612
Private Schools	131
Universities and Colleges	13
Hospitals	69
EMS / Ambulance	102
Veteran's Affairs Medical Facilities	8
Local Health Dept Units	48
Long Term Healthcare	325
Hospices and related medical facilities	205
Rural Health Clinics	26
Bridges	3666
Airports	42
AWIN Towers	54
Environmental Facilities	1843
Intermodel Terminals	30
Electricity Providers	20
Power Plants	16
Power Substations	292
Radio / TV Stations	385
Post Offices	296
Prisons	10
Dams	694

4.3.9 Assessing Drought Vulnerability by Jurisdiction

Availability of water during drought conditions is controlled largely by the topography, geology, hydrogeology, and hydrology of an area. Because these factors vary considerably by physiographic region in Arkansas, drought vulnerability can be generally assessed by physiographic region. Local conditions, such as the availability of a large impoundment for water storage, may affect drought vulnerability on a local scale.

Figure 4.3.9-1: Drought Vulnerability



Region A – Low Vulnerability to Drought: Region A is in the area of the Mississippi River Alluvial Plain physiographic province (Figure 4.3.9-1). The area is underlain by the high yielding Mississippi River Valley alluvial aquifer. The extensive alluvial aquifer is the principal source of water for irrigation in Arkansas. This region is the primary agricultural area in the state for crops, a large majority of which is irrigated. The Mississippi River Valley alluvial aquifer system generally consists of unconsolidated gravel and sand that is overlain by silt and clay deposited by existing and former stream systems. The alluvial aquifer is capable of yielding large quantities of water to wells. Properly constructed wells capable of yielding 500 gallons per minute can be completed almost anywhere within this aquifer. Some irrigation wells yield from 1,000 gallons to as much as 5,000 gallons per minute. Because of overuse by irrigation, however, parts of the alluvial aquifer have become so depleted that they have been designated critical groundwater areas by the state. Counties within this region with critical groundwater designations are excluded from this low vulnerability region because of the potentially limited groundwater availability during a drought. Other deeper, less productive aquifers underlying parts of this region include the Cockfield, Sparta, Wilcox, and Nacatoch aquifers. The low relief of most of the area makes it unsuitable for large surface water impoundments.

Region B – Moderate Vulnerability to Drought: Region B includes areas in the Gulf Coastal Plain physiographic province (Figure 4.3.9-1). Several significant aquifers lie under parts of this region including the Ouachita–Saline Rivers alluvial, Red River alluvial, Cockfield, Sparta, Wilcox, and Nacatoch aquifers. None of these aquifers, however, consistently approaches the yield of the Mississippi River Valley alluvial aquifer. The Sparta aquifer is the most productive

aquifer in this region and is capable of producing water to properly constructed wells at a rate of 300 gallons to over 1000 gallons per minute. Although well yields can be high, the Sparta has a much lower storage capacity than the alluvial aquifer. The Sparta is therefore used primarily for industrial, municipal and domestic purposes rather than for large-scale irrigation of crops. Because of the overuse of the Sparta, primarily by industrial users, five counties have been designated as critical groundwater areas by the state and are excluded from the moderate vulnerability designation because of the potentially limited groundwater availability during a drought. This region has slightly higher relief than the Mississippi Alluvial Plain and is therefore more conducive to surface water impoundments such as Millwood Lake. The Ouachita River and Red River found within this region both have safe yield available.

Region C – High Vulnerability to Drought: Region C includes the Ozark Plateaus, Arkansas Valley and Ouachita Mountains physiographic provinces (Figure 4.3.9-1). Aquifers in this region are well lithified, and permeability is a function of tectonics, diagenesis, geochemistry, hydrology and weathering. Groundwater in this region occurs primarily in fractures, solution openings, and along bedding planes. With the exception of the narrow Arkansas River alluvial aquifer occurring along the Arkansas River, low yields of water wells, generally less than 10 gallons per minute, characterize the area. The Ozark Plateaus aquifer system consists of limestone, dolomite and sandstone. The Roubidoux and Gunter aquifers are the highest yielding aquifers (typically 100–300 gpm) in Ozark Plateaus. These aquifers commonly occur at depths greater than 1000 feet. The Western Interior Plains confining unit underlying the Arkansas Valley consists of shale, siltstone and sandstone and yields water only locally. Where groundwater is available, yields range from <1 to 20 gpm. The Ouachita Mountains aquifer consists mostly of sandstone, shale and chert-novaculite. Only limited quantities of water for domestic and non-irrigation farm use can be obtained from wells completed in this aquifer. Most wells yield less than 50 gallons per minute, and many wells yield less than 10 gallons per minute. The high relief in this region allows for the construction of large surface water impoundments including Lake Ouachita, Lake Maumelle, Greers Ferry Lake, Beaver Lake, Bull Shoals Lake, among others. The only river in this region with safe yields available is the White River.

Other areas in the state considered highly vulnerable to drought are the state designated critical groundwater areas in the Mississippi Alluvial Plain (southeastern White, Lonoke, southeastern Pulaski, Prairie, Jefferson and Arkansas Counties) and Gulf Coastal Plain (Columbia, Ouachita, Union, Calhoun, and Bradley Counties) provinces. In these areas, groundwater is being depleted faster than the rate of recharge resulting in large cones of depression in once highly productive aquifers. If water use in these areas continues at the same rate as today, permanent damage to the aquifers and serious water shortages would result. A drought would hasten these conditions and may result in dry wells.

The HMP Sub-Committee has reviewed this drought vulnerability as part of the 2010 revision process. The entire state continues to be at-risk to cyclical drought with the western side having a higher overall risk factor. However in 2006-2007, the southeastern corner of the state was experiencing a drought. The vulnerability to drought is different from the other vulnerabilities considered in this plan. The HMP Sub-Committee has determined that drought does not materially impact the physical infrastructure of the state rather it impacts the various human, animal and plant populations. According to NOAA in 2009, the State of Arkansas had seven of the wettest months on record to eliviate drought conditions in the state.

Table 4.3.9-1: Statewide Precipitation Ranks for Arkansas (2009-2010)

Statewide Precipitation Ranks for ARKANSAS 2009-2010		
Period	**Amount**	**Rank**
Feb 2010 1-month period	**3.27"**	**55th driest** 62nd wettest
Jan-Feb 2010 2-month period	**7.41"**	59th driest **58th wettest**
Dec-Feb 2009-10 3-month period	**13.36"**	78th driest **38th wettest**
Nov-Feb 2009-10 4-month period	**15.05"**	**49th driest** 67th wettest
Oct-Feb 2009-10 5-month period	**29.40"**	111th driest **5th wettest**
Sep-Feb 2009-10 6-month period	**38.14"**	115th driest **1st wettest**
Aug-Feb 2009-10 7-month period	**41.49"**	115th driest **1st wettest**
Jul-Feb 2009-10 8-month period	**48.90"**	115th driest **1st wettest**
Jun-Feb 2009-10 9-month period	**51.53"**	115th driest **1st wettest**
May-Feb 2009-10 10-month period	**62.91"**	115th driest **1st wettest**
Apr-Feb 2009-10 11-month period	**68.05"**	115th driest **1st wettest**
Mar-Feb 2009-10 12-month period	**73.30"**	115th driest **1st wettest**

Source: National Oceanic and Atmospheric Administration

Drought Impact Analysis

Drought is often associated with periods of long and intense heat. Drought usually does not affect humans directly but extreme heat can cause injury and even death particularly with children, elderly citizens and other special needs populations. Injuries and potential deaths are most likely to impact rural, poor areas that lack air conditioning and immediate medical care.

The largest impact of prolonged drought is the financial impact to farmers with crops and livestock. Arkansas has a significant agriculture industry and a serious drought would damage or possibly destroy annual crops and limit the number of livestock that could be properly cared for. The financial impact could be widespread over the area of the drought particularly if it lasts for a long time or occurs at vital times in crop development.

Drought has no real effect on houses, facilities or state infrastructure. The impacts would be minimal in terms of landscaping. Rationing water supplies would most likely be the worse case scenario impact.

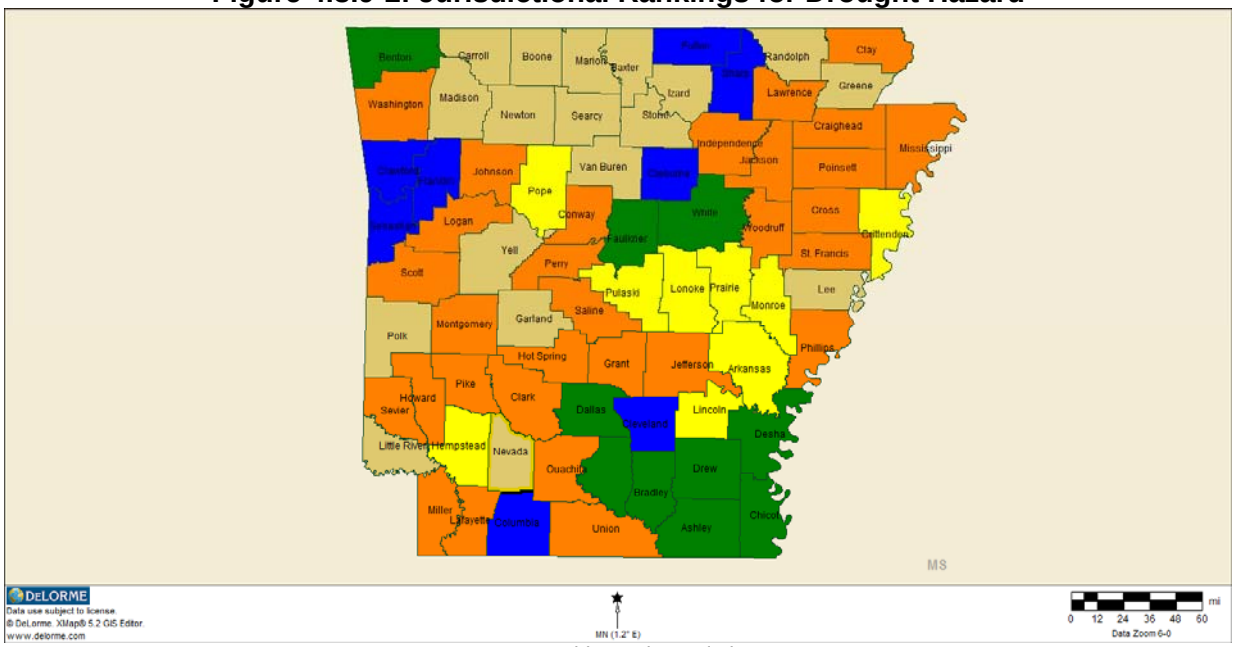
Prolonged drought over a number of years could have long-term environmental impacts on the area including species endangerment and necessary changes to the local agricultural makeup.

Local Plan Integration

As of January 2010, sixty-two local Mmitigation Pplans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the drought hazard. Note that this map does not include City or School District Plans

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.9-2: Jurisdictional Rankings for Drought Hazard



Source: Bold Panning Solutions

Drought Hazard totals:	
Medium-High Risk Jurisctions	29
Medium Risk Jurisdictions	9
Low Risk Jurisdictions	10
No Hazard Score	8

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January 2010, sixty-two local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table on the following pages.

Table 4.3.9-2: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.*
Arkansas County	Medium	1	N/A	0	0	N/A	N/A	N/A	55
Ashley County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A	55
Benton County	Low	7	N/A	0	0	N/A	0	N/A	23
Bradley County	Low	38	$ 350,000	N/A	N/A	0	0	N/A	N/A
Calhoun County	Low	1	N/A	0	0	0	0	N/A	N/A
Chicot County	Low	37	N/A	?	?	0	0	N/A	N/A
City of Foreman	Medium	3	N/A	0	0	N/A	N/A	N/A	58
Clark County	Medium-High	1	N/A	0	0	N/A	N/A	N/A	56
Clay County	Medium-High	35	$ 8,700,000	1	N/A	0	0	$ 873,333	54
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	Medium-High	36	N/A	N/A	N/A	0	0	N/A	N/A
Crawford County	N/A	8	$ 2,000,000	N/A	N/A	N/A	N/A	N/A	N/A
Crittenden County	Medium	38	N/A	0	?	0	0	N/A	53
Cross County	Medium-High	39	N/A	0	?	N/A	N/A	N/A	N/A
Dallas County	Low	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Desha County	Low	1	N/A	0	0	N/A	N/A	N/A	55
Drew County	Low	1	N/A	N/A	N/A	0	0	N/A	N/A
Faulkner County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	1	N/A	0	0	N/A	N/A	N/A	N/A
Grant County	Medium-High	41	N/A	N/A	N/A	0	0	N/A	N/A
Hempstead County	Medium	40	N/A	N/A	N/A	0	0	N/A	N/A

Hot Spring County	Medium-High	1	N/A	0	0	N/A	N/A	N/A	N/A
Howard County	Medium-High	3	N/A	0	0	N/A	N/A	N/A	58
Independence County	Medium-High	1	N/A	N/A	N/A	N/A	N/A	N/A	4
Jackson County	Medium-High	35	N/A	N/A	N/A	0	0	N/A	N/A
Jefferson County	Medium-High	41	N/A	N/A	N/A	0	0	N/A	N/A
Johnson County	Medium-High	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lafayette County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	Medium	37	N/A	N/A	N/A	0	0	N/A	N/A
Little Rock/ L.R. North	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marmaduke ISD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	Medium-High	40	N/A	N/A	N/A	0	0	N/A	100
Mississippi County	Medium-High	38	$ 280,000	0	N/A	0	0	N/A	N/A
Monroe County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	High	144	N/A	0	0	N/A	N/A	N/A	N/A
Ouachita County	Medium-High	1	N/A	0	0	0	0	N/A	N/A
Perry County	Medium-High	1	N/A	0	0	N/A	N/A	N/A	N/A
Phillips County	Medium-High	42	N/A	N/A	N/A	N/A	N/A	N/A	112
Pike County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	Medium-High	38	N/A	N/A	0	0	N/A	N/A	N/A
Pope County	Medium	1	N/A	N/A	N/A	1	0	N/A	N/A
Prairie County	Medium	4	$ 10,066,000	N/A	N/A	N/A	N/A	$ 218,000	40
Pulaski County	Medium	4	N/A	4	N/A	1	N/A	N/A	N/A
Saline County	Medium-High	2	N/A	N/A	N/A	N/A	N/A	N/A	56
Scott County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A	76

Sebastian County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	3	N/A	0	0	N/A	N/A	N/A	58
Sharp County	N/A	6	N/A	0	0	N/A	N/A	N/A	75
St. Francis County	Medium-High	3	N/A	0	0	N/A	N/A	N/A	N/A
Union County	Medium-High	1	N/A	0	0	N/A	N/A	N/A	50
Washington County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A	74
White County	Low	1	N/A	0	0	N/A	N/A	N/A	55
Woodruff County	Medium-High	1	N/A	0	0	N/A	N/A	N/A	N/A
Totals		**810**	**$ 21,396,000**	**5**	**0**	**2**	**0**	**$ 1,091,333**	

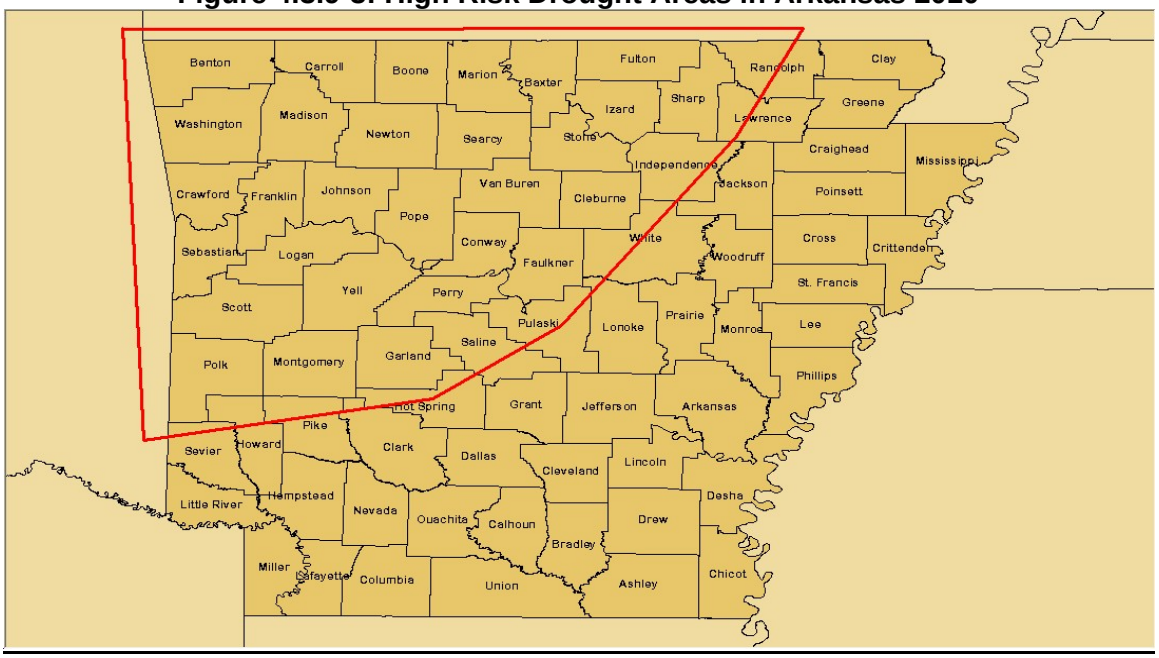
* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.9-2.

GIS Baseline Dataset

The northwest portion of the state is the most susceptible to drought; however drought occurs all throughout the state on a cyclical basis. Based on the overall geographic risk, the high risk region in the northwest of the state is outlined with the red line. However, since the physical infrastructure is not affected by drought, the GIS baseline analysis was not conducted for this hazard. For the 2010 update process, the Sub-Committee found that there is limited data regarding this hazard and elected not to modify the GIS Baseline findings in the previous plan.

Figure 4.3.9-3: High Risk Drought Areas in Arkansas 2010



Source: GeoStor

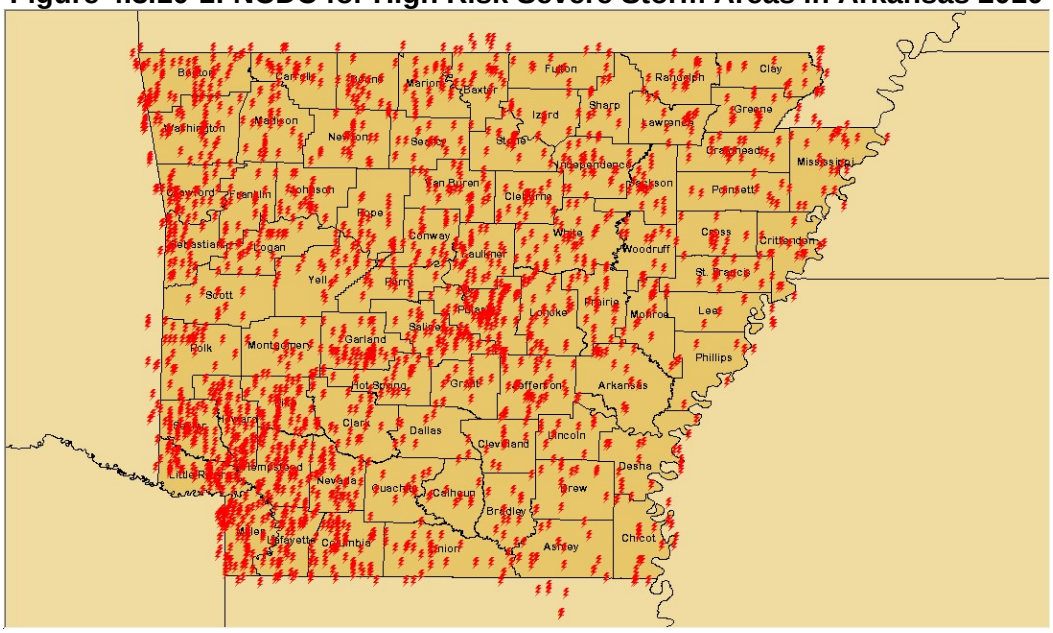
4.3.10 Assessing Severe Storm, Hail and Lightning Vulnerability by Jurisdiction

As discussed in Chapter 2, Section 4.2.10, all counties in Arkansas have experienced severe thunderstorms and the associated impacts from hail and lightning. These storms occur randomly throughout the state although the counties have not been evenly affected. This hazard is related to a number of other hazards already profiled and analyzed in this plan including:

- Tornadoes
- Flooding
- Straight-line winds

It is difficult to analyze this hazard separately. The following analysis should be considered in conjunction with these other individual hazards. The central and western parts of the state are more often affected by severe storms, whereas the eastern part of the state is the least affected. There is limited data regarding lightning, however the following map shows the distribution of hail across the state from 1950 through 2007. During the 2010 revision process the Sub-Committee could not locate sufficient data to update the following map; however, based on NCDC data gathered while researching the hazard, the Sub-Committee found that the areas with the most frequent hail since the last formal update are the areas that experienced the most hail events through March 2010. These findings show that the prior analysis of the highest risk areas remains valid.

Figure 4.3.10-1: NCDC for High Risk Severe Storm Areas in Arkansas 2010



Source: NCDC

From this map, the distribution of hail matches closely with the vulnerable jurisdictions discussed for tornadoes and straight-line winds. The corridor from the southwest corner of the state up through the central area around Little Rock has the highest vulnerability. There is also significant activity in the northwest corner.

Thunderstorm, Hail and Lightning Impact Analysis

Thunderstorms can negatively affect the State of Arkansas with a variety of impacts:

Severe thunderstorms impact the entire state with a number of related hazards including flooding, tornadoes, straight-line winds, hail and lightning.

Large hail storms can cause considerable damage particularly to windows, cars and buildings.

Depending on the stage of development, hail can severely damage crops and other agriculture.

People and livestock caught unprotected can be injured by hail.

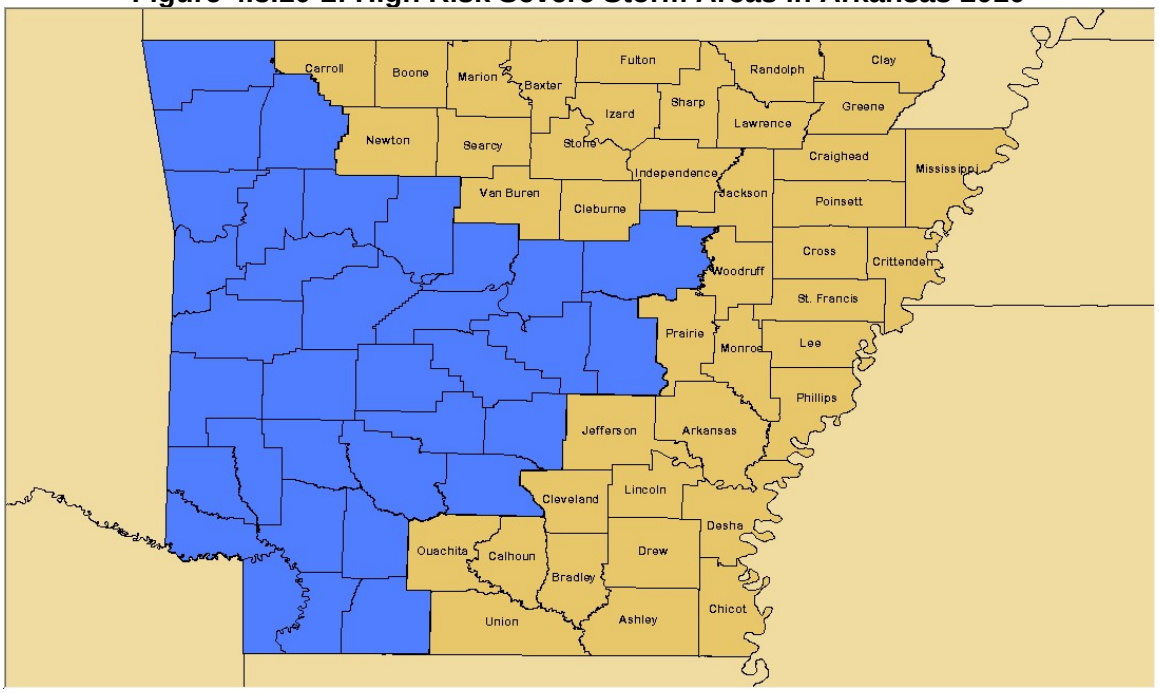
Lightning has been known to strike people causing injuries and even death.

Lightning is one of the causes of wildfires throughout the state.

HAZUS-MH2

During the previous update, the HMP Sub-Committee has selected the following counties as the high risk areas for severe thunderstorms with hail and lightning. For the 2010 update, this hazard was researched and it was determined that this remains the highest risk area in the state,

Figure 4.3.10-2: High Risk Severe Storm Areas in Arkansas 2010



Source: GeoStor

Table 4.3.10-1: 2007 HAZUS-MH2 Analysis – Total exposure for the high risk counties for thunderstorms and hail

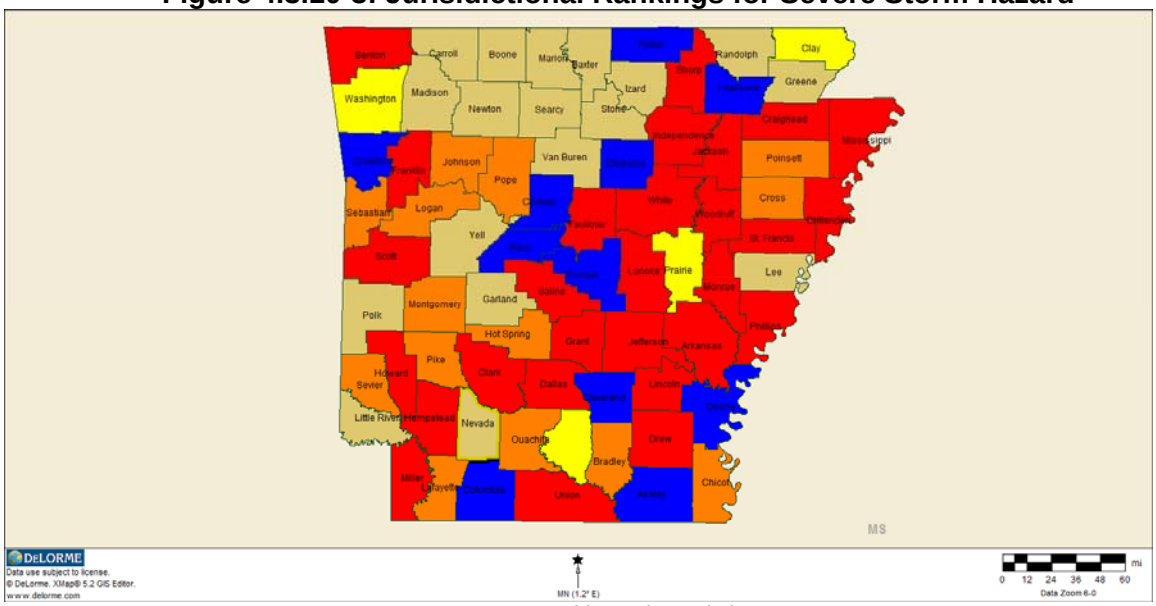
County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Benton	153,406	58,212	$15,341,645	$1,371,340	$965,847	$17,678,832
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Columbia	25,603	9,981	$2,037,015	$1,042,009	$378,694	$3,457,718
Conway	20,336	7,967	$1,867,754	$753,888	$203,919	$2,825,561
Crawford	53,247	19,702	$4,161,626	$1,162,819	$265,315	$5,589,760
Dallas	9,210	3,519	$797,958	$660,375	$202,971	$1,661,304
Faulkner	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Franklin	17,771	6,882	$1,452,041	$585,923	$290,563	$2,328,527
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Grant	16,464	6,241	$1,279,753	$795,183	$174,174	$2,249,110
Hempstead	23,587	8,959	$1,689,613	$1,149,661	$414,642	$3,253,916
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
Howard	14,300	5,471	$1,058,845	$876,166	$232,203	$2,167,214
Johnson	22,781	8,738	$1,765,691	$827,011	$209,696	$2,802,398
Lafayette	8,559	3,434	$647,857	$551,756	$329,365	$1,528,978
Little River	13,628	5,465	$1,129,972	$385,969	$289,797	$1,805,738
Logan	22,486	8,693	$1,832,764	$568,467	$394,032	$2,795,263
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Madison	14,243	5,463	$1,088,498	$984,759	$59,064	$2,132,321
Miller	40,443	15,637	$3,028,753	$1,045,446	$175,122	$4,249,321
Montgomery	9,245	3,785	$804,599	$782,797	$231,768	$1,819,164
Nevada	9,955	3,893	$704,325	$926,367	$89,932	$1,720,624
Perry	10,209	3,989	$867,114	$436,122	$57,942	$1,361,178
Pike	11,303	4,504	$961,598	$575,156	$174,000	$1,710,754
Polk	20,229	8,047	$1,455,330	$872,440	$233,064	$2,560,834
Pope	54,469	20,701	$5,179,873	$968,461	$555,713	$6,704,047
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
Scott	10,996	4,323	$789,013	$953,781	$117,006	$1,859,800
Sebastian	115,071	45,300	$12,255,589	$764,711	$707,380	$13,727,680
Sevier	15,757	5,708	$1,089,374	$678,002	$289,710	$2,057,086
Washington	157,715	60,151	$15,034,068	$1,975,733	$321,456	$17,331,257
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Yell	21,139	7,922	$1,645,708	$812,038	$319,890	$2,777,636
Totals	**1,685,129**	**657,428**	**165,126,696**	**32,721,899**	**13,949,604**	**211,798,199**

Local Plan Integration

As of January 2010, sixty-two local mitigation plans have been FEMA approved in the State of Arkansas. The map displays jurisdictional rankings for the severe storm hazard. Note that this map does not include City or School District Plans.

Red = High Hazard Score
Orange = Medium-High Hazard Score
Yellow = Medium Hazard Score
Green = Low Hazard Score
Blue = No Hazard Score or Listing

Figure 4.3.10-3: Jurisidictional Rankings for Severe Storm Hazard



Source: Bold Panning Solutions

Severe Storm Hazard totals:	
High Risk Jurisdictions	28
Medium-High Risk Jurisdictions	14
Medium Risk Jurisdictions	4
No Hazard Score	11

Over time, the following information will be collated for each local FEMA approved hazard mitigation plan throughout the State of Arkansas. This data will be used to drive the state-level vulnerability analysis and determine hazard risk locations. As of January 2010, sixty-two, local natural hazard mitigation plans have been FEMA approved in the State of Arkansas. As the remainder of the local mitigation plans completes the FEMA approval process, the data will be used to produce financial figures and determine hazard risk locations at a state level. These figures will be generated using this methodology for the next planning initiative (Version 5). Data from all sixty-two current Arkansas FEMA approved mitigation plans is collated in the table on the following pages.

Table 4.3.10-2: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs*.
Arkansas County	High	122	$ 173,000	1	5	N/A	N/A	N/A	55
Ashley County	N/A	91	$ 497,000	0	4	N/A	N/A	N/A	55
Benton County	High	240	$ 9,025,000	1	N/A	N/A	1	$ 392,391	23
Bradley County	Medium-High	61	$ 3,430,000	0	0	9	2	$ 95,338	36
Calhoun County	Medium	52	$ 55,000	0	2	0	2	$ 948	58
Chicot County	Medium-High	60	$ 3,620,000	0	0	9	1	$ 73,918	49
City of Foreman	Medium-High	123	$ 140,000	0	0	N/A	N/A	N/A	58
Clark County	High	147	$ 181,000	1	2	N/A	N/A	N/A	54
Clay County	Medium	35	$ 6,650,000	0	0	6	3	$ 141,489	54
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	High	92	$ 5,700,000	0	2	18	4	N/A	43
Crawford County	N/A	27	N/A	N/A	N/A	N/A	N/A	N/A	29
Crittenden County	High	54	$ 6,000,000	0	0	10	3	N/A	N/A
Cross County	Medium-High	46	$ 41,000	0	0	N/A	N/A	N/A	48
Dallas County	High	115	$ 106,000	0	3	N/A	5	N/A	57
Desha County	N/A	77	$ 206,000	0	1	N/A	N/A	N/A	56
Drew County	High	45	$ 4,800,000	0	0	9	1	$ 97,963	47
Faulkner County	High	201	$ 178,000	0	11	N/A	N/A	$ 1,000	57
Franklin County	High	144	$ 280,000	0	0	N/A	N/A	$ 6,086	46
Fulton County	N/A	51	$ 52,000	N/A	N/A	N/A	1	N/A	N/A
Grant County	High	65	$ 2,750,000	1	0	3	1	N/A	38
Hempstead County	High	137	$ 3,300,000	0	0	7	5	N/A	55
Hot Spring County	Medium-High	173	$ 642,000	0	0	N/A	N/A	N/A	54
Howard County	High	151	$ 2,945,000	N/A	N/A	N/A	N/A	N/A	50
Independence County	High	81	$ 611,000	0	0	N/A	N/A	N/A	20
Jackson County	High	133	$ 653,000	0	3	N/A	N/A	N/A	51
Jefferson County	High	130	$ 4,400,000	1	2	7	1	$ 90,673	49
Johnson County	Medium-High	N/A	$ 181,000	N/A	N/A	N/A	N/A	N/A	10
Lafayette County	Medium-High	105	$ 675,000	0	3	N/A	N/A	N/A	50
Lawrence County	N/A	79	$ 1,986,000	0	2	N/A	N/A	N/A	50

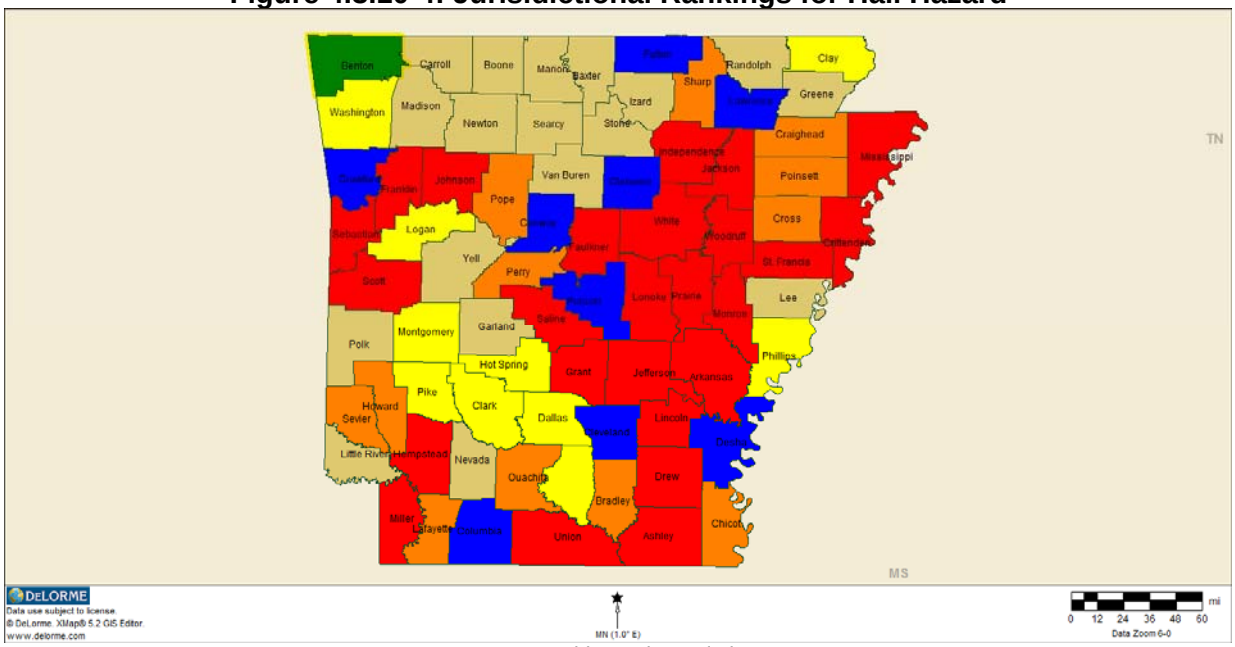
Lincoln County	High	41	$ 2,000,000	0	0	5	2	N/A	35
Little Rock/ L.R. North	N/A	328	N/A	N/A	N/A	0	8	N/A	N/A
Logan County	Medium-High	100s	$ 1,000,000	N/A	N/A	N/A	N/A	N/A	1950
Lonoke County	High	207	$ 1,247,000	N/A	N/A	N/A	N/A	N/A	1993
Marmaduke ISD	High	70	$ 659,000	0	0	N/A	N/A	N/A	56
City Of Mena	High	105	$ 250,000	0	0	0	1	N/A	N/A
Miller County	High	153	$ 5,100,000	0	1	16	3	N/A	53
Mississippi County	High	67	$ 2,750,000	1	0	3	1	N/A	43
Monroe County	High	73	$ 726,000	N/A	N/A	N/A	N/A	$ 55,000	50
Montgomery County	Medium-High	87	N/A	N/A	N/A	N/A	N/A	N/A	36
City of Mountain View	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ouachita County	Medium-High	123	$ 241,000	0	2	N/A	N/A	N/A	57
Perry County	N/A	100+	$ 100,000	N/A	N/A	N/A	N/A	N/A	51
Phillips County	High	51	$ 1,477,000	1	4	N/A	N/A	N/A	46
Pike County	Medium-High	117	$ 236,000	0	1	N/A	N/A	N/A	56
Poinsett County	Medium-High	66	$ 10,300,000	0	0	19	3	$ 205,229	52
Pope County	Medium-High	N/A	$ 10,000	N/A	N/A	N/A	N/A	N/A	N/A
Prairie County	Medium	102	$ 266,000	0	4	N/A	N/A	N/A	57
Pulaski County	N/A	328	$ 406,000	N/A	N/A	N/A	N/A	N/A	47
Saline County	High	183	$ 251,000	1	4	N/A	2	N/A	56
Scott County	High	86	$ 6,000	0	0	N/A	N/A	N/A	46
Sebastian County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A	56
Sevier County	Medium-High	116	$ 2,412,000	0	1	N/A	N/A	N/A	58
Sharp County	High	81	$ 1,631,000	1	1	N/A	N/A	N/A	58
St. Francis County	High	73	$ 655,000	0	6	N/A	N/A	N/A	38
Union County	High	99	$ 1,249,000	0	5	N/A	N/A	N/A	52
Washington County	Medium	55	$ 2,413,300	0	0	N/A	N/A	N/A	54
White County	High	197	$ 253,000	0	1	N/A	N/A	N/A	55
Woodruff County	High	1	N/A	0	0	N/A	N/A	N/A	50
Totals		**5525**	**$94,742,300**	**8**	**65**	**121**	**50**	**$1,160,035**	

* - Years used in local plan to determine hazard score/probablitlity.

N/A = Data not provided in FEMA approved Mitigation Plan. Future mitigation plan revisions reviewed by ADEM will be required to add and update VA data to include all data listed in Table 4.3.10-2.

Hail Hazard – Local Plan Integration

Figure 4.3.10-4: Jurisidictional Rankings for Hail Hazard



Source: Bold Panning Solutions

Hail Hazard totals:

High Risk Jurisdictions	25
Medium-High Risk Jurisdictions	12
Medium Risk Jurisdictions	10
Low Risk Jurisdictions	1

Table 4.3.10-3: Local Plan Vulnerability Assessment

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)	Yrs.
Arkansas County	High	84	N/A	0	0	N/A	N/A	N/A	55
Ashley County	High	57	$ 500,000	0	0	N/A	N/A	$ 9,090	55
Benton County	Low	202	$ 2,796,000	0	0	N/A	N/A	$ 121,565	23
Bradley County	Medium-High	61	$ 3,430,000	0	0	9	2	$ 95,338	36
Calhoun County	Medium	56	N/A	0	0	0	0	N/A	39
Chicot County	Medium-High	60	$ 3,620,000	0	0	9	1	$ 73,918	49
City of Foreman	N/A	22	N/A	0	0	N/A	N/A	N/A	58
Clark County	Medium	126	$ 1,000	0	0	N/A	N/A	N/A	56
Clay County	Medium	35	$ 6,650,000	0	0	6	3	$ 141,489	54
Cleburne	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

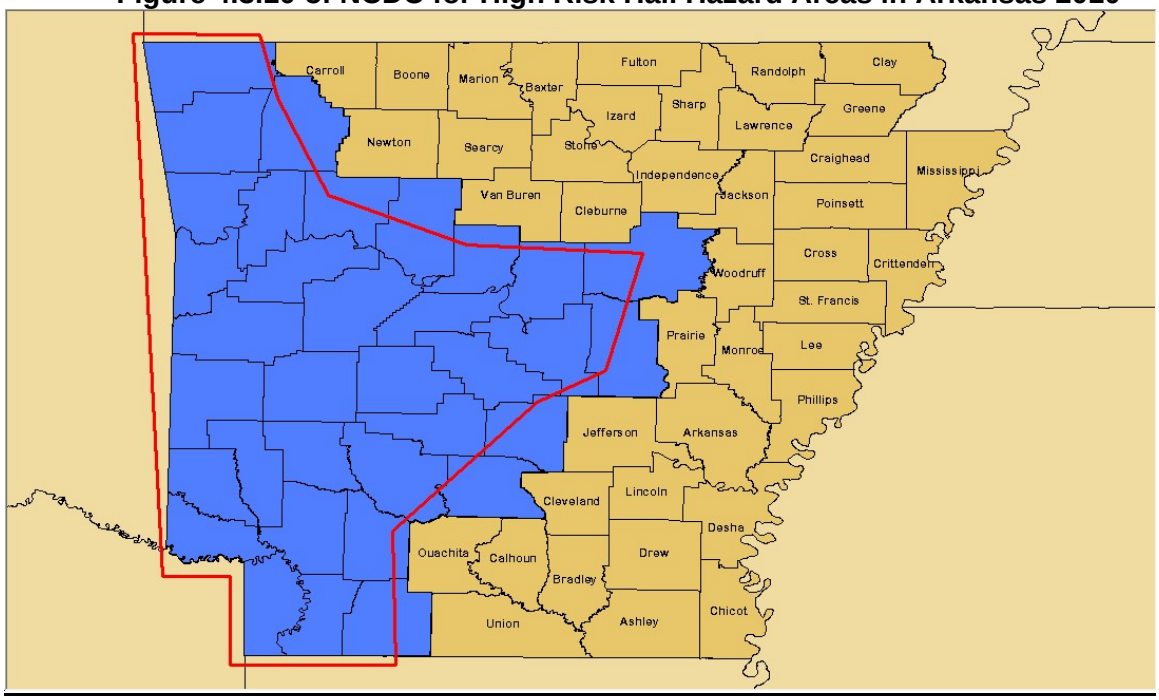
County									
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	Medium-High	87	$ 122,000	0	0	18	4	N/A	43
Crawford County	N/A	127	$ 850,000	0	0	N/A	N/A	N/A	13
Crittenden County	High	52	$ 6,046,100	0	0	10	3	$ 151,150	40
Cross County	Medium-High	35	$ 20,000	0	0	N/A	N/A	N/A	42
Dallas County	Medium	51	N/A	0	0	N/A	N/A	N/A	25
Desha County	N/A	33	N/A	0	0	N/A	N/A	N/A	56
DrewCounty	High	43	$ 1,500,000	0	0	9	0	N/A	47
Faulkner County	High	102	N/A	N/A	N/A	N/A	N/A	N/A	50
Franklin County	High	149	$ 1,056,000	N/A	N/A	N/A	N/A	N/A	47
Fulton County	N/A	51	$ 50,000	N/A	N/A	N/A	1	N/A	39
Grant County	High	63	N/A	0	0	N/A	N/A	N/A	38
Hempstead County	High	136	N/A	N/A	N/A	N/A	N/A	N/A	55
Hot Spring County	Medium	107	N/A	0	0	N/A	N/A	N/A	56
Howard County	Medium-High	167	N/A	0	0	N/A	N/A	N/A	58
Independence County	High	116	N/A	0	1	N/A	N/A	N/A	56
Jackson County	High	78	$ 6,475,200	N/A	N/A	N/A	N/A	N/A	50
Jefferson County	High	125	N/A	N/A	N/A	N/A	N/A	N/A	49
Johnson County	High	134	N/A	0	0	N/A	N/A	N/A	58
Lafayette County	Medium-High	112	$ 70,000	0	0	N/A	N/A	N/A	34
Lawrence County	N/A	56	$ 167,000	0	0	N/A	N/A	N/A	46
Lincoln County	High	41	N/A	0	0	N/A	N/A	N/A	35
Little Rock/ L.R. North	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Medium	76	N/A	0	0	N/A	N/A	N/A	36
Lonoke County	High	144	$ 8,000	0	0	N/A	N/A	N/A	57
Marmaduke ISD	N/A	52	$ 27,000	0	0	N/A	N/A	$ 13,449	56
City of Mena	High	125	N/A	0	0	N/A	N/A	N/A	56
Miller County	High	152	N/A	0	1	N/A	N/A	N/A	N/A
Mississippi County	High	25	$ 1,800,000	N/A	N/A	N/A	N/A	N/A	N/A
Monroe County	High	43	N/A	N/A	N/A	N/A	N/A	N/A	10
Montgomery County	Medium	79	N/A	N/A	N/A	N/A	N/A	N/A	47
City of Mountain View	High	60	N/A	0	0	N/A	N/A	N/A	37

Ouachita County	Medium-High	95	$ 1,495,000	N/A	N/A	N/A	N/A	N/A	57
Perry County	Medium-High	66	$ 100,000	0	0	N/A	N/A	N/A	53
Phillips County	Medium	18	$ 19,000	0	0	N/A	N/A	N/A	29
Pike County	Medium	139	N/A	0	0	N/A	N/A	N/A	56
Poinsett County	Medium-High	64	$ 3,030,000	N/A	N/A	N/A	N/A	N/A	52
Pope County	Medium-High	120	N/A	0	0	N/A	N/A	N/A	57
Prairie County	High	61	N/A	N/A	N/A	N/A	N/A	N/A	57
Pulaski County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Saline County	High	140	$ 5,000	0	0	N/A	N/A	N/A	56
Scott County	High	82	$ 1,000	N/A	N/A	N/A	N/A	N/A	58
Sebastian County	High	211	$ 116,000	0	0	N/A	N/A	N/A	47
Sevier County	Medium-High	135	$ 50,000	0	0	N/A	N/A	N/A	58
Sharp County	Medium-High	75	N/A	0	0	N/A	N/A	N/A	58
St. Francis County	High	57	$ 43,000	0	0	N/A	N/A	N/A	52
Union County	High	84	$ 5,000	0	0	N/A	N/A	N/A	48
Washington County	Medium	5	$ 59,010,000	0	0	N/A	N/A	N/A	55
White County	High	166	$ 100,000	0	0	N/A	N/A	N/A	44
Woodruff County	High	40	$ 53,000	0	0	N/A	N/A	N/A	50
Totals		**4798**	**$ 99,215,300**	**0**	**2**	**61**	**14**	**$ 606,000**	

GIS Baseline Dataset

The corridor from the south west to the central area of the state experiences a large number of thunderstorms. The 34 counties have been noted in blue based on the analysis by the HMP Sub-Committee. Based on the overall geographic risk, the high risk region is shown outlined with the red line and this region is used for this GIS baseline vulnerability analysis. For the 2010 revision process the HMP Sub-Committee researched data from the NCDC and found that the Western and Central parts of the state remain the areas that experience the most thunderstorm events therefore, the Committee determined this GIS baseline and the data related to it to still be valid.

Figure 4.3.10-5: NCDC for High Risk Hail Hazard Areas in Arkansas 2010



Source: NCDC

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to thunderstorms, hail and lightning.

Table 4.3.10-4: Regional Vulnerability to Thunderstorms

Vulnerability	Number of Records
Arkansas Counties	34
Fire Stations	657
Law Enforcement	255
Armories	101
Church Camps	11
Safe Rooms	37
Fairgrounds / Speedways	66
Military Installations	4
Public Schools	576
Private Schools	120
Universities and Colleges	17
Hospitals	68
EMS / Ambulance	86
Veteran's Affairs Medical Facilities	9
Local Health Dept Units	43
Long Term Healthcare	296

Hospices and related medical facilities	186
Rural Health Clinics	15
Bridges	3277
Airports	33
AWIN Towers	43
Environmental Facilities	1702
Intermodel Terminals	22
Electricity Providers	19
Power Plants	13
Power Substations	256
Radio / TV Stations	291
Post Offices	253
Prisons	7
Dams	670

4.3.11 Assessing Hazardous Material Events Vulnerability by Jurisdiction

The State of Arkansas is exposed to a variety of HAZMAT hazards that could significantly jeopardize the people, animals and infrastructure of various jurisdictions. The HMP Sub-Committee has agreed that HAZMAT hazards are a high priority for planning, response and mitigation purposes, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable population and resources. The following considerations were made by the Sub-Committee in preparing this analysis:

The committee recognized that additional HAZMAT events besides these could occur in the State of Arkansas with similar devastating consequences.

Historically, HAZMAT events have caused damage to property and injury and/or death of persons.

A variety of factors increase the difficulty of responding to a HAZMAT event, such as notification and evacuation of vulnerable populations.

Due to the prevalence of HAZMAT facilities and the variety of modes of transporting HAZMAT within Arkansas, the entire State of Arkansas is viewed to be vulnerable to a HAZMAT event. However, some locations are more vulnerable to the impacts of a HAZMAT event.

The top six potential HAZMAT event categories have been identified, profiled, and analyzed in detail:

Fixed-site HAZMAT locations,

Pine Bluff Arsenal,

Methamphetamine Laboratories,

Highway HAZMAT,

Railroad HAZMAT, and

Pipeline HAZMAT.

Fixed-site HAZMAT - Vulnerability and Impact Analysis

The State of Arkansas is exposed to a variety of fixed-site HAZMAT hazards that could significantly jeopardize the people, animals and infrastructure of various jurisdictions. The HMP Sub-Committee has agreed that fixed-site HAZMAT hazards are a high priority for planning, response and mitigation purposes, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

Hundreds of facilities in Arkansas have large quantities of hazardous materials on-site.

Fixed-site HAZMAT events are costly for the government to respond to and recover from.

Fixed-site facilities are located in all regions of Arkansas, in areas with high and low populations of people and infrastructure.

The State of Arkansas has been impacted by past fixed-site HAZMAT events that have caused illness and death to people and damage to property.

First responders have been injured and killed while responding to fixed-site HAZMAT events.

A variety of factors can increase the difficulty of responding to and recovering from a fixed-site HAZMAT event, such as the notification and evacuation of vulnerable populations.

Fixed-site HAZMAT events have caused extreme damage to the environment that require years for complete recovery.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified one primary category of life vulnerability to be considered in this analysis.

Human Population – Fixed-site HAZMAT events often occur in areas of population. Notifying and evacuating the populations affected by a HAZMAT event is difficult. Responding to HAZMAT events puts first responders in danger of injury or death.

The HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a fixed-site HAZMAT event:

Infrastructure and Economy– Preparing and responding to HAZMAT events are costly to the government and first responder agencies. Clean up of the environment due to a HAZMAT event can cost millions of dollars and take several years to recover. Lawsuits against private companies responsible for HAZMAT events can be costly.

Human Population Impact Analysis

Emergency responders often have limited options and short timeframes for protecting the public in chemical accidents. Thus, a chemical accident that releases toxic fumes frequently involves an evacuation of the affected areas of the community as a precautionary measure; but ensuring that all citizens are out of an evacuation zone, especially if the release is extremely toxic or presents secondary contamination issues, can be challenging.

Although evacuation is the most common strategy used by emergency managers to protect the public, some authorities now suggest that “sheltering in place” may be a practical alternative for: (1) Critical events where advance warning is not possible, or (2) Events that recur on a periodic basis.

Physically moving from an area exposed to a chemical hazard in the appropriate time frame may not be a viable option for certain vulnerable populations such as those in institutional settings, the elderly who need longer preparation time, people with special medical needs, or individuals with limited mobility or without vehicles that must rely on others for assistance.

HAZMAT releases pose short- and long-term toxicological threats to humans and to terrestrial and aquatic plants and wildlife. Toxic materials affect people through one of three processes: inhalation, ingestion, or direct skin contact (Federal Emergency Management Agency, 1997). Inhalation exposures result from breathing gases that may have been vented from containers, liquid aerosols generated during venting of pressurized liquids, fumes from spilled acids, vapor created by evaporating liquids, and airborne dust. Ingestion exposures typically result from poor hygiene habits after handling contaminated material, eating contaminated food, or the inhalation of insoluble particles that may become trapped in the mucous membranes. Skin may be affected by direct contact with gas, liquid, or solid forms of HAZMAT.

In some cases, these substances may irritate the skin or eyes, make it difficult to breathe, cause headaches and nausea, or result in other types of illnesses. Some hazardous substances may cause far more severe health effects, including behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (e.g., reproductive impairment, kidney failure, etc.), physical deformations and birth defects.

Table 4.3.11-1: Effects of Hazardous Materials on Humans

Common Sources	Contaminants	Potential Health Effects
Household items, such as batteries, thermometers, and paints	Mercury	• Toxic to kidneys. • Can cause eye and skin irritation; chest pain; tremor; fatigue; weakness.
Pesticides	Chlorinated ethanes; DDT; Lindane	Acute symptoms of apprehension, irritability, dizziness, disturbed equilibrium, tremor, and convulsions.
Various commercial and industrial manufacturing processes	Arsenic; beryllium; cadmium; chromium; lead; mercury	All are toxic to kidneys. Decreased mental ability, weakness, headache, abdominal cramps, diarrhea, and anemia. Also affects blood-forming mechanisms and the peripheral nervous system. Long-term exposure to lead can cause permanent kidney and brain damage. Cadmium can cause kidney and lung disease. Chromium, beryllium, arsenic, and cadmium have been implicated as human carcinogens.
Chemical manufacturing	Benzene; ethyl benzene; toluene; xylene	Benzene suppresses bone marrow function, causing blood changes; chronic exposure can cause leukemia. Central nervous system depression: decreased alertness, headaches, sleepiness, loss of consciousness.
Steel and glass manufacturing	Chromium; lead; mercury	All are toxic to kidneys. Lead causes decreased mental ability, weakness, headache, abdominal cramps, diarrhea, and anemia. Also affects blood-forming mechanisms and the peripheral nervous system.

Some hazardous substances produce toxic effects in humans or the environment after a single, episodic release. These toxic effects are referred to as the acute toxicity of a hazardous substance. Other hazardous substances produce toxic effects in humans or the environment after prolonged exposure to the substance, which is called chronic toxicity.

Children are at greater risk of exposure to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed for several reasons: children play outside more often increasing the likelihood of exposure to chemicals in the environment; since they are shorter than adults are, they breathe more dust and heavy vapors close to the ground; children are also smaller and thus receive higher doses of chemical exposure per body weight; finally, the developing body systems of children can sustain damage if toxic exposures occur during certain growth stages.

Environmental Impact Analysis

Impacts on the environment can be just as devastating: hazardous substances can kill living organisms in a lake or river, destroy wildlife and vegetation in a contaminated area, cause major reproductive complications in wildlife, or otherwise limit the ability of an ecosystem to survive; certain hazardous substances also have the potential to explode or cause a fire, threatening both wildlife and human populations.

Economic Impact Analysis

The actual total economic loss to Arkansans from HAZMAT events has never been determined, although it is estimated to be in the 10's of millions of dollars per year when considering the costs for cleanup efforts, loss of revenue and salaries, loss of land and facility usage, costs due to injuries or death, as well as any legal or environmental fines.

Pine Bluff Arsenal Hazard Vulnerability and Impact Analysis

The State of Arkansas is exposed and at risk to an event at Pine Bluff Arsenal that could have an extreme impact on the people, animals and infrastructure. The HMP Sub-Committee has agreed that Pine Bluff Arsenal is a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

Pine Bluff Arsenal stores large quantities of hazardous materials at their facility.

Pine Bluff Arsenal stores missiles that have a potential for explosion.

Pine Bluff Arsenal is surrounded by communities having high populations.

An event at Pine Bluff Arsenal could cause widespread injury and death to populations and first responders.

A variety of factors increase the difficulty of responding to and recovering from a major incident at Pine Bluff Arsenal.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified one primary category of life vulnerability to be considered in this analysis.

Human Population – Based on the 2000 census, 43,000 people live within 10 miles of Pine Bluff Arsenal. The 2008 Census estimates for the area have not materially changed; therefore this analysis remains valid for the 2010 revision of this plan. A major event at PBA would cause significant illness, death and damage to the overall human population of the affected and surrounding communities.

The HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by an event at Pine Bluff Arsenal:

Hospitals and related medical personnel and infrastructure– In an event, medical resources of the state and surrounding jurisdictions will be mobilized to respond to the situation. This will include on-site response personnel, doctors, nurses, biological experts and others. The

medical community, along with the physical hospitals, labs and related facilities, will be vulnerable during an event.

Infrastructure and economy– Damage to Pine Bluff Arsenal itself could be severe. The surrounding cities and their governments would feel the economic impacts from populations abandoning the area out of fear of future events. Many state-owned facilities and employees located within a few mile radius of PBA could suffer substantial damages.

Human Population Vulnerability and Impact Analysis

Human population in and around the Pine Bluff Arsenal is vulnerable to an event. Whether the event is caused by terrorists or by an accident on base, the surrounding human population is equally susceptible to illness, death, and all of the collateral damage and economic impact.

An estimate of populations affected by a Pine Bluff Arsenal event was extracted using 2008 Census data. Using the center of the PBA facility, a 5 and 10-mile buffer was placed around the site. Based on 2008 estimates there are 50,408 people living in Pine Bluff, Arkansas and 78,373 within Jefferson County. To the west of PBA, Grant County has a population of 17,690. Also located within Pine Bluff, Arkansas, is the University of Arkansas at Pine Bluff.

As part of the 2010 revision process, the HMP Sub-Committee determined that 2009 census estimates for Pine Bluff and the surrounding counties had not yet been developed and published. Therefore the committee determined that an analysis using the 2008 census estimates would be the best available data.

The population of the Immediate Response Zone (IRZ), which includes portions of Jefferson and Grant Counties and extends to 15 kilometers, is 22,251. The population living in the Protective Action Zone (PAZ) which extends an additional 35 kilometers (50 kilometers total) totals 150,552. The populations of incorporated cities near the Pine Bluff Arsenal/Pine Bluff Chemical Activity/Pine Bluff Chemical Activity are:

Pine Bluff……50,408
Altheimer.....…1,110
Humphrey.....…..755
Redfield.....……..1,173
Sherrill.....…..114
Wabbaseka..……....296
White Hall...……..…5,121

Based on 2008 Census data, 7,205 residents live within 5 miles of Pine Bluff Arsenal. 44,531 residents live within 10 miles of the facility.

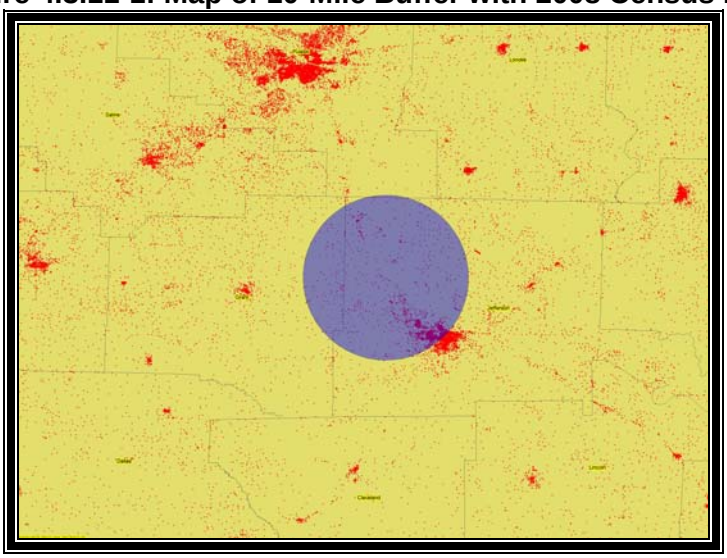
Table 4.3.11-2: 5-Mile Buffer around Pine Bluff Arsenal

Population Based on 2008 Census		
Total Population Affected	**Total Population of Arkansas**	**Percent of Population Affected**
7,205	2,867,764	0.25%

Table 4.3.11-3: 10-Mile Buffer around Pine Bluff Arsenal

Population Based on 2008 Census		
Total Population Affected	**Total Population of Arkansas**	**Percent of Population Affected**
44,531	2,867,764	1.55%

Figure 4.3.11-1: Map of 10-Mile Buffer with 2008 Census Data



As detailed within the Arkansas Emergency Operations Plan, certain population centers have been identified as being at risk in the event of an incident at PBA. The following population centers are considered at risk:

1. White Hall: The city of White Hall borders PBA on the west with a population of 5,121. It is located south of the storage area and the proposed disposal area. Wind directions from the north to north-northwest could cause a plume to pass over the city. Based on data compiled by PBA, wind direction from the north occurs approximately 10% of the time, and wind direction from the north-northwest occurs approximately 3.5% of the time.

2. Redfield: The city of Redfield is located approximately 5 miles northwest of PBA with a population of 1,173. According to PBA data and the Emergency Response Concept Plan (ERCP), wind direction from the southeast would pose a threat to Redfield in an event at PBA. According to the information, wind direction from the southeast occurs approximately 4% of the time and wind direction from the south-southeast occurs approximately 5% of the time. Winds from either of these two directions could cause a plume to pass over the city.

3. Pine Bluff: A portion of the city of Pine Bluff is located inside the 15Km IRZ; however, the majority of the city and most of the population is outside of the IRZ. Pine Bluff is located south-southeast of PBA and has a population of 50,408. Wind directions that might impact Pine Bluff are from the north (occurring approximately 10% of the time), north-northwest (occurring approximately 3.5% of the time) and from the northwest (occurring approximately 4% of the time).

There are multiple correctional facilities within the CSEPP area. These include city and county jails, detention centers and state units at Pine Bluff, which include the community punishment unit, a women's unit, and a diagnostic facility.

Vulnerability of Hospitals and Related Medical Personnel and Infrastructure

The Arkansas Department of Health and Human Services (ADH) is the state government agency tasked with coordinating health and medical response activities in the event of a major emergency disaster situation. In the event any situation at the Pine Bluff Arsenal/Pine Bluff Chemical Activity requires emergency response, the ADH Major Disaster and Incident Response Plan (MDIRP) will be activated – fully or partially, depending upon the nature of the incident.

In the event of a chemical accident/incident at the Pine Bluff Arsenal, the following medical agencies/facilities would be directly involved:

Jefferson and Grant County Emergency On-Call Medical Coordinators

Arkansas Department of Health and Human Services

Jefferson Regional Medical Center, Pine Bluff, Arkansas

U. S. Army Health Clinic, Pine Bluff Arsenal

Hospitals with agreements to provide medical response during an event at PBA are listed on the following page.. All of the hospitals included would be at risk of contamination.

Table 4.3.11-4: CSEPP Agreement Hospitals

Hospital	County	Atropine	Protopam
Jefferson Regional Medical Center-Pine Bluff	Jefferson	2075mg	252g
Arkansas Children's Hospital-Little Rock	Pulaski	500mg	66g
McClellan Memorial VA Medical-Little Rock	Pulaski	500mg	66g
UAMS Medical Center-Little Rock	Pulaski	1400mg	174g
St.Vincent Infirmary Medical Center-Little Rock	Pulaski	500mg	66g
St. Vincent Doctor's Hospital-Little Rock	Pulaski	500mg	66g
Baptist Medical Center-Little Rock	Pulaski	500mg	66g
Baptist Memorial Medical-North Little Rock	Pulaski	425mg	54g
Southwest Regional Medical Center-Little Rock	Pulaski	500mg	66g
Rebsamen Regional Medical Center-Jacksonville	Pulaski	425mg	54g
Hot Springs County Medical Center- Malvern	Hot Springs	425mg	54g
Saline Memorial Hospital-Benton	Saline	500mg	66g
Stuggart Regional Medical Center-Stuggart	Arkansas	425mg	48g
Dallas County Hospital-Fordyce	Dallas	425mg	54g
Delta Memorial Hospital-Dumas	Desha	425mg	54g
Drew Memorial Hospital-Monticello	Drew	425mg	54g

During an event, traffic control points (TCPs) and access control points (ACPs) would be activated for the safe and timely evacuation of the general population. The TCPs would be manned by local law enforcement personnel and augmented by the Arkansas State Police and National Guard. Contamination to personnel could cause serious illness or death.

Opening reception centers, care centers and shelters that assist evacuees would increase the risk of personnel being exposed to contaminants from the event. All levels of law enforcement, fire and medical personnel would be involved in processing chemical agent victims. Contamination to some degree is expected to occur.

The following actions would take place during a major event at PBA. All of the responders would be at risk of injury or death.

Fire and rescue personnel would be activated and requested to respond to the emergency.

Local fire departments and ambulance services are responsible for providing rescue, emergency treatment, and transportation for the seriously ill or injured. This is accomplished through either the local fire department's rescue unit, the local ambulance service, or the nearest available unit from a neighboring jurisdiction.

Medical personnel would be deployed immediately to locations as determined by the EOC executive staffs of the various affected counties. Responding organizations (i.e., fire departments, rescue squads, ambulances) would respond with a minimum of ten (10) certified responders and adequate equipment to perform their specified functions.

In the event of casualties, emergency responders may be required to handle the remains. Due to the possibility of residual chemical contamination, cadavers would not be handled in the routine manner. Appropriate procedures have been developed for the safe handling of fatalities.

Infrastructure and Economic Impact Analysis

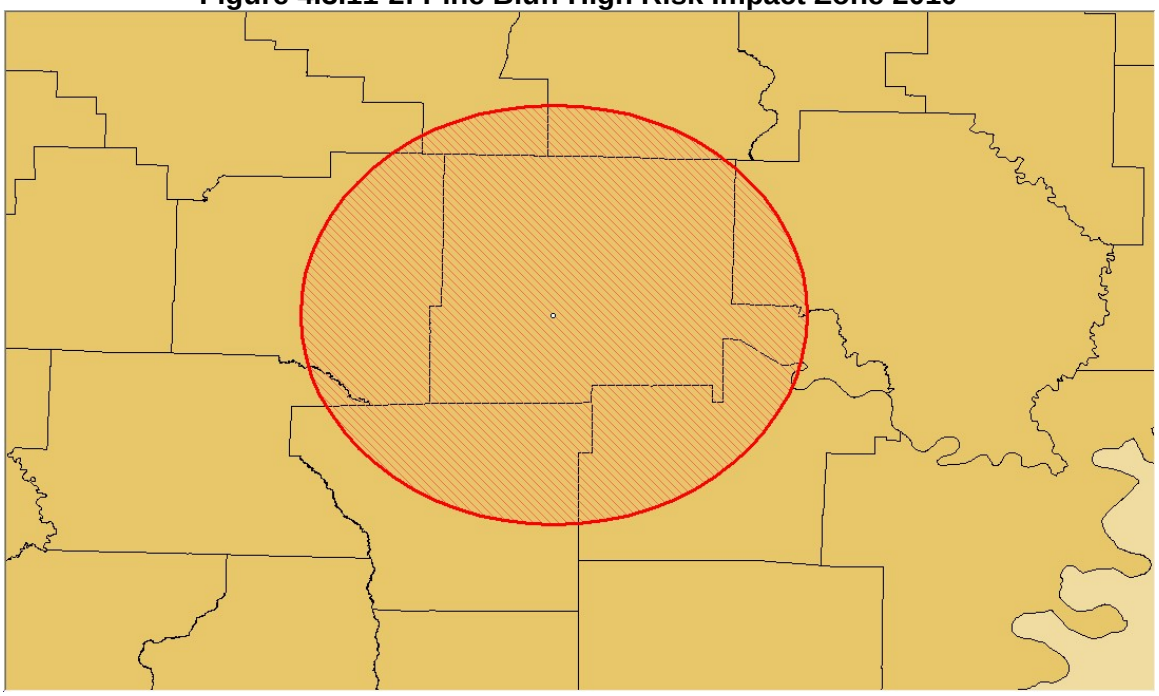
Pine Bluff, Eastwood and White Hall, Arkansas are the most vulnerable jurisdictions to an event at Pine Bluff based on their geographic location. If a major event were to take place at PBA, the economic impact on Pine Bluff, AR and Jefferson County would be extreme.

A major event could cause residents to relocate out of the area thereby reducing housing values. A loss of population would also dramatically reduce the tax revenue for Jefferson County since Pine Bluff is the central economic hub of the county.

2010 GIS Baseline Analysis

Incidents at the Pine Bluff arsenal would not damage the actual building and infrastructure; however there would be an associated impact to the surrounding area. As part of the previous plan update process, the HMP Sub-Committee has identified an area 25 miles around the arsenal as a high risk impact zone. During the 2010 update process the committee determined that the map below is valid because the area around Pine Bluff has not experienced much development. Therefore the committee used the GIS baseline from the previous plan update for the 2010 plan update.

Figure 4.3.11-2: Pine Bluff High Risk Impact Zone 2010



Source: GeoStor

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to an incident at Pine Bluff Arsenal.

Table 4.3.11-5: Regional Vulnerability to an Incident at Pine Bluff Arsenal

Vulnerability	Number of Records
Arkansas Counties	10
Fire Stations	43
Law Enforcement	21
Armories	4
Church Camps	0
Safe Rooms	0
Fairgrounds / Speedways	1
Military Installations	1
Public Schools	45
Private Schools	10
Universities and Colleges	1
Hospitals	2
EMS / Ambulance	7
Veteran's Affairs Medical Facilities	0
Local Health Dept Units	4
Long Term Healthcare	24
Hospices and related medical facilities	22
Rural Health Clinics	0
Airports	4
AWIN Towers	7
Environmental Facilities	166
Intermodel Terminals	7
Electricity Providers	1
Power Plants	1
Power Substations	13
Radio / TV Stations	22
Post Offices	22
Prisons	2
Dams	46

Methamphetamine Laboratory Hazard Vulnerability and Impact Analysis

The State of Arkansas is exposed and at risk to methamphetamine laboratory events that could have a severe impact on the people, animals and economy. The HMP Sub-Committee has agreed that meth labs are a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

Arkansas has one of the largest numbers of reported meth labs in the US.

Arkansas has a history of meth lab events and although the frequency of these events is decreasing, meth lab events remain a risk to the population.

Meth lab events have caused damage to property, illness, and death to populations within Arkansas.

There are a variety of factors that can happen that would increase the difficulty of responding to a meth lab event including toxic fumes, dangerous chemicals and risk of explosion.

Due to the ease of acquiring products for meth production and a location's limited requirements needed for manufacturing, meth labs can be located virtually anywhere. The entire State of Arkansas is vulnerable to meth lab events. Some locations may be more vulnerable or more susceptible but all areas are at risk.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified three primary categories of life vulnerability to be considered in this analysis.

Human Population – Meth labs are frequently found within residential areas and homes, and in many cases the location of the meth lab is inside a home with children. Entering a meth lab for first responders is extremely dangerous. Hazardous materials are usually kept in unmarked containers and in unhealthy conditions. Responders run the risk of breathing toxic fumes or being caught in an explosion.

Environment – Meth labs contain toxic and hazardous materials. Many meth labs dispose of used chemicals by dumping them in yards, community trash bins, or down the sink. All of these methods are extremely harmful to the environment.

Along with the primary vulnerabilities to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a biological pandemic:

Infrastructure and Economy– There is no direct threat to state facilities or infrastructure. The biggest impact on the government is the financial burden of disposing of meth labs in a safe and environmentally friendly method. Meth lab disposal has substantial costs.

Human Population Impact Analysis

In Arkansas, as in other parts of the United States, the number of clandestine methamphetamine laboratories, commonly referred to as “meth labs,” is growing and their locations are shifting from isolated, rural facilities to houses, trailers and apartments in more densely populated urban areas. This shift is making the entire population of Arkansas more vulnerable to the effects of a meth lab.

The reckless practices of the untrained people who manufacture meth in clandestine labs result in explosions and fires that injure or kill not only the people and families involved, but also law enforcement or firemen who respond.

The Sub-Committee acknowledges that an accurate assessment of vulnerable populations affected by a meth lab event cannot be estimated. This is due to the fact that meth labs can be created and operated within residential homes, bathrooms, closets, cabins, vans, and even trunks of vehicles. In many cases, the neighbors and surrounding populations are unaware of the on-going meth lab activity in their neighborhoods until local law enforcement intervenes. There are no geographic, demographic or economic boundaries identified in the production of meth. Therefore, it is understood that all populations are at some risk to the impacts of meth lab events.

There is a high risk for people to have acute exposure to harmful chemicals in meth labs. Many of the chemicals used in the “cooking” process are harmful and explosive. Approximately 15 percent of meth labs are discovered as a result of a fire or explosion.

Short-term exposures to high concentrations of chemical vapors in a meth lab can cause severe health problems or even death. For this reason, meth “cookers,” their families, and first responders are at highest risk of acute health effects from chemical exposure, including lung damage and chemical burns to different parts of the body. Heating solvents inside a building can create a highly flammable situation; meth labs are often discovered when fire fighters respond to a blaze.

After seizure of a meth lab there is often only a low exposure risk to chemical residues, but contamination needs to be cleaned up. The properties often have serious sanitation and safety issues (i.e., physical and electrical hazards may exist). Sanitation issues can complicate the assessment of a chemical hazard risk. Any evaluation needs to consider the overall condition of the property.

Chemical residues and lab wastes that are left behind at a former meth lab can also result in health problems for people who use the property. Unsuspecting people can touch residues of meth and have symptoms similar to those experienced by meth users. For this reason, local health departments should thoroughly assess the property for hazards prior to allowing it to be re-inhabited, especially by children. In multiple-unit dwellings, neighbors are vulnerable to the effects of toxic fumes created within a meth lab. Their health can be impacted severely by the on-going exposure to the chemicals.

In buildings where residual contamination is present, new occupants could unwittingly be exposed to hazardous materials. Children are particularly vulnerable to the deleterious effects of these chemicals. In general, children are more likely to be exposed to the residuals of contamination from previous methamphetamine laboratory activities because of behaviors such as crawling on floors and putting foreign materials in their mouths. Even children who live in apartments adjacent to methamphetamine laboratories that have not been properly decontaminated can be exposed to potentially harmful chemical residues.

Table 4.3.11-6: Children Involved in Meth Lab Related Incidents in the U.S.

Children Involved in Methamphetamine Lab-Related Incidents in the United States							
		Number of Children					
Year	Number of Meth Lab-Related Incidents	Present	Residing in Seized Meth Labs	Affected	Exposed to Toxic Chemicals	Taken Into Protective Custody	Injured or Killed
2002	15,353	2,077	2,023	3,167	1,373	1,026	26 injured, 2 killed
2001	13,270	2,191	976	2,191	788	778	14 injured
2000	8,971	1,803	216	1,803	345	353	12 injured, 3 killed

The HMP Sub-Committed tried to update these statistics for 2002 through 2010; however the federal government report has not been updated. Therefore these statistics were considered the best available data on this subject.

A child living at a clandestine methamphetamine laboratory is exposed to immediate dangers and to the on-going effects of chemical contamination. In addition, the child may be subjected to fires and explosions. A child living at a meth lab may inhale or swallow toxic substances or inhale the secondhand smoke of adults who are using meth, absorb methamphetamine and other toxic substances through the skin following contact with contaminated surfaces, clothing, or food, or become ill after directly ingesting chemicals or an intermediate product.

Exposure to low levels of some meth ingredients may produce headache, nausea, dizziness, and fatigue; exposure to high levels can produce shortness of breath, coughing, chest pain, dizziness, lack of coordination, eye and tissue irritation, chemical burns (to the skin, eyes, mouth, and nose), and death. Corrosive substances may cause injury through inhalation or contact with the skin. Solvents can irritate the skin, mucous membranes, and respiratory tract and affect the central nervous system. Chronic exposure to the chemicals typically used in meth manufacture may cause cancer; damage the brain, liver, kidney, spleen, and immunologic system; and result in birth defects. Normal cleaning will not remove methamphetamine and some of the chemicals used to produce it. They may remain on eating and cooking utensils, floors, counter tops, and absorbent materials. Toxic byproducts of meth manufacturing are often improperly disposed outdoors, endangering children and others who live, eat, play, or walk at or near the site.

Environmental Impact Analysis

The production of methamphetamine may create serious environmental hazards, indoors and out. Various meth recipes include combinations of volatile organic compounds (VOCs), corrosives, metals, solvents and salts. Some of these chemicals include acetone, starting fluid, freon, hexane (Coleman fuel), methanol, toluene, white gas, xylene, anhydrous ammonia, hydriodic acid (iodine), hydrochloric acid (murrain acid), phosphine, sodium hydroxide (lye), sulfuric acid (drain cleaner), iodine, lithium metal, red phosphorus, yellow phosphorus, and sodium metal.

Making meth with these chemicals can result in explosions, chemical fires, and the release of toxic gases. Meth cooking also produces solid and liquid wastes that can contaminate a building and its contents. The dumping of those wastes on the ground, down drains, or down sewers can cause contamination of soil, ground water, drinking water supplies, lakes, and rivers.

Meth cooks often pour leftover chemicals and byproduct sludge down drains in nearby plumbing, storm drains, or directly onto the ground. Chlorinated solvents and other toxic byproducts used to make meth pose long-term hazards because they can persist in soil and groundwater for years. Cleanup costs are exorbitant because solvent contaminated soil usually must be incinerated.

Chemicals Found Dumped Behind a Meth Lab

Infrastructure and Economic Impact Analysis

The Sub-Committee has researched and found that there is no direct vulnerability to state-owned facilities within Arkansas due to the impacts of meth lab events. Meth lab events usually occur in homes within residential neighborhoods, trailer parks, and rural settings. Of these settings, there are usually no state-owned facilities. The state and local governments are most vulnerable to the financial impacts of meth labs.

Cleanups of labs are extremely resource-intensive and beyond the financial capabilities of most jurisdictions. The average cost of a cleanup is about $5,000 but some cost as much as $150,000.

In northwest Arkansas, police are draining their budgets, working overtime and crossing jurisdictional boundaries to fight methamphetamine. Use of the drug has grown so much that law enforcement agents say it was their chief criminal problem in the 1990s.

In 1998, $567,000 was spent on clandestine lab cleanups associated with federal agency cases in Arkansas, $122,000 through Fayetteville's office. Five years earlier, in 1993, $71,000 was spent on lab cleanups in Arkansas – none was spent in Fayetteville.

In 1999, the Drug Enforcement Administration (DEA) exhausted $11 million budgeted to clean up 3,800 seized labs nationwide and raised its budget in 2000 to $13.5 million. They spent more than $5 million to train state and local law enforcement personnel to handle cleanup after a lab is seized.

The Arkansas State Crime Lab has spent considerable time and money training local agents to serve as first responders to the growing problem. The State Crime Lab teaches local agents how to spot labs and then provides on-going training for field agents. To process a lab, an agent must be certified with the Drug Enforcement Agency, and Occupational Safety and Health Administration, because the labs are so dangerous. The areas are typically not very clean with chemical spills and stains.

Saline County Prosecuting Attorney Robert Herzfeld wrote legislation (sponsored by state Rep. Janet Johnson of Bryant) to require meth cooks to clean up their labs. Still, the tremendous cost to the state to handle the chemicals in Saline County alone in 2002 was about $390,000. The Arkansas State Crime Lab reported 78 meth lab seizures in Saline County, with small labs costing around $5,000 and larger lab bills hitting between $10,000 and $20,000.

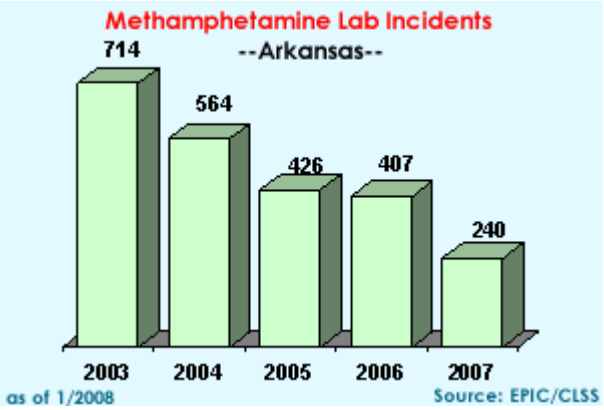
In 2000, U.S. Senator Blanche Lincoln (D-Ark.) sent a letter to Attorney General Janet Reno asking her to transfer $8 million for methamphetamine cleanup efforts in Arkansas and other states from various Department of Justice (DOJ) programs. The DEA had already exhausted its meth cleanup budget for the year, which is used to assist states in cleanup and seizure activities. Arkansas and other states ask for and rely on the DEA to provide cleanup assistance and equipment when these dangerous chemical sites are found and confiscated. According to the DEA, their budget to shut down state and local drug labs was cut by $5 million in the FY2000 Appropriations bill. In FY1999, the DEA received $10 million while in 2000 they received only $4.5 million.

State law enforcement officials announced that they may be forced to halt meth lab seizures until the DEA resumes its support. The lack of funding for cleanup impacts the ability of law officers to close down meth labs. The result of the lack of funding is fewer meth labs will be shut down and the people and environment will be left further at risk.

Another financial impact on the government is the additional training required for response to meth labs. Because of the possibility of explosions and direct contact with toxic fumes and hazardous chemicals, law enforcement officers who raid clandestine drug labs are now required to take special hazardous materials handling training. The EPA considers the chemicals from the labs hazardous materials and requires officers to be trained in the use of special suits and to wear those suits when handling the labs.

The US Drug Enforcement Agency (DEA) has reported the following statistics related to Methamphetamine labs. The numbers have come down significantly from a peak in 2003. However this remains a large hazard for the State of Arkansas

Figure 4.3.11-3: Meth Lab Incidents in Arkansas



Highway HAZMAT Vulnerability and Impact Analysis

Hazardous materials are transported throughout Arkansas every day on the state's highways and interstates. A hazardous materials event could have an impact on the people, agriculture, economy, and infrastructure based on where and when the event takes place. The HMP Sub-Committee has agreed that highway transportation of hazardous materials is a hazard and views it as a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

High quantities of hazardous materials are transported throughout Arkansas every day on the state's highways and interstates.

The highways and interstates in Arkansas overlap jurisdictions and areas where large populations of people are found.

Hazardous material events have a history of occurring frequently on the highways and interstates within Arkansas.

There are a variety of factors that can occur that would increase the difficulty of responding and recovering including notification, and evacuation of residents within an affected area.

A major hazardous material event on one of Arkansas' interstates could disrupt the flow of traffic and/or cause the closure of the corridor, thereby causing millions of dollars in lost production to businesses and the general public.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified one primary category of life vulnerable to be considered in this analysis.

Human Population – Every day commuters and transportation companies share the highways and interstates that are used to transport hazardous materials throughout Arkansas. In the event of a hazardous materials accident/spill, it is expected that one or more motorists may be involved. Interaction with the hazardous materials combined with injuries sustained in the event could cause injury and/or death.

Along with this primary vulnerability to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a highway related hazardous materials spill:

Transportation- Interstate 40 runs from Wilmington, NC to Los Angeles, CA and is a major connector between the east and west coasts. Interstate 30 runs from Little Rock to Dallas, TX. Both corridors are vital for transportation within Arkansas. Force of closure for any length of time could cause major transportation problems within the state.

Infrastructure and Economy– An event occurring on a major highway or bridge could damage the infrastructure permanently. Economic impacts could be felt from traffic delays resulting in missed deliveries and/or delayed shipments. Cleanup costs for hazardous material spills on Arkansas highways are costly to the State of Arkansas.

Human Population Impact Analysis

Accidents occurring on Arkansas highways and interstates can result in the release of toxic chemicals and fumes. Fumes or clouds of burning chemicals from an accident can travel through the air many miles and impact surrounding populations. These clouds of smoke or “plumes” are unpredictable and can change direction frequently due to the chemical involved, wind direction, wind speed, and many other atmospheric conditions.

An estimate of populations affected by highway related HAZMAT events was accomplished by using data from the 2008 Census in a GIS format and overlaying major GIS highway and interstate data within Arkansas provided by GeoSTOR. Using the highway and interstate data as a guide, a 1-mile buffer was placed around each travel section and a report was created detailing the census data found within the buffer. Based on the 2008 Census, there are 136,948 households located within 1 mile of a major highway/interstate. Of those households there are an estimated 346,472 people.

Table 4.3.11-7: Populations Located within 1 mile of a Major Highway/Interstate

Population Based on 2008 Census		
Total Population Affected	Total Population of Arkansas	Percent of Population Affected
346,472	2,867,764	12.08%

These 2008 Census statistics show the latest update published by the Census Bureau at the time of the 2010 revision.

Transportation Impact Analysis

Interstate 40 runs from Wilmington, NC to Los Angeles, CA and is a major connector between the east and west coasts. Interstate 30 runs from Little Rock to Dallas, TX. Both corridors are vital for transportation within Arkansas. Force of closure for any length of time could cause major transportation problems within the state. Accidents taking place on bridges and transportation infrastructure can cause damage to the structure and result in their closure for long periods for repair.

Economic Impact Analysis

Economic impacts from highway related hazardous material events impact the government, private business, and local populations. The state and local governments within Arkansas are vulnerable to a highway related HAZMAT event by the impacts of the costs of responding to an event and clean up.

Private businesses are vulnerable to highway related HAZMAT events in a number of ways. Highway events can cause road closures, generate traffic problems, and impact employees' abilities to commute to work. It is estimated that millions of dollars in lost wages and production take place each year due to traffic events, both HAZMAT related and not. Private business is also vulnerable to the impacts of an event by having to reroute shipments around road closures. Delayed delivery of shipments and loss of time can cost private business money. Employees are impacted due to lost wages from traffic and road closures due to highway related HAZMAT events.

Railroad Vulnerability and Impact Analysis

Hazardous materials are transported throughout Arkansas every day by rail. A hazardous materials rail event could impact the people, agriculture, economy, and infrastructure based on where and when the event takes place. The HMP Sub-Committee has agreed that rail transportation of hazardous materials is a hazard and views it as a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

High quantities of hazardous materials are transported throughout Arkansas every day on the state's rail system.

The rail lines within Arkansas intersect frequently and overlap jurisdictions and areas where large populations of people reside.

Major hazardous material events have occurred in the past on the rail system within Arkansas.

There are a variety of factors that can occur that would increase the difficulty of responding and recovering including notification, and evacuation of residents within an affected area.

A major hazardous material event on one of Arkansas' rail systems could disrupt the continued flow of goods and/or cause the closure of the corridor within the affected area, causing millions of lost production dollars to businesses and the public.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee identified two primary categories of life vulnerability to be considered in this analysis.

Human Population – Rail lines are found in both rural and urban settings within Arkansas. Trains and the rail lines flow through many parts of Arkansas with high concentrations of people. Rail accidents or the release of toxic chemicals into the environment poses health risks to the population including injury and death.

Commercial Agriculture – Many of the rail lines within Arkansas run through areas used for farming and agriculture. A rail line accident or the release of toxic chemicals into the environment could impact animals and agriculture.

Along with these two areas of primary vulnerability to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a rail related hazardous materials spill:

Transportation - A major railway event has the potential of causing extensive damage to rail lines. Railway damage and/or closure would disrupt traffic flow within the State of Arkansas and cause rail congestion throughout surrounding states. The rail system within Arkansas is a key corridor for rail transportation between the east and west coast as well as the gulf coast to the northeast.

State Infrastructure and Economy– An event occurring on a railway could cause damage to nearby state facilities. Cleanup costs for hazardous material spills on Arkansas highways are costly to the State of Arkansas. Private businesses from all areas of the country rely on the rail systems to deliver and receive goods. Union Pacific is a major rail carrier within the State of Arkansas and one of the largest in the United States. A major HAZMAT event on one of Arkansas' railways could result in the closure of the transportation corridor for a long period while response and recovery take place. Closure of the corridor would result in delayed product shipments and increased costs to reroute materials.

Human Population Impact Analysis

An estimate of populations affected by rail events was determined using data from the 2008 Census and overlaying Arkansas rail data provided by GeoSTOR. Using the GIS rail data as a guide, a 1-mile buffer was placed around each rail section and a report was created detailing the census data found within the buffer. It was determined that an estimated 108,584 households are located within a 1-mile radius of a railway. Within those households, there are an estimated 218,786 residents.

Table 4.3.11-8: Population Located Within 1 Mile of a Railway

Population Based on 2008 Census		
Total Population Affected	Total Population of Arkansas	Percent of Population Affected
218,786	2,867,764	8.60%

These 2008 Census statistics were the latest updates published by the Census Bureau at the time of the 2010 revision.

Economic Impact Analysis

Rail freight service is an indispensable transportation mode in many rural areas of Arkansas. Rail transportation is often the only economical freight mode for transporting natural resources, raw materials, and other bulk commodities. Interruption of service due to closure of a rail line from a HAZMAT spill can have a detrimental effect on a region, particularly areas with extensive agriculture and forestry operations.

The Burlington Northern Santa Fe Railway serves the coal and grain producing regions of Wyoming and the Dakotas. It also has ties to numerous mid-western states and the Gulf Coast region.

The Kansas City Southern Railway serves the six states of Missouri, Kansas, Oklahoma, Arkansas, Louisiana, and Texas. Their rail lines run primarily north/south, serving the grain-producing regions of Kansas and Oklahoma, and the petrochemical plants of eastern Texas and southern Louisiana. The largest Class I railroad in Arkansas, in terms of miles of track, is the Union Pacific Railroad.

Loss of service due to the closure of a railway corridor could greatly impact businesses that rely on the freight brought by railway every day. Production in manufacturing plants could drop, resulting in lower product output. Lost production hours would be financially damaging.

The costs of cleanup for railway HAZMAT events can cost the government and responsible businesses million of dollars.

Pipeline Vulnerability and Impact Analysis

Hazardous materials are transported every day through the thousands of miles of pipeline that run across Arkansas. A hazardous materials pipeline event could impact the people, agriculture, economy, and infrastructure depending on where and when the event takes place. The HMP Sub-Committee has determined that pipeline transportation of hazardous materials

is a hazard and views it as a high priority for planning, response and mitigation purposes, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

High quantities of hazardous materials are transported daily throughout Arkansas through pipelines.

The pipelines within Arkansas intersect frequently and overlap jurisdictions and areas where large populations of people reside.

Major pipeline-related hazardous material events have occurred in the past within Arkansas.

A variety of factors can increase the difficulty of responding to and recovering from a hazardous material event including the notification and evacuation of residents within the affected and surrounding areas.

A major pipeline hazardous material event in Arkansas could disrupt the flow of goods and/or cause the closure of the pipeline corridor within the affected area, causing millions of dollars in lost production to businesses.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified two primary categories of life vulnerability to be considered in this analysis.

Human Population – Pipelines can be found in many parts of Arkansas with high concentrations of people. Pipeline explosions or the release of toxic chemicals into the environment poses health risks to the population that could result in injury or death.

Commercial Agriculture – Many of the pipelines within Arkansas are located in rural areas used for farming and agriculture. A pipeline explosion or the release of toxic chemicals into the environment poses risks that could damage animals and crops.

Along with these two primary vulnerabilities to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a pipeline event:

Infrastructure and Economy– Many pipelines in Arkansas are used to distribute chemicals to manufacturers across the country. The manufacturers rely on a constant supply of material for use in their production. An event that disrupted pipeline flow could cause the loss of millions of dollars in production. Many of the pipelines within Arkansas also provide petroleum to motorists in the northeast United States. A disruption of the petroleum supply could cause gas prices to spike as seen during the hurricane season of 2005.

Human Population Impact Analysis

An estimate of populations affected by pipeline events was accomplished by using data from the 2008 Census and overlaying pipeline data within Arkansas provided by GeoSTOR. Using the GIS pipeline data as a guide, a 1-mile buffer was placed around each pipeline section and a report was created detailing the census data found within the buffer. It was found that there are an estimated 90,868 households located within 1 mile of a major pipeline known to transport hazardous materials. Within those households, there are an estimated 212,468 residents.

Table 4.3.11-9: Population Located Within 1 Mile of a Major Pipeline

Population Based on 2008 Census		
Total Population Affected	Total Population of Arkansas	Percent of Population Affected
212,468	2,867,764	7.40%

The Sub-Committee recognizes the fact that during a single pipeline event, the entire population of the State of Arkansas that resides within 1 mile of a pipeline would not be affected at the same time. However, it is determined that these identified populations all share the same vulnerability and impacts as the result of a pipeline event.

These 2008 Census statistics were the latest update published by the Census Bureau at the time of the 2010 revision.

Economic Impact Analysis

Financial losses are incurred by private industry when a pipeline event occurs. They can suffer financial penalties from the government due to inappropriate operation or maintenance, legal lawsuits from injured persons, and expensive charges for hazardous material cleanup. Table 4.3.11-10 is a table showing the number of damages suffered because of pipeline events in Arkansas from 1999-2008. Each year, pipelines cause an estimated $300,000-400,000 in property damage.

For the 2010 plan revision, the HMP Sub-Committee located these pipeline statistics for 1999-2008 with the chart on the following page from the PHMSA Pipeline Safety Program website

http://primis.phmsa.dot.gov/comm/reports/safety/AR_detail1.html#_OuterPanel_tab_2

Note: Significant incidents include all serious incidents.

Table 4.3.11-10: Arkansas All Pipeline Systems: 1999-2008						
Year	Number (B)	Fatalities	Injuries	Property Damage (D) (E)	Gross Barrels Lost	Net Barrels Lost (F)
1999	2	0	0	$153,461	785	465
2000	4	1	1	$48,598	210	22
2001	5	0	3	$522,476	0	0
2002	7	1	2	$495,678	101	28
2003	2	0	1	$381,577	0	0
2004	3	0	0	$346,492	695	248
2005	3	0	0	$637,162	0	0
2006	1	0	0	$106,956	0	0
2007	3	0	0	$1,162,036	5,814	5,800
2008	3	0	1	$727,615	0	0
Totals	33	2	8	$4,582,056	7,605	6,563
3 Year Average (2006-2008)	2	0	0	$665,536	1,938	1,933
5 Year Average (2004-2008)	3	0	0	$596,053	1,302	1,210
10 Year Average (1999-2008)	3	0	1	$458,206	761	656
20 Year Average (1989-2008)	3	0	1	$458,206	761	656

Development in Hazard Prone Areas:

Structures located near highways and other high traffic roadways are most at risk to a hazardous materials event. Any development that takes place in these areas will place more people and structures in the risk area for hazardous materials events, however since most hazardous material spills are localized to an extremely small area this will not have an effect on the overall risk assessment for this hazard.

4.3.12 Assessing Nuclear Events Vulnerability by Jurisdiction

The State of Arkansas is exposed and at risk to several nuclear hazards that could have an extreme impact on the people, animals and infrastructure. The HMP Sub-Committee has agreed that nuclear hazards are a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

The Committee recognized that there are locations within Arkansas that contain or have contained high quantities of nuclear and radioactive materials.

Historically, nuclear events have caused damage to property and have caused injury to and/or death of persons around the world.

A variety of factors can increase the difficulty of responding to and recovering from a nuclear event.

Two primary nuclear sites within Arkansas have been identified, profiled, and analyzed in detail by the HMP Sub-Committee:

Arkansas Nuclear One (ANO)

Southwest Experimental Fast Oxide Reactor (SEFOR)

Arkansas Nuclear One - Vulnerability and Impact Analysis

The regional area extending out 50 miles around Arkansas Nuclear One (ANO) is exposed and at risk to a nuclear event. An event at ANO would have an extreme impact on the people, agriculture, economy, and infrastructure. The HMP Sub-Committee has agreed that ANO is a nuclear hazard and views it as a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

Past nuclear reactor events have occurred in the world causing widespread damage, illness, and loss of life.

The Committee recognized that an event at ANO could begin at any time with little or no warning.

There is a large concentration of people in and around the 50-mile area of ANO, including but not limited to London, AR, Russellville, AR, Interstate 40 and Arkansas Tech University.

A variety of factors can increase the difficulty of responding to and recovering from a nuclear event including notification, evacuation, and long-term contamination of the surrounding population.

An event at ANO could impact the power supply and economy for all residents in Arkansas and surrounding states.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified two primary categories of life vulnerability to be considered in this analysis.

Human Population – Even low amounts of radiation exposure to humans can cause nausea, vomiting, and diarrhea. Higher amounts of radiation exposure can cause changes to a person's internal organs as well as death. Long-term effects to individuals contaminated by radiation may not be visible for years. The results of radiation exposure have also been known to lead to cancer.

Commercial Agriculture – Livestock and agriculture can suffer the same effects as listed above for humans. In addition, livestock and agriculture also depend on the natural water supply provided by the lakes, streams and rivers as well as natural vegetation that grows in the soil. Radiation contamination in the area would eliminate these vital sources.

Along with these two primary vulnerabilities to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a nuclear event at ANO:

Transportation- Interstate 40 is located less than a mile from the reactor at ANO. Interstate 40 runs from Wilmington, NC to Los Angeles, CA and is a major transportation corridor between the east and west coast.

Infrastructure and Economy– People leaving the area from fear of the event would destroy the local economy. Housing values would plummet and the local tax base would suffer. Businesses would be forced to close and/or relocate. The cleanup and recovery costs of an event at ANO would be in the billions.

Human Population Impact Analysis

An event at ANO would be catastrophic to the State of Arkansas as well as for the counties, cities, and populations surrounding the plant. Areas around the plant could be affected for years afterward depending on the magnitude of the event and extent of radiation contamination. A nuclear event would prompt many residents to relocate away from the area, devaluing housing prices and disrupting daily life. County budgets and finances would suffer from the loss of tax revenue and stability. Because ANO supplies over 25% of the power to Arkansas, residents of Arkansas could see an immediate dramatic rise in the cost of electricity if the plant were to stop operating abruptly because of a shutdown. Pope County is the most vulnerable to loss of life based on ANO's geographic location.

The counties of Johnson, Logan, and Yell are also vulnerable due to their close proximity to the plant. In 2004, the town of London, AR, located the closest to ANO, had a population of 925 residents. The 2005 Census estimate for London had the population increasing by 30 people to 955 residents.

	2005	2000	1990
Population	955	925	825

Source: U.S. Census Bureau, 2005 Population Estimates, Census 2000, 1990 Census

In 2004, the town of Russellville, AR had a population of almost 20,000 that could be affected by an event at ANO. The population trend for Russellville has been upward, with a 2005 estimate of 25,520 living in the area potentially affected by ANO.

	2005	2000	1990
Population	25,520	23,682	21,260

Source: U.S. Census Bureau, 2005 Population Estimates, Census 2000, 1990 Census

All jurisdictions within 50 miles of ANO would be vulnerable to an event. The greatest potential for human injury involving radiological contamination would be to those working on-site at ANO. However, occurrences such as traffic accidents within the plume exposure pathway could result in members of the public becoming injured and contaminated.

Table 4.3.12-1: County Populations Found within the 10-Mile EPZ Zone

		Population Estimates					Estimates Base	Census 2000
Rank	Geographic area	July 1, 2004	July 1, 2003	July 1, 2002	July 1, 2001	July 1, 2000	April 1, 2000	April 1, 2000
	Arkansas	2,752,629	2,727,774	2,707,509	2,692,134	2,678,501	2,673,398	2,673,400
	COUNTY							
13	Pope County	55,933	55,285	55,224	54,864	54,489	54,469	54,469
30	Johnson County	23,713	23,462	23,211	22,913	22,785	22,781	22,781
34	Logan County	22,899	22,820	22,542	22,459	22,512	22,486	22,486
35	Yell County	21,318	21,469	21,364	21,261	21,179	21,139	21,139

For the 2010 revision, the 2008 census estimates have been included. All four at-risk counties have increased their population since 2004 based on these estimates, with the exception of Logan County which saw a slight decrease since 2004.

Table 4.3.12-2: Population Estimate (Census 2008)

COUNTY	2008 Population Estimate
Pope County	59,952
Johnson County	24,851
Logan County	22,567
Yell County	21,976
Total Population	129,346

An estimate of populations affected by an ANO event was accomplished by using data from the 2004 Census in a GIS format overlaid on the location of ANO. Using the center of the ANO facility, a 10, 25 and 50-mile buffer was placed around the ANO site and a report for each buffer was created detailing the census data within that area. Based on the 2004 census, there are 46,842 residents who live within 10 miles of ANO, 100,384 residents who live within 25 miles, and 265,719 within 50 miles.

Table 4.3.12-3: Population Located within 10 Miles of ANO

Population Based on 2008 Census		
Total Population Affected	**Total Population of Arkansas**	**Percent of Population Affected**
47,103	2,867,764	1.60%

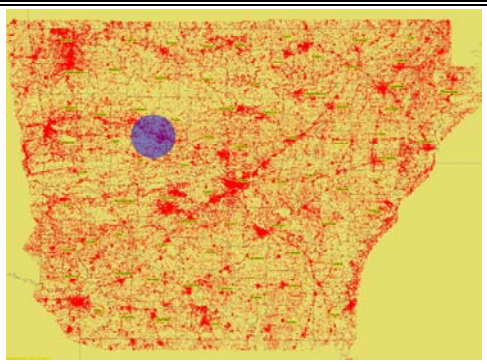
Table 4.3.12-4: Population Located within 25 Miles of ANO

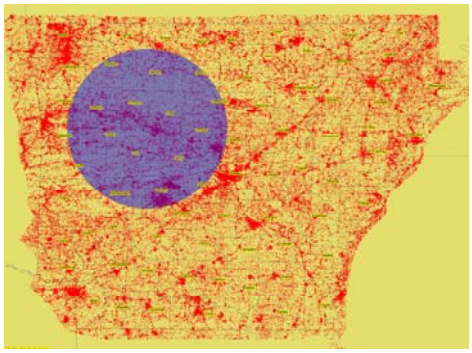
Population Based on 2008 Census		
Total Population Affected	**Total Population of Arkansas**	**Percent of Population Affected**
102,758	2,867,764	3.58%

Table 4.3.12-5: Population Located within 50 Miles of ANO

Population Based on 2008 Census		
Total Population Affected	**Total Population of Arkansas**	**Percent of Population Affected**
269,612	2,867,764	9.40%

Figure 4.3.12-1: 10 and 50-Mile Buffer Zone around ANO with Population





The amount of radioactivity released by a nuclear power plant is monitored continuously to be sure it does not go above allowed levels. The same sophisticated monitoring equipment provides exact information about any accidental release. The risk to the public from radioactivity released from nuclear power plants is much smaller than the risk we receive naturally every day. Nuclear plants add less than one percent of your total background radiation exposure.

The severity and magnitude of an event at ANO would be catastrophic in terms of lives and property. The toll on human lives from a major event at ANO could be expected to be in the thousands. From past nuclear event experiences, the results of the event would injure and kill not only residents but also first responders. Many first responders could become contaminated during response and not be aware of their contamination for hours or days. The first stages of radiation sickness to people would be characterized by nausea, vomiting, and diarrhea. Following this initial period of sickness, symptoms may subside and the individual may begin to feel well. This stage can last from hours to weeks, and while no symptoms are present, changes are occurring in the internal organs that can lead to death. Long-term effects to individuals contaminated by the radiation may not be visible for years. In many cases, it would be expected that the population affected by an ANO event would eventually show a higher rate of cancer.

The effects on the environment would also be catastrophic. Radioactive materials would contaminate the water and soils in the region. Agricultural areas would be forced to destroy livestock and crops. The agriculture industry, the area's main source of income, would likely not be able to return to the area for decades.

The only way to eliminate the nuclear hazard of ANO completely would be by decommissioning the operation of the reactor permanently. Even with the strictest guidelines for safety and operation in place, there will always remain a possibility of a nuclear event while the facility is in operation. The same holds true for reducing the size of the hazard. The only way to reduce the size of the event would be to close the facility.

An event at ANO or any other nuclear reactor would cause widespread concern about the safety of the facility. The public would certainly lose confidence in the ability of the facility to guarantee safety for residents in the region. It would be expected that a large portion of the community would demand the closure of the facility.

Commercial Agriculture Impact Analysis

The commercial agriculture industry around ANO would be impacted by an ANO event.

If an event occurred, all animals and vegetation would have to be tested and/or quarantined. The cleanup and recovery phase following a nuclear event would be costly to both the government and private sectors. Some steps that would be required for areas of agriculture include:

Placing milk animals within 10 miles of ANO on stored feed, and assess the need to extend that distance.

Soil samples collected, where appropriate, in areas where deposition of radionuclides may have occurred, for determination of milk-chain and other ingestion pathway protective action requirements, and for ground shine exposure levels.

Vegetation samples collected, where appropriate, in the areas where deposition of radionuclides may have occurred for determination of milk-chain and other ingestion pathway protective action requirements, and for ground shine exposure levels.

Environmental sampling expected to continue for a considerable time into the post-accident period. As a result, environmental data will provide both information for decisions regarding protective actions, and a basis for total-impact assessment.

Affected pasturelands by the plume require removal of lactating dairy herds from contaminated pasturage, and placement on uncontaminated stored feed.

The USDA will provide the ADH with information concerning the location of growing crops, grains, forage, etc., so that samples may be taken to determine if there is a hazard to humans or animals. If the ADH declares a particular area quarantined for cattle grazing, the USDA will provide farmers with information concerning the availability of uncontaminated feed.

Samples will be taken from dairy and milk producers in the affected area to determine if contamination is present. Contaminated milk will be withheld from the market to allow for the decay of short-lived radionuclides. This may be achieved by: Freezing and storage of milk, concentrated milk, or milk products; Storage for prolonged periods at reduced temperatures provided ultra-high temperature pasteurization has been applied during processing.

Contaminated fruits and vegetables will have to be washed, brushed, scrubbed, or peeled to remove surface contamination.

Grains will be milled and polished.

If sample analyses indicate contamination of meat or fish, the following protective action will be recommended: Withholding products from the market to allow for decay of short-lived radionuclides. This may be achieved by storage of frozen products, or by other types of processing such as smoking and curing.

Transportation Impact Analysis

Interstate 40 is a major transportation channel between the east and west coast of the United States and is located less than a mile from ANO. A nuclear event would cause the closure of Interstate 40 and rerouting of thousands of vehicles. Private companies would be vulnerable to costs from delays and rerouting of shipments.

Economic Impact Analysis

An event at ANO will have a tremendous economic impact on the State of Arkansas. The following items discuss some of the most likely financial impacts.

Health Impacts – A radioactive event would have potential health impacts for the responders and the people in the surrounding areas. There would be significant costs associated with screening, testing and primary medical care for these citizens.

Response and Administrative Costs – Any event would trigger a large-scale response along with the supporting administrative efforts to manage the recovery. This would involve a large group within the state including the governor, ADEM, the Department of Health and Human Services, and the local governmental partners. These costs could have a significant impact on the state's fiscal budget.

Cleanup and Recovery Costs – There would be a significant financial obligation necessary to return the area to "normal" and certify that the area is safe. Testing and monitoring for radioactivity and any associated cleanup costs would add to the financial burdens of this event.

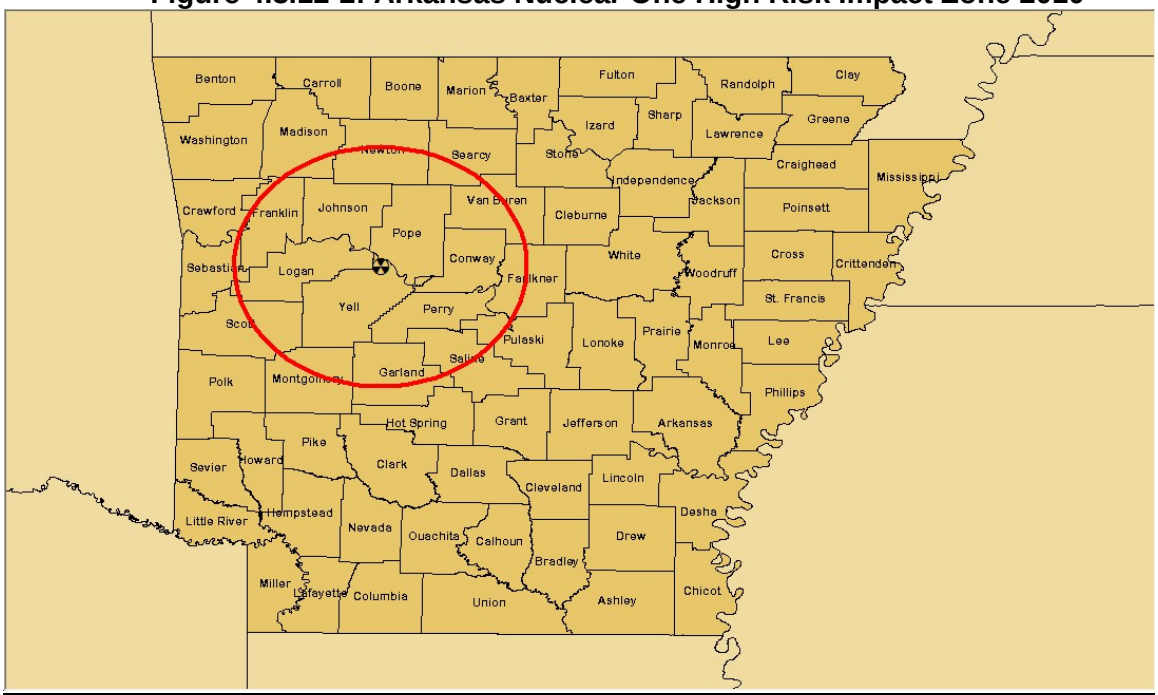
Electricity Costs – ANO provides a large portion of the electricity for the State of Arkansas. In the event of a large-scale release, the plant would most likely be closed down pending cleanup and safety reviews. This would decrease the supply of electricity and most likely drive up the prices for commercial power.

Local Economy – The area surrounding the ANO facility would be negatively impacted as people leave the area due to safety concerns. This short-term impact would affect the local businesses and slow the economy of the area significantly. In addition, long-term concerns about health and safety issues would have an adverse economic effect on the area for years to come.

GIS Baseline Analysis for ANO

Incidents at the Arkansas Nuclear One facility would not damage the actual building and infrastructure however there would be an associated impact to the surrounding area. As part of the previous plan update process, the HMP Sub-Committee has identified an area 50 miles around the nuclear plan as a high risk impact zone. As part of the 2010 update process, the Sub-Committee updated ANO information where possible and relevant..

Figure 4.3.12-2: Arkansas Nuclear One High Risk Impact Zone 2010



Source: GeoStor

Using the baseline dataset the following summarizes the details of the overall region's vulnerability to an incident at Arkansas Nuclear One.

Table 4.3.12-6: Regional Vulnerability to an Incident at Arkansas Nucleara One

Vulnerability	Number of Records
Arkansas Counties	19
Fire Stations	194
Law Enforcement	52
Armories	14
Church Camps	2
Safe Rooms	4
Fairgrounds / Speedways	20
Military Installations	1
Public Schools	120
Private Schools	18

Universities and Colleges	5
Hospitals	10
EMS / Ambulance	17
Veteran's Affairs Medical Facilities	0
Local Health Dept Units	12
Long Term Healthcare	53
Hospices and related medical facilities	34
Rural Health Clinics	10
Bridges	877
Airports	9
AWIN Towers	14
Environmental Facilities	472
Intermodel Terminals	6
Electricity Providers	4
Power Plants	5
Power Substations	51
Radio / TV Stations	48
Post Offices	81
Prisons	2
Dams	226

Southwest Experimental Fast Oxide Reactor Vulnerability and Impact Analysis

The regional area extending out from the Southwest Experimental Fast Oxide Reactor (SEFOR) is exposed and at risk to a radioactive event. An event at SEFOR would have an extreme impact on the surrounding residents and environment. The HMP Sub-Committee has agreed that SEFOR is a nuclear/radioactive hazard and views it as a priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

The SEFOR site contains radioactive material residue left from periods of operation during the 1970s.

The containment unit that houses the radioactive residue also contains sodium which when mixed with water becomes highly explosive.

The containment unit is deteriorating and could eventually allow water to enter.

The Committee recognized that an explosion event at the SEFOR facility could occur at any time without warning.

A variety of factors can ease the difficulty of responding to and recovering from an event at SEFOR including notification, evacuation, and long-term contamination of residents.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed on the previous page, the HMP Sub-Committee has identified two primary categories of life vulnerability to be considered in the SEFOR analysis.

Human Population – Even low amounts of radiation exposure to humans can cause nausea, vomiting, and diarrhea. Higher amounts of radiation exposure can cause changes to a person's internal organs as well as death. Long-term effects to individuals contaminated by radiation may not be visible for years. The results of radiation exposure have also been known to lead to cancer.

Commercial Agriculture – Livestock and agriculture can suffer the same effects as listed above for humans. In addition, livestock and agriculture also depend on the natural water supply provided by the lakes, streams and rivers as well as natural vegetation that grows in the soil. Radiation contamination in the area would eliminate these vital sources.

Along with these two primary vulnerabilities to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a nuclear event at ANO.

Transportation- Interstate 540 is located less than 10 miles from the SEFOR site. Interstate 540 is a major transportation corridor used by residents and private industry. Large transportation companies including JB Hunt and Wal-Mart, located only 25 miles northeast of SEFOR, rely heavily on highway transportation on I-540.

Economic Impact- The recovery from a radiological event would take significant amounts of time, resources and funding. A significant economic impact during recovery would be felt by local jurisdictions, the University of Arkansas and many state agencies.

Human Population Impact Analysis

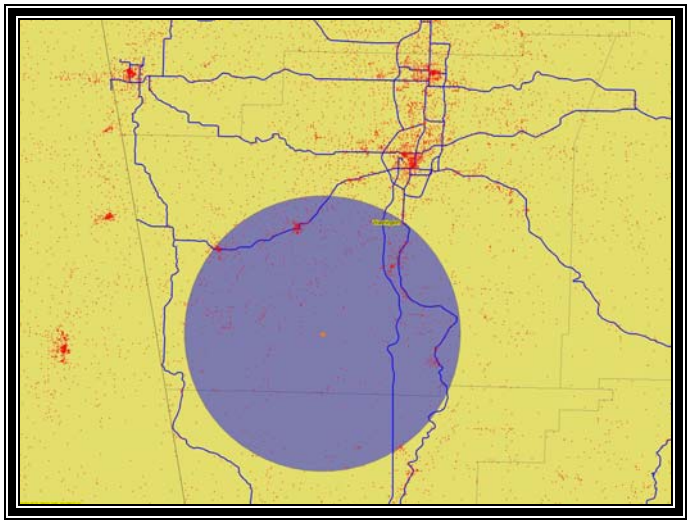
An event at the SEFOR site would be damaging to the State of Arkansas as well as the cities and residents within the area. Areas around the SEFOR site could be affected for years afterward depending on the magnitude of the event and extent of radiation dispersion and contamination.

An estimate of populations affected by a SEFOR event was accomplished by using data from the 2008 Census in a GIS format overlaid on the location of the SEFOR site. Using the center of the SEFOR facility, a 10-mile buffer was placed around the site and a report was created detailing the census data within that area. Based on the 2008 census, 12,312 residents live within 10 miles of the SEFOR facility.

Table 4.3.12-7: Population Located Within 10 Miles of SEFOR

Population Based on 2008 Census		
Total Population Affected	**Total Population of Arkansas**	**Percent of Population Affected**
12,312	2,867,764	.42%

Figure 4.3.12-3: 10 Mile Buffer Zone around SEFOR with Population



The severity and magnitude of an event at the SEFOR site would be tragic in terms of lives and property. The immediate toll on humans due to exposure to radioactive materials might be low, but the long-term effects to residents might not be known for years depending on the amount and direction of radioactive materials dispersed. From past radioactive event experiences, the results of the event would injure and kill not only residents but also first responders. Many first responders could become contaminated during response and not be aware of their contamination for hours or days. The first stages of radiation sickness to people would be characterized by nausea, vomiting, and diarrhea. Following this initial period of sickness, symptoms may subside and the individual may begin to feel well. This stage can last from hours to weeks, and while no symptoms are present, changes are occurring in the internal organs, which can lead to death. Long-term effects to individuals contaminated by the radiation also may not be visible for years. In many cases, it would be expected that the population affected by a SEFOR event would eventually show a higher rate of cancer.

The effects on the environment would also be damaging. Radioactive materials would contaminate the water and soil in the region. Agricultural areas could be forced to destroy livestock and crops. The agriculture industry, the area's main source of income, would likely be affected for years.

The only way to eliminate the hazard posed by SEFOR would be to decommission the site.

Commercial Agriculture Impact Analysis

The commercial agriculture industry around SEFOR would be impacted drastically by an event. If an explosion occurred, all animals and vegetation would have to be tested, quarantined, and/or destroyed. The cleanup and recovery phase following a SEFOR event would be costly to both the government and private sectors. Steps for cleanup and recovery from a SEFOR event would closely resemble those detailed on the previous page for a nuclear event at ANO.

Transportation Impact Analysis

Interstate 540 is a major transportation channel that runs north and south from western Arkansas to Kansas City, Missouri. Interstate 540 also intersects with Bentonville, Arkansas, which is headquarters for two of the largest highway transportation companies in the United States, Wal-Mart and JB Hunt. An event could cause the closure of Interstate 540 and re-routing of thousands of vehicles. Many private companies would be vulnerable to costs from delays and re-routing of shipments.

Economic Impact Analysis

An event at SEFOR will have a substantial economic impact on the State of Arkansas. The following items discuss some of the most likely financial impacts.

Health Impacts – A radioactive event would have potential health impacts for the responders and the people in the surrounding areas. There would be significant costs associated with screening, testing and with primary medical care for these citizens.

Response and Administrative Costs – Any event would trigger a large-scale response along with the supporting administrative efforts to manage the recovery. This would involve a large group within the state including the governor, ADEM, the Department of Health and Human Services, and the local governmental partners. These costs could have a significant impact on the state's fiscal budget.

Cleanup and Recovery Costs – There would be a significant financial obligation necessary to return the area to "normal" and certify that the area is safe. Testing and monitoring for radioactivity and any associated cleanup costs would add to the financial burdens of this event.

4.3.13 Assessing Terrorism Events Vulnerability by Jurisdiction

The State of Arkansas is exposed and at risk to terrorist events that could have a serious impact on the people, animals and infrastructure. The HMP Sub-Committee has agreed that hazards related to terrorist events are a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

Terrorist events are designed to cause maximum damage and loss of life and occur without warning.

Terrorist events affect the economy and cost the government millions of dollars every year in preparation and response.

In recent years, terrorist attacks, both international and domestic, have occurred in the United States.

First responders have been injured and killed while responding to a terrorist attack.

A variety of factors can increase the difficulty of responding to and recovering from a terrorist event, and impact the notification and evacuation of vulnerable populations within the affected and surrounding areas.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified two primary categories of life vulnerability to be considered in this analysis.

Human Population – Terrorist events can occur at any time, anywhere, within the State of Arkansas. It is understood that it is unlikely that any single terrorist event would affect the entire state's human population at one time. Terrorist events usually occur in high profile locations or populous areas, although a terrorist event could take place at any time or location within the State of Arkansas. Because of this, an event could cause Arkansas populations significant illness, death, damage, and long term mental duress.

Commercial Agriculture – Livestock and agriculture could be at risk from a terrorist attack depending on the mode of the terrorist event. A planned biological event introduced by terrorism could have devastating results on the agricultural industry in Arkansas.

Along with these two primary vulnerabilities to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a terrorist event:

Property and Economy– Densely populated areas and high profile locations and areas throughout the state would have a high vulnerability. Specific locations such as high-density human events like sporting events or high profile locations like the world headquarters of Wal-Mart could be targeted and result in a very high impact. Likewise, certain sectors of the economy may be adversely impacted during significant terrorist events.

State Infrastructure and Facilities – Terrorist events could be focused on affecting the operation of the local government. Whether international or domestic, terrorist groups often target government facilities to disrupt operations.

Human Population Impact Analysis

Terrorist events are largely targeted at populated areas and events. Within Arkansas, there are many daily public events and gatherings where thousands of people congregate. During a college football season at the University of Arkansas in Fayetteville, it is common to have 70,000+ fans in the stadium on any given Saturday. During Wal-Mart's annual stockowners meeting each year, high profile executives, celebrities, and thousands of stockowners meet in Bud Walton Arena. Alltel Arena in Little Rock hosts concerts and events weekly to a capacity crowd of 18,000. Any of these locations could be a target for a terrorist event and if it were to take place, it would result in a catastrophic loss of life.

Table 4.3.13-1: Large Capacity Facilities

Facility	Capacity
Alltel Arena	18,000
Ray Winder Field	6,700
Razorback Stadium	71,000
Bud Walton Arena	19,200
Arkansas State Stadium	30,700
War Memorial Stadium	55,000
LRAFB – Air Show	200,000
Arkansas State Fair	15,000
Hot Springs Convention Center	6,000

Mental Effects on Humans

Terrorism erodes—at both the individual level and the community level—the sense of security and safety people usually feel. Terrorism challenges the natural need of humans to see the world as predictable, orderly, and controllable. Research has shown that deliberate violence creates longer lasting mental-health effects than natural disasters or accidents. The consequences for both individuals and the community are prolonged, and survivors often feel that injustice has been done to them. This can lead to anger, frustration, helplessness, fear, and a desire for revenge. Studies have shown that acting on this anger and desire for revenge can increase rather than decrease feelings of anger, guilt, and distress.

However, the mechanisms for natural recovery from traumatic events are strong. Many trauma experts agree that the psychological outcome of communities as a whole will be resilience, not psychopathology. For most, fear, anxiety, re-experiencing, urges to avoid, and hyper-arousal symptoms, if present, will gradually decrease over time.

Research has shown that those who are most at risk for more severe traumatic stress reactions, such as Posttraumatic Stress Disorder (PTSD), are those who have experienced the greatest magnitude of exposure to the traumatic event, such as victims and their families. However, sometimes rescue workers also have direct relationships with or indirect exposure to those who are missing or killed. Therefore, these rescue workers need to cope with their own losses as well as with the demands of the rescue mission. In the case of September 11th, for example, a particularly difficult task for these rescue workers was the identification and removal of the casualties. These activities have been shown to be particularly traumatic and associated with higher rates of PTSD.

Below is a list of recent terrorist attacks and the resulting mental effects. Information has been provided by the National Center for Posttraumatic Stress Disorder (PTSD).

September 11th Attacks

Research on national samples in the US revealed that 3-5 days after the attack 44% of Americans reported at least one symptom of PTSD. One to two months post-attack, 4% showed probable PTSD nationwide, and prevalence of PTSD in NYC residents was 11%. One study found that in American adults, the amount of time watching TV coverage was related to PTSD symptoms.

Prevalence of PTSD decreased during the 6 months following the disaster, however, alcohol and substance use remained high. Depression was related to alcohol use increase, and along with PTSD was related to increased cigarette and marijuana use. Manhattan residents overall showed significant increases in the use of all three substances.

Oklahoma City Bombing

Almost half of the survivors directly exposed to the blast reported developing problems with anxiety, depression, and alcohol, and over one third of these survivors reported PTSD. Predictors of PTSD, anxiety, and depression included more severe exposure, female gender, and having a psychiatric disorder before the bombing. Over a year after the bombing, Oklahomans reported increased rates of alcohol use, smoking, stress, and PTSD symptoms as compared to citizens of another metropolitan city.

Two years after the bombing, 16% of children and adolescents who lived approximately 100 miles from Oklahoma City reported significant PTSD symptoms related to the event.

Commercial Agriculture Impact Analysis

A terrorist event using biological agents could be an extreme danger for the agricultural industry and economy in Arkansas. Depending on the type of biological weapon, the agriculture industry could be more affected than the human population. An example of biological events that could be introduced could be the Avian Flu, Mad Cow Disease, or Foot and Mouth Disease. The introduction of any of these into the agricultural industry from a terrorist event would force the closure of production plants, the destruction of animals and result in the loss of millions and possibly billions of dollars to agricultural companies and the small farmer.

The poultry industry in Arkansas is approximately $3.32 billion dollars annually and approximately 50% of the state's agricultural Gross National Product (GNP) is this bird-related industry.

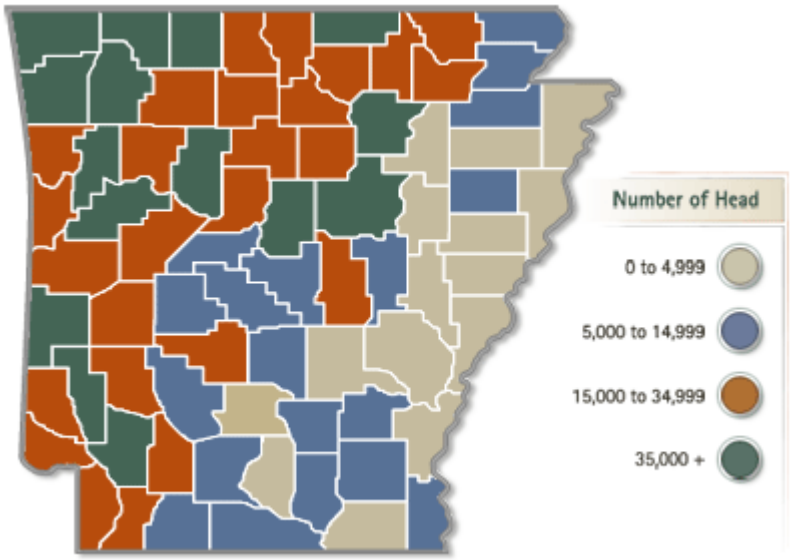
According to a 2009 report by the University of Arkansas, Division of Argriculture, agriculture in general accounted for 268,617 jobs, nearly one in every five jobs in Arkansas. Direct employment in agriculture production and processing is 173,856, 11.6 percent of all jobs in Arkansas.

The annual sales total of beef cattle and calves in Arkansas was $414,937,000 in 2002.

There are an estimated 1.8 million head of cattle in Arkansas, according to the 2007 Census of Agriculture. The next Census of Agriculture year is 2012.

Arkansas averages $2 billion a year in the cattle industry.

Figure 4.3.13-1: Distribution of Cattle in Arkansas



Source: Arkansas Farm Bureau

State Infrastructure and Facilities Impact Analysis

There is no way to predict when a terrorist attack might occur. If an attack were to take place on the government sector or its facilities within Arkansas, the results would be disastrous. Continuity of government would be threatened within the state.

4.3.14 Assessing Biological Events Vulnerability by Jurisdiction

The State of Arkansas is exposed and at risk to a variety of biological hazards that could have an extreme impact on the people, animals and infrastructure. The HMP Sub-Committee has agreed that biological hazards are a high priority for planning, response and mitigation, and has conducted the following vulnerability and impact analysis on the state's jurisdictions and vulnerable populations and resources. The Sub-Committee has made the following considerations in preparing this analysis:

The top potential diseases have been identified and previously profiled in detail.

The Sub-Committee recognized that other bio-agents besides these could be introduced into the State of Arkansas with similar devastating consequences.

Diseases and viruses continually mutate and evolve so that a specific disease could change slightly and then have a tremendous impact with completely unforeseen consequences on the state.

There are a variety of factors that can happen that would increase the difficulty of responding and recovering.

Due to the nature and mode of disease transmission, the *entire* State of Arkansas is vulnerable to epidemics and outbreaks. Some locations may be more vulnerable or more susceptible but all areas are at risk.

The State of Arkansas is equally vulnerable to naturally occurring events such as the 2009 H1N1 Pandemic Flu and human-caused events such as a terrorist anthrax attack. Both types of events would require almost identical response and recovery actions with the only major difference being a law-enforcement component in a human-caused terrorism event.

Primary Categories of Vulnerability

Based on the assumptions and the elements detailed above, the HMP Sub-Committee has identified three primary categories of life vulnerability to be considered in this analysis.

Human Population – Four of the top seven potential bio-hazards are diseases that affect humans with severe illness and possible death. Also, the Avian Flu, though primarily a danger to bird flocks, is mutating and has affected humans as well. Other bio-agents, besides the seven profiled within the plan, are also possible and would cause significant illness, death and damage to the overall human population of the State of Arkansas.

Commercial Poultry and Wild Bird Populations – The Avian Flu is one of the top concerns of the federal government at this time, and the acting director of ADEM has announced that this is a top priority of the state. The vulnerability of the state's bird populations and the resulting impact to the economy is considered in this analysis.

Livestock Herd Populations – The State of Arkansas has a very large number of livestock herds throughout the state including beef cattle, dairy cattle and pigs. These populations are at risk to Foot and Mouth Disease and Mad Cow Disease as well as a number of lower priority viruses, bacteria, and bio-agents.

Along with these three primary vulnerabilities to living populations, the HMP Sub-Committee has also identified categories of infrastructure that could be significantly impacted by a biological pandemic:

Hospitals and Related Medical Personnel and Infrastructure – In the event of an outbreak, the medical resources of the state would be immediately mobilized to respond to the situation. This would include on-site response personnel, doctors, nurses, epidemiologists, surveillance experts and others. The medical community along with the physical hospitals, labs, and related facilities would be vulnerable during an outbreak.

Veterinary Resources – During an animal disease outbreak such as Avian Flu or Foot Mouth disease, the state's veterinary infrastructure would take a lead role in responding and recovering from the event. These resources, both human and material, would be at risk and vulnerable.

Infrastructure and Economy– For both human and animal related bio-hazards, specific locations and sectors throughout the state would have a high vulnerability. The overall impact of the event may be determined by responses at specific locations such as high-density human events like football games or high-density animal locations such as cattle auctions. Likewise, certain sectors of the economy may become adversely impacted during significant outbreak events.

Human Population Vulnerability

The entire human population of Arkansas is potentially vulnerable to disease outbreaks and major pandemics. Whether the disease is brought about by terrorists using weaponized anthrax or Smallpox or by natural occurrences such as influenza or West Nile Virus, the human population is equally susceptible to illness, death, and economic impacts.

The following Chart details the overall human population for Arkansas and is followed by each of the 75 counties. The data from the US Census ranks the counties by total population and shows the growth trends for a four year period.

The following chart shows the population estimates for 2005 and 2006 that have been included as part of the previous plan revision, and the 2007 and 2008 estimates as part of the 2010 plan revision.

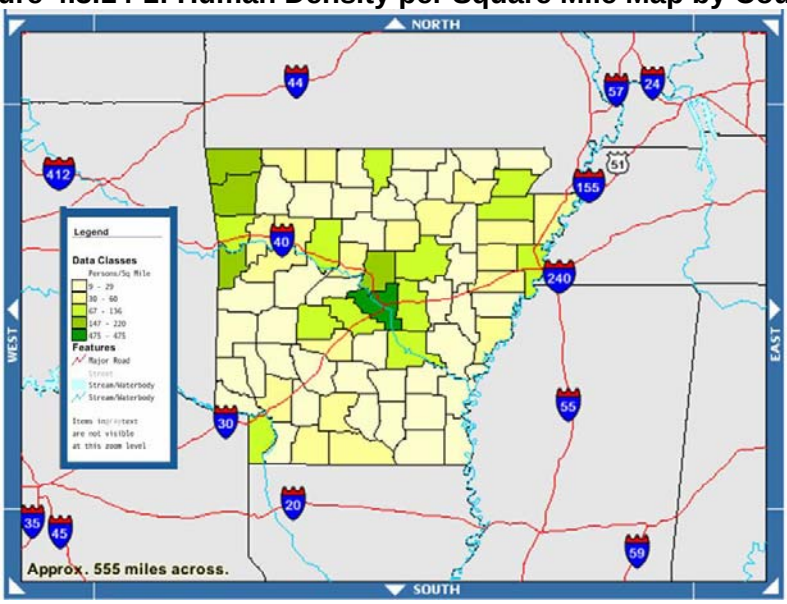
Table 4.3.14-1: Population Estimates

Geographic area	**Population Estimates**		**Population Estimates**	
	July 1, 2006	**July 1, 2005**	**July 1, 2007**	**July 1, 2008**
Arkansas	2,810,872	2,775,708	2,842,194	2,867,764
COUNTY				
Pulaski County	367,319	365,274	374,011	376,797
Benton County	196,045	187,381	202,639	209,791
Washington County	186,521	181,366	193,812	195,803
Sebastian County	120,322	118,600	121,386	122,274
Faulkner County	100,685	97,739	104,294	106,823
Garland County	95,164	93,436	96,245	97,465
Saline County	94,024	91,226	96,046	98,209
Craighead County	88,244	86,632	90,727	92,640
Jefferson County	80,655	81,103	79,156	78,373
White County	72,560	71,387	73,507	74,845
Lonoke County	62,902	60,630	63,468	65,233
Crawford County	58,785	57,457	59,204	59,952
Pope County	57,671	56,778	58,939	59,682
Crittenden County	52,083	51,605	52,110	52,554
Mississippi County	47,517	47,763	46,647	46,808

Union County	44,170	44,060	43,165	43,213
Miller County	43,055	42,777	42,785	43,226
Baxter County	41,307	40,394	41,872	42,115
Greene County	40,091	39,342	40,352	40,684
Boone County	36,405	35,764	36,644	36,881
Independence County	34,909	34,673	34,547	34,641
Hot Spring County	31,730	31,394	31,845	31,909
St. Francis County	27,535	27,725	27,284	27,557
Carroll County	27,339	26,983	26,877	26,336
Ouachita County	26,710	27,033	26,046	25,770
Cleburne County	25,485	25,324	25,355	25,397
Poinsett County	25,086	25,287	24,821	24,721
Johnson County	24,453	24,087	24,656	24,851
Columbia County	24,440	24,525	24,361	24,146
Hempstead County	23,347	23,289	23,796	23,888
Phillips County	23,331	23,823	23,143	22,900
Clark County	22,913	22,906	22,594	22,567
Logan County	22,903	22,827	22,282	22,233
Ashley County	22,843	23,083	22,000	21,603
Yell County	21,834	21,393	21,697	21,976
Conway County	20,694	20,646	20,705	20,755
Polk County	20,363	20,143	20,166	20,257
Arkansas County	19,884	20,043	19,355	19,236
Cross County	19,056	19,244	18,651	18,808
Randolph County	18,448	18,424	18,646	18,670
Drew County	18,387	18,558	18,152	18,185
Franklin County	18,276	18,169	18,066	18,134
Sharp County	17,963	17,526	17,810	17,866
Grant County	17,493	17,308	17,450	17,690
Jackson County	17,426	17,576	17,173	16,936
Marion County	16,931	16,693	16,826	16,861
Lawrence County	16,899	17,137	16,579	16,774
Van Buren County	16,718	16,562	16,469	16,575
Clay County	16,497	16,598	16,254	16,519

Sevier County	16,297	16,327	16,102	15,845
Madison County	15,361	14,989	15,389	15,651
Howard County	14,415	14,530	13,978	14,143
Desha County	14,181	14,263	13,785	13,538
Lincoln County	14,125	14,202	13,701	13,609
Izard County	13,356	13,328	12,935	12,992
Little River County	13,074	13,088	12,823	12,807
Chicot County	12,915	13,027	12,328	11,993
Bradley County	12,111	12,195	11,962	11,906
Stone County	11,981	11,775	11,939	12,090
Fulton County	11,756	11,825	11,733	11,688
Scott County	11,415	11,107	11,263	11,248
Lee County	11,379	11,524	10,806	10,782
Pike County	10,859	10,926	10,759	10,616
Perry County	10,411	10,453	10,388	10,317
Nevada County	9,471	9,524	9,331	9,157
Montgomery County	9,272	9,256	9,027	9,047
Monroe County	9,095	9,277	8,751	8,665
Prairie County	8,927	9,031	8,727	8,580
Cleveland County	8,858	8,896	8,688	8,518
Newton County	8,411	8,387	8,335	8,298
Dallas County	8,350	8,470	8,218	8,144
Searcy County	8,075	8,022	8,071	8,048
Woodruff County	7,905	8,022	7,750	7,705
Lafayette County	7,896	8,012	7,631	7,439
Calhoun County	5,558	5,559	5,522	5,435

Figure 4.3.14-1: Human Density per Square Mile Map by County



Source: ADHT

Vulnerability of human populations to certain diseases is impacted and determined by the overall health, age and ethnicity of the people in the affected areas. Older people, infants, and children tend to be more susceptible to pandemic events. These groups are considered special populations with respect to many of the profiled hazards such as influenza and West Nile Virus. Also some additional diseases are more prevalent in certain ethnicities or in specific population sectors such as the rural poor with limited access to immediate medical attention. The following table from the US Census, details the demographics of Arkansas along with comparisons to the national totals.

Table 4.3.14-2: US Demographics of Arkansas

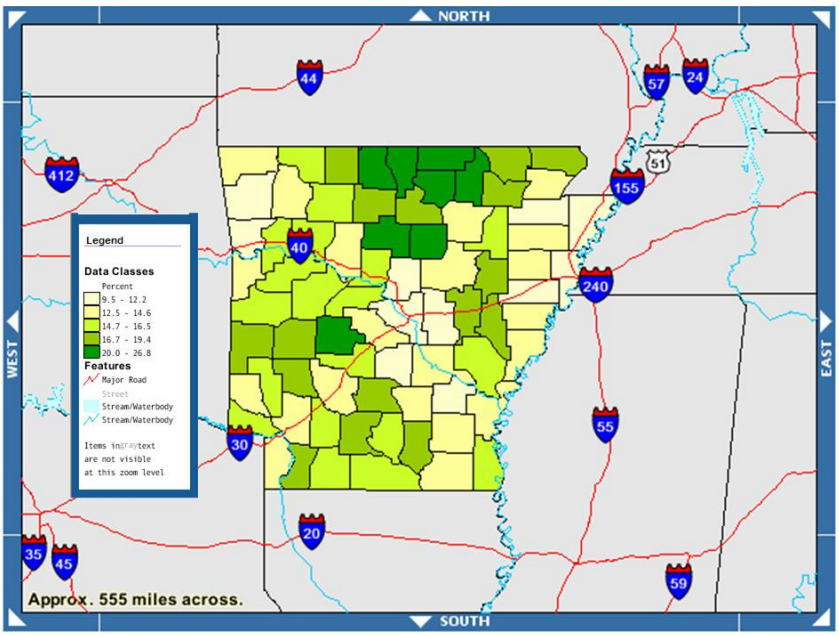
General Characteristics	Estimate	Percent	U.S.
Total population	2,830,047		
Male	1,385,579	49.0	49.3%
Female	1,444,468	51.0	50.7%
Median age (years)	37.1	(X)	36.7
Under 5 years	196,662	6.9	6.9%
18 years and over	2,130,559	75.3	75.5%
65 years and over	397,309	14.0	12.6%
One race	2,780,263	98.2	97.8%
White	2,224,620	78.6	74.3%
Black or African American	438,247	15.5	12.3%
American Indian and Alaska Native	18,949	0.7	0.8%
Asian	31,448	1.1	4.4%
Native Hawaiian and Other Pacific Islander	2,077	0.1	0.1%
Some other race	64,922	2.3	5.8%
Two or more races	49,784	1.8	2.2%
Hispanic or Latino (of any race)	148,755	5.3	15.1%
Household population	2,749,652		
Group quarters population	(X)	(X)	(X)
Average household size	2.49	(X)	2.61

Average family size	3.02	(X)	3.20
Total housing units	1,286,382		
Occupied housing units	1,106,185	86.0	88.0%
Owner-occupied housing units	750,243	67.8	67.1%
Renter-occupied housing units	355,942	32.2	32.9%
Vacant housing units	180,197	14.0	12.0%
Social Characteristics	**Estimate**	**Percent**	**U.S.**
Population 25 years and over	1,863,115		
High school graduate or higher	(X)	81.2	84.5%
Bachelor's degree or higher	(X)	18.8	27.4%
Civilian veterans (civilian population 18 years and over)	249,154	11.7	10.1%
Disability status (population 5 years and over)	(X)	(X)	(X)
Foreign born	111,948	4.0	12.5%
Male, now married, except separated (population 15 years and over)	604,551	55.5	52.2%
Female, now married, except separated (population 15 years and over)	588,473	50.7	48.2%
Speak a language other than English at home (population 5 years and over)	162,716	6.2	19.6%
Economic Characteristics	**Estimate**	**Percent**	**U.S.**
In labor force (population 16 years and over)	1,350,667	61.1	65.2%
Mean travel time to work in minutes (workers 16 years and over)	21.0	(X)	25.3
Median household income (in 2004 inflation-adjusted dollars)	39,127	(X)	52,175
Median family income (in 2004 inflation-adjusted dollars)	48,098	(X)	63,211
Per capita income (in 2004 inflation-adjusted dollars)	21,270	(X)	27,466
Families below poverty level	(X)	13.2	9.6%
Individuals below poverty level	(X)	17.6	13.2%
Housing Characteristics	**Estimate**	**Percent**	**U.S.**
Single-family owner-occupied homes	750,243		
Median value (dollars)	99,600	(X)	192,400
Median of selected monthly owner costs			
With a mortgage (dollars)	964	(X)	1,508
Not mortgaged (dollars)	308	(X)	425

Source: U.S. Census Bureau

The following map shows the counties with the high populations of elderly citizens over the age of 65. The HMP Sub-Committee considers these counties to have high levels of special populations with respect to many potential pandemic scenarios especially influenza and West Nile Virus.

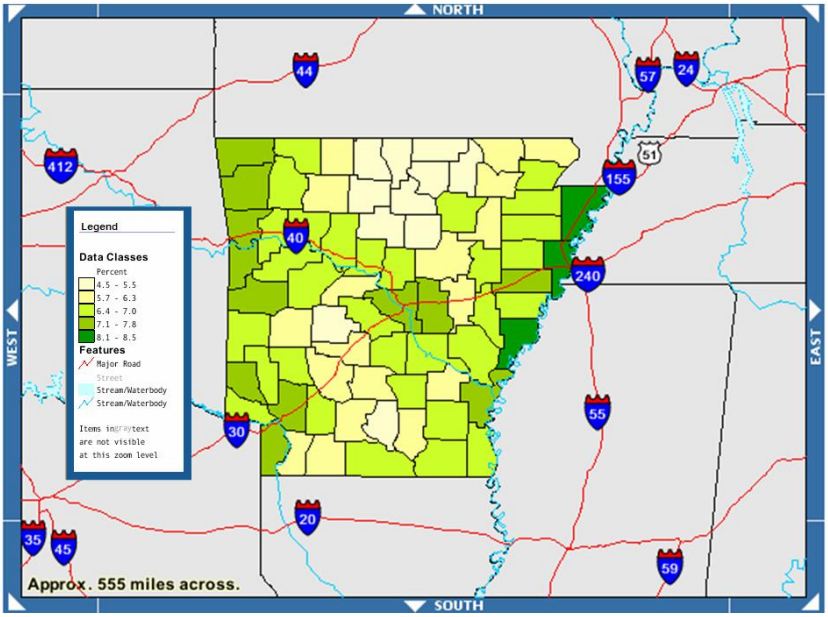
Figure 4.3.14-2: High Risk Areas of Special Populations Areas in Arkansas



Source: ADHT

This map below details the areas with the highest percentages of young children under the age of five. This population group is likewise a high risk category for bio-hazards due to weak immune systems.

Figure 4.3.14-3: High Risk Areas for Bio-Hazards in Arkansas



Source: ADHT

Impact Analysis on Human Populations

Many of the potential bio-hazards can affect humans and the spreading disease will impact the state's population in a variety of ways.

Illnesses and deaths of citizens in the affected area.

Fear of being infected could result in a panic within the population.

The spreading of the disease to the primary care givers and first responders in the area could negatively affect the short-term response for containing the outbreak.

An outbreak could overwhelm the capacity of the health care system, particularly the hospitals and laboratories, impacting their ability to provide efficient treatment.

Contamination of the hospitals, emergency rooms and smaller medical clinics would impact the ability to respond and provide care.

Spreading of the event could overwhelm the state and local expert resources for surveillance and event management, thereby causing further outbreaks and expansion of the pandemic. The event could negatively impact the reputations of government officials and instill a lack of confidence in their ability to successfully manage the disease and minimize the deaths, damages, and expenses.

Subsequent economic impacts could result from workforce illness. Workers either fearing sickness or having to assist ill relatives, would impact businesses and the economy.

Environmental issues might arise relating to the eradication of the disease and cleanup issues in the affected areas.

Poultry Population Vulnerability

The State of Arkansas is particularly concerned about the Avian Flu and its ability to infect and spread among the bird populations. This disease also has the ability to affect the human population especially people in close proximity to the infected birds such as the workers at the various poultry farms and the veterinary experts who would respond to an incident and then manage the containment processes for the disease. Listed below are a number of statistics that detail the importance of this industry and the high level of vulnerability it has to a potential pandemic.

The poultry industry in Arkansas is approximately $3.32 billion dollars annually.

Approximately 50% of the state's agricultural GNP is the poultry industry.

Agriculture in general accounted for 291,290 jobs, nearly one of every five jobs in the state.

Direct employment in agriculture production and processing is estimated to be 173,856 jobs, accounting for almost 11.4 percent of all jobs in the state.

Poultry production and processing alone provides over 17 percent of the state's agricultural jobs.

Arkansas exports roughly 20 percent of all poultry production internationally to Russia, Japan and Hong Kong. This export business has steadily grown since the 1990s.

Arkansas is tied with the state of Georgia as the largest producer of broilers in the country, and the state is the third largest producer of turkeys (Farm Bureau, 2002).

The following chart shows the overall value of livestock in Arkansas over a 12-year period. Of this amount, broilers, eggs, turkeys, and farm chickens contribute significantly.

Table 4.3.14-3: Top 5 Agriculture Commodities 2008

Top 5 agriculture commodities, 2008			
	Value of receipts thousand $	Percent of state total farm receipts	Percent of US value
1. Broilers	2,807,200	33.6	12.1
2. Rice	1,407,065	16.9	43.8
3. Soybeans	1,031,325	12.4	3.5
4. Cotton	515,409	6.2	9.1
5. Cattle and calves	494,614	5.9	1.0
All commodities	8,347,269		2.6

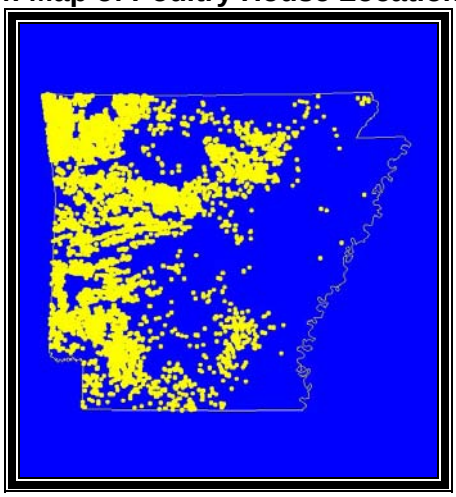
The following data was provided by the University of Arkansas detailing the specific numbers for these two categories.

Livestock-generated Activity by Sector, 2009

Livestock Contribution to:	Employment Total (Number of Jobs)	Income (Million $)	Value Added Total (Million $)
Animal Agricuture	57,610	1,620	2,280
Poultry and eggs	40,707	1,290	1,690

The following map shows the locations of all the poultry houses in the state. These locations are widely dispersed throughout the western side of the state thereby making the entire area highly vulnerable to Avian Flu or another bio-agent that would impact the bird populations.

Figure 4.3.14-4: Map of Poultry House Locations in Arkansas

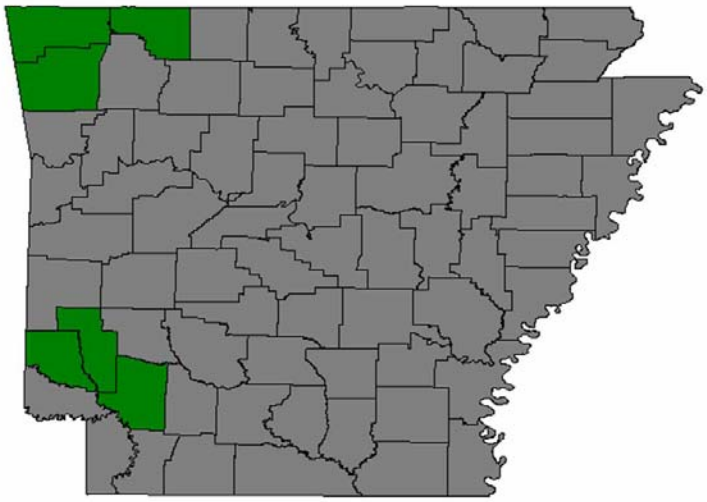


Source: GeoStor

Within this dispersed area, the northwest corner of the state has the highest density of poultry related facilities. This area is considered by the HMP Sub-Committee to be the area of highest vulnerability. The top counties for poultry production are listed below and are considered as the most likely locations to have an outbreak event with devastating consequences to the state:

1. Washington County
2. Howard County
3. Hempstead County
4. Carroll County
5. Benton County
6. Sevier County

Figure 4.3.14-5: 2010 Top Poutry Production Counties
Green – Top Poultry Production Counties
Grey – Other Counties



Source: USDA

Private businesses operate these facilities within the poultry industry in Arkansas. Some of these companies are huge conglomerates with significant staff, veterinarian, labs, and bio-safety elements, while others are small-businesses operating at break-even budgets in a competitive environment. These businesses must work together with the government to ensure that the Avian Flu does not infect birds in Arkansas and that if infections are detected; the outbreak is immediately halted and contained. The entire industry is highly vulnerable to a pandemic and this would have far reaching economic impacts on the state and its citizens. The larger Arkansas poultry companies would be negatively impacted by an Avian Flu pandemic. These organizations are extremely active and commit significant resources for contingency planning.

1. **Tyson Foods, Inc.**
   Location of Facilities — Bentonville, Bergman, Berryville, Clarksville, Dardanelle, Fayetteville, Fort Smith, Grannis, Green Forest, Hope, Lowell, Nashville, North Little Rock, Paris, Pine Bluff, Rogers, Russellville, Scranton, Siloam Springs (Cobb-Vantress, Inc.), Springdale, Texarkana, Van Buren, and Waldron
   Products — Poultry processing, breed stock, feeds and related products, tortillas, corn chips, taco shells, pre-plated frozen entrees, prepared foods, pet foods, and cornish hen processing

2. **Pilgrim's Pride Corporation**
   Location of Facilities — Batesville, Clinton, El Dorado, De Queen, Hope and Nashville
   Products — Processed poultry, hatching/grow-out and chicken feeds

3. **OK Industries, Inc.**
   Location of Facilities — Fort Smith (OK Foods and OK Feed Mills)
   Products — Frozen processed poultry products, precooked chicken, and feeds

4. **ConAgra, Inc.**
   Location of Facilities — Atkins, Huntsville, Jonesboro, and Russellville
   Products — Poultry processing, feed for chicken broilers, frozen dinners and specialties, deli hams, turkeys, and chickens

5. **Cargill, Inc.**
   Location of Facilities — Booneville (EMMPAK), Ozark, Russellville, and Springdale
   Products — Turkey processing, poultry, and dairy feed

6. **Simmons Foods, Inc.**
   Location of Facilities — Siloam Springs and Van Buren (Simmons Poultry Farms)
   Products — Fresh and frozen poultry, poultry by-products, and pet food

7. **George's Processing, Inc.**
   Location of Facilities — Springdale
   Products — Poultry processing

8. **Petit Jean Poultry**
   Location of Facilities — Arkadelphia and Danville
   Products — Poultry processing

9. **Townsends of Arkansas**
   Location of Facilities — Batesville
   Products — Poultry products

10. **Peterson Farms, Inc.**
    Location of Facilities — Decatur and Rogers
    Products — Processed poultry and feeds

11. **Wayne Farms**
    Location of Facilities — Danville
    Products — Poultry products

Impact Analysis on Poultry Populations

Avian Flu and other illnesses can affect the bird populations of the state. Any pandemic that affects the poultry industry of Arkansas will have significant impact on the economy and the citizens. The following list details some of the major impacts that could result from this hazard:

Illness and death of infected birds.

Destruction of live birds in the affected area in order to contain the outbreak.

Illness of workers at the poultry facilities.

Illness of responding veterinarians and government human resources.

Severe economic impact from the destruction of large flocks that could cause impacts for seasons to come.

Severe economic impact resulting for the lack of public confidence in poultry as a safe food.

Negative press, bleak financial estimates and falling stock prices of the large publicly traded poultry companies.

Poultry shortages throughout the country and potentially the world, resulting in higher prices due to these shortages. This could impact the continuity of operations for numerous wholesalers and retailers in related industries.

Residual impacts to the entire economy of Arkansas as businesses close down, workers are impacted, and the state slips into a recession.

Major facilities would be impacted as they quarantine their production, enact bio-protection measures, and work to contain the outbreak.

Potential impact to interstate traffic as roadblocks, testing centers and bio-protection measures are enacted to protect the unaffected portions of the industry.

Overwhelming the response resources of the state and the industry thereby negatively impacting the efforts to contain the illnesses. This could ultimately affect the reputation of state government.

The destruction of the carcasses could have a localized impact on the environment in the areas immediately surrounding the affected zone.

Cattle Population Vulnerability

Around 30,000 farms in Arkansas produce beef cattle with about 97 percent being family owned and operated. The average farm is relatively small with only 29 cows, with 67 percent of the farms having fewer than 50. Though this industry is characterized by small operations, the total economic impact of the Arkansas beef cattle industry totals more than $2 billion.

A pandemic that affects the cattle populations of Arkansas will have a significant impact on the area.

Arkansas is the 17th largest state in production of cattle in the US with over 1.8 million head.

Arkansas has approximately 35,000 dairy cattle in the state.

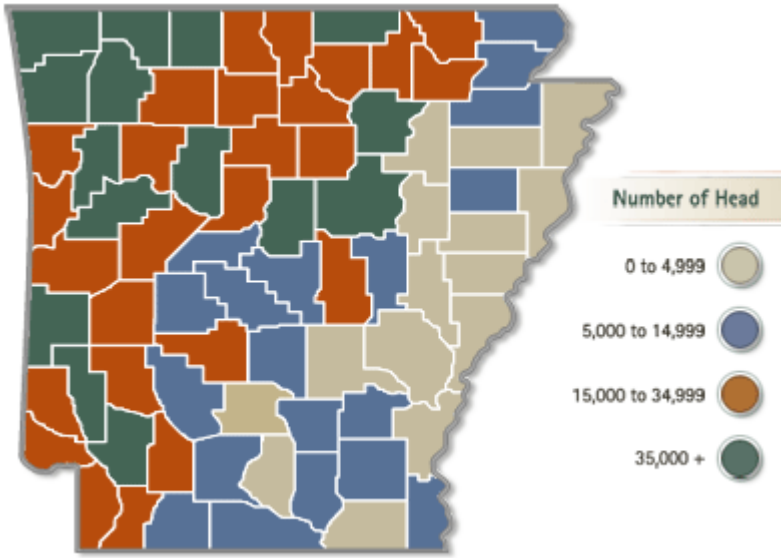
There are over 28,000 cattle farms and over 83% of these farms have under 100 head of cattle, accountine for 40% of the total inventory.

Amount of pasture land in Arkansas is over 4.5 million acres; amount in hay over 1 million acres.

The top ten counties in beef cattle production are: Washington, Benton, Carroll, Madison, Boone, White, Hempstead, Independence, Logan and Faulkner.

The following map shows the number of cattle per county. The HMP Sub-Committee recognizes that the entire state has cattle herds and is therefore vulnerable, however due to the larger economic impact associated with these counties, the planning team has designated these ten counties as the highest vulnerability to a pandemic disease such as Foot and Mouth or Mad Cow.

Figure 4.3.14-6: Number of Cattle per County

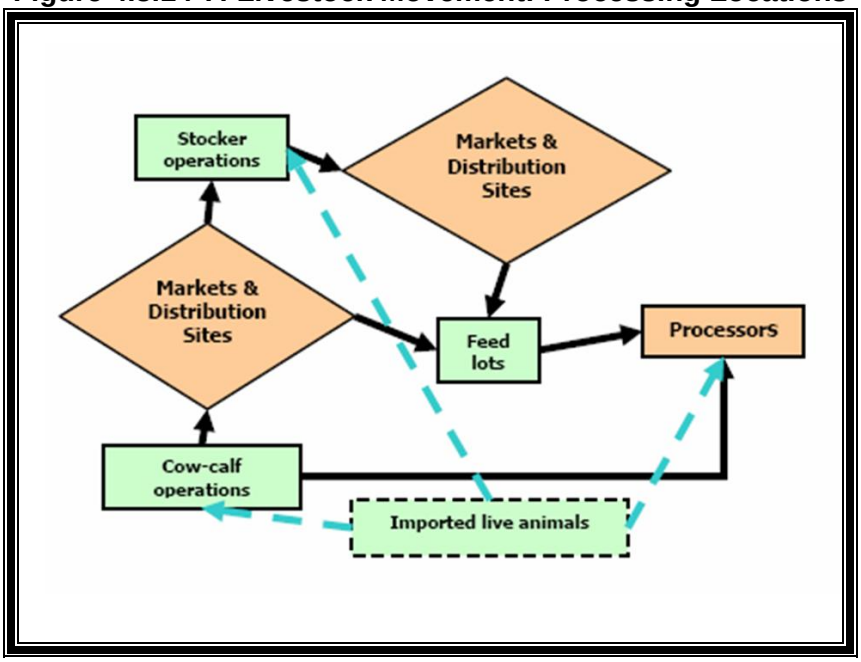


Source: Arkansas Farm Bureau

Though the livestock industry is not as large as the poultry industry in the state, it still represents a significant number of jobs and dollars for the state.

The overall livestock industry is extremely complicated with a large number of small players. Animals are moved frequently and go through a number of processing locations during their lifetime. Unfortunately, the process of cattle movement from location to location is ideal for the spreading of a disease. A single animal could be transported by truck with a dozen other cows from other small farms. These dozen or so cows could be at several different auction houses in several different cities within a few days, and then sent on to a variety of different farms with hundreds of other animals. The distribution of the industry makes it difficult to intercept the spreading virus and control it.

Figure 4.3.14-7: Livestock Movement: Processing Locations



Source: USDA

The image above details the intricate movement that can take place concerning livestock. In many cases, an animal can be taken through the process numerous times, making it difficult to identify the source of an outbreak.

The following directory lists the stockyard locations operating in the state for 2010. These locations are considered particularly vulnerable to outbreaks and key locations for containment and response activities.

Arkansas Stockyard Directory

Ash Flat Livestock
Bill Nix/Mike Nix
P.O. Box 308
Ash Flat, AR 72513
870-994-7311
Sale Day: Friday

Batesville Stockyard
Keith Lovell
P.O. Box 2707
Batesville, AR 72503
870-793-3102
Sale Day: Saturday
Barn is in Batesville

Batesville Stockyard
Keith Lovell
P.O. Box 2707
Batesville, AR 72503
870-793-3103
Sale Day: Wednesday
Barn is in Charlotte

Beebe Livestock Auction
Buddy Guyot/ Sid Guyot
P.O. Box 1004
Beebe, AR 72012
501-882-5553
Sale Day: Saturday

Benton County Sale Barn
Danny Smith/Paul Vaughn
3870 Highway 412 E
Siloam Springs, AR 72761
479-524-2371
Sale Day: Thursday

Bob Gordon Livestock
Bob Gordon
3477 Highway 71 S.
Mena, AR 71953
870-394-3884
Sale Day: Tuesday

Cattlemen's Livestock
Leon Wallace/Ron Wallace
P.O. Box 1918
Harrison, AR 72601
870-741-6311 870-741-6652
Sale Day: Monday

Cattlemen's Livestock Mkt
Tim Bean
P.O. Box 1440
Glenwood, AR 71943
870-356-3182
Sale Day: Thursday

Centerton Livestock Auction
Tim Schlegel
2210 Kinyon Road
Centerton, AR 72719
501-795-2397
Sale Day: Saturday

Clinton Livestock Auction
Layton Dunn
Route 1 Box 425A
Clinton, AR 72031
501-745-2481
Sale Day: Monday

County Line Sale
Mick Randolph
Route 1
Ratcliff, AR 72951
501-635-4412
Sale Day: Wednesday

Cowboy Stockyards Inc.
Louis Schmoll
P.O. Box 300
Atkins, AR 72823
501-354-2684
Sale Day: Tuesday
Barn is in Morrilton

Cowboy Stockyards Inc.
Louis Schmoll
P.O. Box 300
Atkins, AR 72823
501-354-2684
Sale Day: Wednesday
Barn is in Ola

Farmers Livestock Auction
Harold Sargent
1301 E. Emma
Springdale, AR 72764
501-751-5727
Sale Day: Friday

Glover Livestock Auction
Thomas Glover/Donnie Glover
P.O. Box 5664; 2310 W. 6th Street
Pine Bluff, AR 71601
870-534-6601
Sale Day: Tuesday

Hays Livestock Auction
Ricky Hays
P.O. Box 1441
Searcy, AR 72143
501-268-2471
Sale Day: Monday

Hill Country Livestock
Jack Hill
P.O. Box 9
Decatur, AR 72722
501-752-8499
Sale Day: Wednesday

Hope Livestock Auction
Buddy Boyce/772-7261
P.O. Box 213
Hope, AR 71801
870-777-4451
Sale Day: Thursday

I-40 Livestock Auction
Kent Reading/Garland Reading
Box C-63
Ozark, AR 72949
479-667-3737
Sale Day: Thursday

Lafayette Co. Livestock Auction
David Camp
Highway 29 South
Lewisville, AR 71845
870-921-4774
Sale Day: Saturday

Lewis Livestock Auction
Tommy Lewis
P.O. Box 252
Conway, AR 72032
501-329-5549
Sale Day: Tuesday

Mtn. Home Livestock Auction
Leon Wallace/Randy Hoover
HCR 62 Box 4
Flippin, AR 72634-9701
870-425-3362
Sale Day: Saturday
Barn is in Mtn Home

Poteau Valley Livestock
L. Ridenhour
Highway 71B
Waldron, AR 72958
501-637-4695
Sale Day: 4th Sat/mo.

Searcy County Auction
J. Simpkins
P.O. Box 118
Marshall, AR 72650
870-448-3880
Sale Day: Monday

Nashville Stockyards
Calvin Buice
P.O. Box 806
Nashville, AR 71852
870-845-5081
Sale Day: Wednesday

Ralston Livestock Inc.
Tim Ralston
749 Pangburn Road
Heber Springs, AR 72543
501-362-8378
Sale Day: Monday

Ward Livestock Auction
W. Robinson
710 Fairview Road
Jonesboro, AR 72401
870-236-3613
Sale Day: Saturday

North Ark. Livestock Auction
Leon Wallace/Ron Wallace
P.O. Box 321
Green Forest, AR 72638
870-438-6915
Sale Day: Thursday

Salem Livestock Auction
J.W. Guffey
P.O. Box 784
Salem, AR 72576
870-895-3231 870-458-2738
Sale Day: Thur night

Washington County Sales
B. Bartholomew
510 West 11th St.
Fayetteville, AR 72701
479-442-6275
Sale Day: Thursday

Pocahontas Livestock Auction
Darrell Qualls
P.O. Box 88
Pocahontas, AR 72455
870-892-4561
Sale Day: Tuesday

Saline/Ouachita Valley
Odell Wolfe
Route 2 Box 422
Warren, AR 71671
870-226-3761
Sale Day: Saturday

Western Ark. Livestock
Wayne Andrews
P.O. Box 1690
Waldron, AR 72958
479-637-4570
Sale Day: Thursday

Impact Analysis on Cattle Populations

In order to better understand the overall impact on the cattle industry and the subsequent ripple effect throughout the economy, the US government has studied the recent case in Great Britain. The 2001 outbreak of Foot and Mouth Disease (FMD) in the United Kingdom had a substantial impact on many segments of European economies. The firm, Price Waterhouse Coopers, estimated that economic impacts related to this FMD outbreak totaled between 0.3 percent and 0.8 percent of the United Kingdom's gross domestic product, or approximately $3.6 to $11.6 billion.

In the event of an outbreak of either FMD or Mad Cow disease in US cattle herds, the results could be devastating to the beef and dairy industries and have far reaching, rippling results throughout the country. The HMP Sub-Committee recognizes that infected animals in areas outside of the state borders would still have an impact on the state. If the outbreak is contained early and completely then the impacts would not be as severe; however, using the British case study as a benchmark, it is difficult to derail the course of a pandemic outbreak as the effects amplify each day with incredible consequences. The following bullets are impacts that the HMP Sub-Committee expects to occur during or after an outbreak either in Arkansas or in one of the surrounding states.

Beef consumption would likely decline due to consumer concerns about safety. This would lead to lower demand, lower prices and a glut of perishable products at retail and wholesale locations as well as processing plants. This would severely impact the reputation of the industry with potential long-term damages as consumers permanently change their daily eating habits away from beef.

Dairy producers with infected or quarantined herds would not be able to sell milk, thus losing considerable income and incurring disposition costs.

Producers would be forced to destroy their livestock with additional long-term costs associated with rebuilding.

Producers would lose the time and funds they had spent in building their breeding stock. There would be reduced income while rebuilding the stock. Prices may be higher for purchasing additional stock, while the market price for animal products could decline.

Premises would have to be cleaned and disinfected, and there would be a waiting period of at least 30 days before restocking could begin. This would further slow the recovery process and increase costs to the producers.

Disposal, sanitation and environmental issues related to the cleanup would need to be addressed.

For an industry with narrow profit margins, losses of this magnitude could significantly reduce receipts and increase costs, putting many producers out of business – particularly small farmers.

The reactions of US trading partners would likely have an enormous effect on the economic losses associated with an occurrence of BSE (Mad Cow). Past experience has shown that importing countries will stop imports of beef and most ruminant products from BSE-infected countries. These are long-term bans, unlike the restrictions imposed in the case of a quickly eradicated FMD outbreak.

The animal rendering, processing, and meat by-product industries would experience a significant economic impact in the event of a BSE outbreak. Because meat and bone meal would likely be further restricted or even totally banned to reduce the spread of the disease, the industries might face significant restructuring.

Other sectors of the US economy, such as cosmetics, pharmaceuticals, medical supplies, and related industries, currently depend to some degree on livestock by-products or rendered products. For example, gelatin and collagen are animal by-products used in the cosmetics industry and are products used in medical treatment. They would also be affected if such products were no longer available or their use more severely restricted.

The nation’s deer, feral swine, and other wildlife populations could also rapidly become infected and potentially remain a reservoir of infection, possibly requiring that some animals be depopulated.

Hospitals and Health System Vulnerability

During any type of biological event, the entire health system of Arkansas will be involved with the response and the on-going recovery. This system encompasses a wide range of people:

Doctors, nurses and other primary care givers.

Epidemiologists, surveillance experts, and researchers.

Public health staff and other state and local emergency responders.

Veterinarians and other animal health specialists.

The people involved in the response and recovery are the most important assets and resources. Their skills and professionalism are required to treat the ill and contain the outbreak as well as to manage the event and inform the public. These human resources are limited and will be in direct contact with the disease and are therefore considered highly at risk during an epidemic. Therefore, the HMP Sub-Committee has prioritized this special population as a vulnerability to bio-hazards.

Besides these people, the medical infrastructure of the state is vulnerable in the event of pandemics caused by bio-hazards. Specific locations that are important and need to be protected include the following:

Hospitals and medical clinics.

Laboratories and other testing facilities.

Veterinarians, laboratories, and other animal health facilities.

Field operations posts and emergency command locations.

Universities and other research institutes.

The overall medical system is comprised of many diverse players and organizations. These include public health facilities, private hospitals and other profit and non-profit concerns. All have differing priorities and vulnerabilities but must work together to identify and contain the outbreak while providing quality care to those effects. The size and scope of the epidemic will be directly related to the ability of the Arkansas community to work together at each step of the process.

Early warning systems in place to identify potential outbreaks.

Communications between related organizations.

Surveillance capabilities to track confirmed cases.

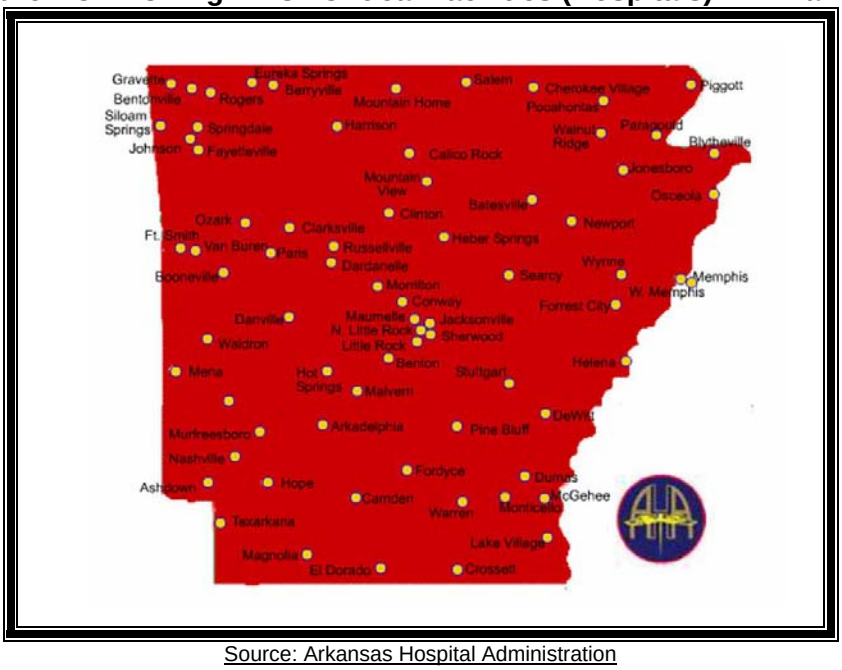
Quarantine suspected carriers and treat infected populations.

Contain the illness and prevent further infections.

Inform the public of the situation to avoid fear and panic.

The people and locations related to the Arkansas medical system are vulnerable to bio-hazards since they will be on the front line of defense. People and places will be exposed to the bio-agent and may easily become infected. The HMP Sub-Committee considers this risk of infection the highest vulnerability to the medical system. The HMP Sub-Committee has considered all of the aspects of this vulnerability and has identified the hospital facilities to be of primary concern. These facilities are hugely important to communities and they cannot be replaced during an outbreak as points for major amounts of health care to large numbers of people. These hospitals contain large amounts of specialized equipment and large numbers of doctors, nurses, and support staff work at these facilities. Shown below are the hospitals and their locations within Arkansas that are considered at risk critical facilities.

Figure 4.3.14-8: High Risk Critical Facilities (Hospitals) in Arkansas



Source: Arkansas Hospital Administration

Table 4.3.14-4: Hospital Facilites

Arkadelphia		
Greg Stubblefield V.P. & Administrator	Baptist Health Medical Center-Arkadelphia 3050 Twin Rivers Dr Arkadelphia, AR 71923 www.baptist-health.com	(870) 245-2622
Ashdown		
David W. Deaton, FACHE CEO	Little River Memorial Hospital 451 W Locke St Ashdown, AR 71822	(870) 898-5011
Barling		
Holli Baker CEO	Vista Health Fort Smith 10301 Mayo Dr Barling, AR 72923 www.vistahealthservices.com	(479) 494-5700
Batesville		
Gary L Bebow, FACHE Administrator/CEO	White River Health System 1710 Harrison St Batesville, AR 72501 www.whiteriverhealthsystem.com	(870) 793-6449
Benton		
Randy Fortner, FACHE President/CEO	Saline Memorial Hospital 1 Medical Park Dr Benton, AR 72015 www.salinememorial.org	(501) 776-6000
Duane Runyan CEO/Managing Director	Rivendell Behavioral Health Services 100 Rivendell Dr Benton, AR 72019 www.rivendellofarkansas.com	(501) 316-1255
Bentonville		
Tripp Smith CEO	Northwest Medical Center Bentonville 3000 Medical Center Pkwy Bentonville, AR 72712 www.northwesthealth.com	(479) 553-1000
Berryville		
Kristy Estrem, FACHE President	St. John's Hospital-Berryville 214 Carter Str Berryville, AR 72616 www.stjohns.com/berryville	(870) 423-3355
Blytheville		
Jim Richardson CEO	Great River Medical Center 1520 N Division St Blytheville, AR 72315 www.greatrivermc.com	(870) 838-7460
Jim Richardson CEO	SMC Regional Medical Center 1520 N Division St Blytheville, AR 72315 www.smcregional.com	(870) 838-7460
Booneville		
Dzaidi Daud President/CEO	Booneville Community Hospital PO Box 290 Booneville, AR 72927 www.boonevillehospital.com	(479) 675-2800
Calico Rock		
Angela Richmond President/CEO	Community Medical Center of Izard County PO Box 438 Calico Rock, AR 72519 www.cmcofic.org	(870) 297-3726

Camden		
James David Cicero President	Ouachita County Medical Center PO Box 797 Camden, AR 71711 www.ouachitamedcenter.com	(870) 836-1000
Clarksville		
Larry Morse, CHE Administrator	Johnson Regional Medical Center PO Box 738 Clarksville, AR 72830 www.jrmc.com	(479) 754-5454
Clinton		
Kirk Reamey, III, FACHE CEO	Ozark Health Medical Center PO Box 206 Clinton, AR 72031 www.ozarkhealthinc.com	(501) 745-7000
Conway		
Todd Ferrand Administrator	Conway Regional Rehabilitation Hospital 2210 Robinson Ave Conway, AR 72034 www.conwayregional.org	(501) 932-3500
James M. Lambert, FACHE President/CEO	Conway Regional Health System 2302 College Ave Conway, AR 72034 www.conwayregional.org	(501) 450-2117
Crossett		
Phillip K. Gilmore, FACHE Administrator	Ashley County Medical Center PO Box 400 Crossett, AR 71635 www.acmconline.org	(870) 364-4111
Danville		
Scott Peek CEO	Chambers Memorial Hospital PO Box 639 Danville, AR 72833 www.chambershospital.com	(479) 495-2241
Dardanelle		
Joseph Mitchell CEO/Administrator	River Valley Medical Center PO Box 578 Dardanelle, AR 72834	(479) 229-4677
De Witt		
Darren Caldwell CEO	DeWitt Hospital PO Box 32 De Witt, AR 72042	(870) 946-3571
DeQueen		
Mandy Hooker Administrator	DeQueen Medical Center 1306 W Collin Raye Dr DeQueen, AR 71832 www.dequeenmedicalcenter.com	(870) 584-0272
Dumas		
Cris Bolin Interim Administrator	Delta Memorial Hospital 811 Highway 65 S Dumas, AR 71639 www.deltamem.org	(870) 382-8126
El Dorado		
America S. Farrell, FACHE CEO	Medical Center of South Arkansas PO Box 1998 El Dorado, AR 71731 www.themedcenter.net	(870) 863-2000
Eureka Springs		

J. David Wheeler, Jr. Administrator	Eureka Springs Hospital 24 Norris St Eureka Springs, AR 72632 www.eurekaspringshospital.com	(479) 253-7400
Fayetteville		
Connie Borengasser CEO	Vista Health Fayetteville 4253 N Crossover Rd Fayetteville, AR 72703 www.vistahealthservices.com	(479) 521-5731
Jack Mitchell, FACHE CEO	HEALTHSOUTH Rehabilitation Hospital of Fayetteville 153 E Monte Painter Dr Fayetteville, AR 72703 www.healthsouthfayetteville.com	(479) 444-2200
Kathleen R. Fogarty Medical Center Director	Veterans Health Care System of the Ozarks 1100 N College Ave Fayetteville, AR 72703 www.fayettevillear.va.gov	(479) 443-4301
Bill Bradley President/CEO	Washington Regional Medical System 3215 N North Hills Blvd Fayetteville, AR 72703 www.wregional.com	(479) 713-1000
Lucinda DeBruce CEO	Springwoods Behavioral Health Hospital 1955 W Truckers Dr Fayetteville, AR 72704 www.springwoodsbehavioral.com	(479) 521-6014
Fordyce		
Brian Miller Administrator	Dallas County Medical Center 201 Clifton St Fordyce, AR 71742	(870) 352-6300
Forrest City		
Brett Kinman CEO	Forrest City Medical Center 1601 New Castle Rd Forrest City, AR 72335 www.forrestcitymedicalcenter.com	(870) 261-0000
Fort Smith		
Jeffery A. Johnston President/CEO	St. Edward Mercy Medical Center PO Box 17000 Fort Smith, AR 72917 www.stedwardmercy.com	(479) 314-6000
Susan Legg Administrator	Advance Care Hospital of Fort Smith 7301 Rogers Ave, Fl 4 Fort Smith, AR 72903 www.dubuis.org	(479) 314-4900
Melody Trimble, FACHE CEO	Sparks Health System PO Box 17006 Fort Smith, AR 72917 www.sparks.org	(479) 441-4000
Gravette		
Paul Taylor CEO	Ozarks Community Hospital 1101 Jackson St SW Gravette, AR 72736 www.ochonline.com	(479) 837-4004
Harrison		
Rob Lake CEO	North Arkansas Regional Medical Center 620 N Main St Harrison, AR 72601 www.narmc.com	(870) 365-2000
Heber Springs		
Edward L. Lacy, FACHE Vice President /Administrator	Baptist Health Medical Center-Heber Springs 1800 By Pass Rd	(501) 887-3000

	Heber Springs, AR 72543 www.baptist-health.com	
Helena		
Jim T. Sato, FACHE CEO	Helena Regional Medical Center PO Box 788 Helena, AR 72342 www.helenarmc.com	(870) 816-3900
Hope		
Terry L. Amstutz, FACHE Administrator	Medical Park Hospital 2001 S Main Hope, AR 71801	(870) 777-2323
Hot Springs		
Jerry D. Mabry, FACHE CEO	National Park Medical Center 1910 Malvern Ave Hot Springs, AR 71901 www.nationalparkmedical.com	(501) 321-1000
Patrick G. McCabe, Jr., FACHE President/CEO	Levi Hospital 300 Prospect Ave Hot Springs, AR 71901 www.levihospital.com	(501) 760-3322
Tim Johnsen President/CEO	St. Joseph's Mercy Health Center 300 Werner St Hot Springs, AR 71913 www.saintjosephs.com	(501) 622-1000
Ralph Beaty CEO	HealthPark Hospital 1636 Higdon Ferry Rd Hot Springs, AR 71913 www.healthparkhospital.com	(501) 520-2000
Keith Rogers Administrator	Advance Care Hospital of Hot Springs PO Box 29001 Hot Springs, AR 71903 www.dubuis.org	(501) 609-4300
Jacksonville		
Don Cameron Interim CEO	North Metro Medical Center PO Box 159 Jacksonville, AR 72076 www.northmetromed.com	(501) 985-7000
Colonel David A. Stanczyk, DMD Commander	19th Medical Group 1090 Arnold Drive LRAFB Jacksonville, AR 72099 www.littlerock.af.mil	(501) 987-1906
Johnson		
Debbie Crandall Administrative Director	Willow Creek Women's Hospital PO Box 544 Johnson, AR 72741 www.northwesthealth.com	(479) 684-3000
Jonesboro		
Chris B. Barber, FACHE Administrator	St. Bernards Medical Center 225 E Jackson Ave Jonesboro, AR 72401 www.stbernards.info	(870) 972-4100
Paul Betz, FACHE Administrator	NEA Baptist Memorial Hospital 3024 Stadium Blvd Jonesboro, AR 72401 www.nea.baptistonline.org	(870) 972-7000
Ben E. Owens, FACHE President/CEO	St. Bernards Healthcare 225 E Jackson Ave Jonesboro, AR 72401 www.stbernards.info	(870) 972-4100
Lake Village		

Russ D. Sword, FACHE Interim CEO	Chicot Memorial Hospital 2729 S Highway 65 82 Lake Village, AR 71653 www.chicotmemorial.com	(870) 265-5351
Little Rock		
Richard A. Pierson Executive Director	UAMS Medical Center 4301 W Markham St, Slot 557 Little Rock, AR 72205 www.uamshealth.com	(501) 851-4623
Lee Gentry, FACHE Administrator	Baptist Health Extended Care Hospital 9601 Interstate 630, Exit 7, Fl 10 Little Rock, AR 72205 www.baptist-health.com	(501) 202-1090
Charles Smith Administrator	Arkansas State Hospital 4313 W Markham St Little Rock, AR 72205 www.state.ar.us/dhs/dmhs/ar_state_hospital.htm	(501) 686-9000
Peter D. Banko, FACHE President/ CEO	St. Vincent Health System 2 Saint Vincent Cir Little Rock, AR 72205 www.stvincenthealth.com	(501) 552-3000
Timothy E. Hill President/CEO	Arkansas Heart Hospital 1701 S Shackleford Rd Little Rock, AR 72211 www.arheart.com	(501) 219-7000
Russell D. Harrington, Jr., FACHE President/CEO	Baptist Health 9601 Interstate 630, Exit 7 Little Rock, AR 72205 www.baptist-health.com	(501) 202-2000
Michael V. Aureli President/CEO	Arkansas Hospice 5600 W 12th St Little Rock, AR 72204 www.arkansashospice.org	(501) 748-3333
	St. Vincent Infirmary Medical Center 2 Saint Vincent Cir Little Rock, AR 72205 www.stvincenthealth.com	(501) 552-3000
Douglas Weeks, FACHE Senior Vice President/Administrator	Baptist Health Medical Center-Little Rock 9601 Interstate 630, Exit 7 Little Rock, AR 72205 www.baptist-health.com	(501) 202-2000
Jonathan R. Bates, M.D. President/CEO	Arkansas Children's Hospital 1 Childrens Way Slot 301 Little Rock, AR 72202 www.archildrens.org	(501) 364-1100
Michael R. Winn Medical Center Director	Central Arkansas Veterans Healthcare System 4300 W 7th St Little Rock, AR 72205 www.littlerock.va.gov	(501) 257-1000
Janice E. Burford, FACHE President/CEO	CARTI PO Box 55050 Little Rock, AR 72215 www.carti.com	(501) 664-8573
Lisa Evans CEO	Pinnacle Pointe Behavioral Healthcare System 11501 Financial Centre Pkwy Little Rock, AR 72211 www.pinnaclepointehospital.com	(501) 223-3322
Douglas Weeks, FACHE Senior Vice President/Administrator	Baptist Health Rehabilitation Institute 9601 Interstate 630, Exit 7 Little Rock, AR 72205 www.baptist-health.com	(501) 663-3302
Mabelvale		

Tammy Pace CEO	Allegiance Specialty Hospital of Little Rock PO Box 546 Mabelvale, AR 72103 www.ahmgt.com	(501) 455-7300
Magnolia		
Margaret West CEO	Magnolia Regional Medical Center 101 Hospital Dr Magnolia, AR 71754 www.magnoliahospital.org	(870) 235-3000
Malvern		
Sheila K. Williams President /CEO	HSC Medical Center 1001 Schneider Dr Malvern, AR 72104 www.hscmc.org	(501) 332-1003
Maumelle		
Jennifer Lang, Ph.D. Administrator	Methodist Behavioral Hospital 1601 Murphy Dr Maumelle, AR 72113 www.methodistfamily.org	(501) 803-3388
Barry Pipkin Regional Vice President	Universal Health Services 10301 Maumelle Blvd Maumelle, AR 72113 www.UHSInc.com	(501) 812-5990
Mc Gehee		
John E. Heard CEO	McGehee Desha County Hospital PO Box 351 Mc Gehee, AR 71654 www.mcgeheehospital.org	(870) 222-5600
Memphis		
Claude D. Watts, Jr. CEO	Regional Medical Center at Memphis 877 Jefferson Ave Memphis, TN 38103 www.the-med.org	(901) 545-7100
Mena		
Bob S. Ellzey, FACHE CEO	Mena Regional Health System 311 Morrow St N Mena, AR 71953 www.menaregional.com	(479) 394-6100
Monticello		
Michael Layfield CEO	Drew Memorial Hospital 778 Scogin Dr Monticello, AR 71655 www.drewmemorial.org	(870) 367-2411
Morrilton		
Christy Hockaday, FACHE CEO/Administrator	St. Anthony's Medical Center 4 Hospital Dr Morrilton, AR 72110 www.stanthonysmorrilton.com	(501) 977-2413
Mountain Home		
Ron Peterson, FACHE President/CEO	Baxter Regional Medical Center 624 Hospital Dr Mountain Home, AR 72653 www.baxterregional.org	(870) 508-1039
Mountain View		
Renie Taylor COO/Administrator	Stone County Medical Center PO Box 510 Mountain View, AR 72560 www.whiteriverhealthsystem.com	(870) 269-4361
Nashville		

Debra Wright CEO	Howard Memorial Hospital PO Box 381 Nashville, AR 71852 www.howardmemorial.com	(870) 845-8003
Newport		
Claude Camp, FACHE CEO	Harris Hospital 1205 McLain St Newport, AR 72112 www.harrishospital.com	(870) 512-3022
North Little Rock		
Harrison M. Dean, FACHE Senior Vice President/Administrator	Baptist Health Medical Center-North Little Rock 3333 Springhill Dr North Little Rock, AR 72117 www.baptist-health.com	(501) 202-3000
Jennifer Nolan CEO	The BridgeWay 21 Bridgeway Rd North Little Rock, AR 72113 www.thebridgeway.com	(501) 771-1500
Carrie Helm CEO	Arkansas Surgical Hospital, LLC. 5201 Northshore Dr North Little Rock, AR 72118 www.ArkSurgicalHospital.com	(501) 748-8000
Ozark		
Ron Summerhill Regional Administrator	Mercy Hospital/Turner Memorial 801 W River St Ozark, AR 72949 www.stedwardmercy.com	(479) 667-4138
Paragould		
Ronald K. Rooney, FACHE President	Arkansas Methodist Medical Center PO Box 339 Paragould, AR 72451 www.arkansasmethodist.org	(870) 239-7100
Paris		
Ron Summerhill Regional Administrator	North Logan Mercy Hospital 500 East Academy St Paris, AR 72855	(479) 963-6101
Piggott		
James L. Magee Executive Director	Piggott Community Hospital 1206 Gordon Duckworth Dr Piggott, AR 72454 www.piggottcommunityhospital.com	(870) 598-3881
Pine Bluff		
Robert P. Atkinson, FACHE President/CEO Emeritus	Jefferson Regional Medical Center 1600 W 40th Ave Pine Bluff, AR 71603 www.jrmc.org	(870) 541-7100
Walter E. Johnson, Jr. President/CEO	Jefferson Regional Medical Center 1600 W 40th Ave Pine Bluff, AR 71603 www.jrmc.org	(870) 536-2849
Pocahontas		
John Tucker, FACHE CEO	Five Rivers Medical Center 2801 Medical Center Dr Pocahontas, AR 72455	(870) 892-6200
Rogers		
Scott Street President/CEO	Mercy Health System of Northwest Arkansas 2710 Rife Medical Ln Rogers, AR 72758 www.mercy4u.com	(479) 338-2908

George Flynn CEO	Mercy Medical Center 2710 Rife Medical Ln Rogers, AR 72758 www.mercy4u.com	(479) 338-8000
Russellville		
Mike McCoy CEO	Saint Mary's Regional Medical Center 1808 W Main St Russellville, AR 72801 www.saintmarysregional.com	(479) 968-2841
Salem		
Joseph T. Hammond, FACHE CEO	Fulton County Hospital PO Box 517 Salem, AR 72576	(870) 895-6099
Searcy		
Eugene Zuber Administrator	Advanced Care Hospital of White County 1200 S Main St Searcy, AR 72143 www.achwc.org	(501) 278-3155
Raymond W. Montgomery, II, FACHE President/CEO	White County Medical Center 3214 E Race Ave Searcy, AR 72143 www.wcmc.org	(501) 268-9863
Sherwood		
Lee Frazier CEO	St. Vincent Rehabilitation Hospital 2201 Wildwood Ave Sherwood, AR 72120 www.stvincentrehabhospital.com	(501) 834-1800
Tim Osterholm Administrator/CEO	St. Vincent Medical Center-North 2215 Wildwood Ave Sherwood, AR 72120 www.stvincenthealth.com	(501) 552-7102
Siloam Springs		
Kevin J. Clement CEO	Siloam Springs Memorial Hospital 205 E Jefferson St Siloam Springs, AR 72761 www.siloamspringsmemorial.com	(479) 549-2577
Springdale		
Lee Christenson Administrator	Northwest Medical Center Springdale 609 West Maple Ave Springdale, AR 72764 www.northwesthealth.com	(479) 757-4005
W. Douglas Arnold CEO	Northwest Health System 609 W Maple Ave Springdale, AR 72764 www.northwesthealth.com	(479) 751-5711
Stuttgart		
Steven Web Administrator	Baptist Health Medical Center-Stuttgart PO Box 1905 Stuttgart, AR 72160 www.baptist-health.com	(870) 673-3511
Texarkana		
Chris Karam, FACHE President/CEO	CHRISTUS St. Michael Health System 2600 St. Michael Dr Texarkana, TX 75503 www.christusstmichael.org	(903) 614-1000
Van Buren		
Pam Tahan CEO	Summit Medical Center PO Box 409	(479) 474-3401

	Van Buren, AR 72957 www.smmitmedicalcenter.net	
Waldron		
Ron Summerhill Regional Administrator	Mercy Hospital of Scott County 1341 W 6th St Waldron, AR 72958	(479) 637-4135
Walnut Ridge		
Terry R. Lambert, FACHE President	Lawrence Memorial Hospital PO Box 839 Walnut Ridge, AR 72476 www.lawrencehealth.net	(870) 886-1200
Warren		
Harold E. Mitchell, Jr., CPA Administrator /CEO	Bradley County Medical Center 404 S Bradley St Warren, AR 71671 www.bradleycountymedicalcenter.com	(870) 226-4302
West Memphis		
James R. Carter, Jr. CEO	Crittenden Regional Hospital 200 W Tyler Ave West Memphis, AR 72301 www.crittendenregional.org	(870) 735-1500
Wynne		
Gary R. Sparks Administrator	CrossRidge Community Hospital PO Box 590 Wynne, AR 72396	(870) 238-3300

Hospitals are split into two categories with respect to ownership. There are not-for-profit hospitals and there are private, independent hospitals. Each type is run differently with different priorities and different responsibilities and goals.

Public hospitals will be responding in conjunction with the state government authorities in public health, while the private entities have a corporate management structure with various responsibilities to patients, insurance companies and stockholders.

Private hospitals tend to be better funded with more equipment and more staff and presumably more time and resources for disaster management and business continuity planning.

Another issue of vulnerability for hospitals is the financial impact of a large scale biological epidemic. During a large scale event, each responding hospital will have additional costs of overtime and staff support for primary care of the infected patients along with any costs associated with disease containment and cleanup. This could easily cause these hospitals to have severe financial distress not to mention the medium and long term affects to their reputations, stock, and on-going business plans.

In the case of Avian Flu or FMD or Mad Cow Disease, the veterinarian resources of the state will be the primary responders much like the doctors during a human outbreak. These human resources with veterinary expertise will be extremely important in executing the timely containment of the disease and preventing worst-case scenario damages. The following list of relief veterinarians is considered vulnerable in terms of the response and recovery.

More information about relief veterinarians can be found on the Arkansas Veterinary Medical Association website, http://www.arkvetmed.org/reliefvets.html

Table 4.3.14-5: Arkansas Relief Veterinarians

Ryan Ayres, DVM UT - 06 E-Mail:_vetdoc07@yahoo.com Memphis	W. Manning, Jr. TX Burleson
John Bressett CORNELL - MO - 82 Gainsville	Lee Morris LSU - AR - 84 Maumelle
Arnetha Brooks TU 03 Little Rock	John Muller OSU - AR - 75 Eureka Springs
Gary Farwell Cal-Davis - 77	Steven Nelson KSU - AR - 81 Little Rock
Newton Foster LSU - AR - 82 Sheridan	Joe Smith OK - AR - 67 Little Rock
Rebecca Fryar TEN - AR - 99	Lori Smith LSU - AR - 99

Russellville Crystal Garner LSU 2009 Danville Sarah Hantz skhantz@gmail.com Fayetteville Jean Hedges LSU - 89 Laura Hokett LSU 87 Jim Lowe Mountain Home	Conway Carolyn Stewart LSU 82 Conway Greg Taylor Miss State 2004 Debbie Waggener DVM OK - 95 Springdale George Williams DVM Miss State - 98

Along with the human element, critical facilities were also considered by the HMP Sub-Committee. The most important facility in the state that was identified was the Veterinary Diagnostic Laboratory maintained by the Arkansas Livestock and Poultry Commission.

The ARLPC Veterinary Diagnostic Laboratory assists the livestock and poultry industries, private veterinarians, and animal owners of Arkansas by diagnosing and monitoring animal diseases that can:

Affect humans,

Reduce the productivity or marketability of animals,

Threaten animal populations, and

Affect the safety or quality of animal products.

The laboratory also participates in federal cooperative disease programs and works with other state agencies to provide veterinary diagnostic testing, disease surveillance, animal health monitoring, drug testing, collaborative research, and animal health education.

The ARLPC Veterinary Diagnostic Laboratory is the only lab in Arkansas that is accredited by the American Association of Veterinary Laboratory Diagnosticians. The AAVLD establishes acceptable criteria for quality assurance, safety, personnel qualifications, and laboratory facilities.

AR Veterinary Diagnostic Lab
1 Natural Resources Dr.
Little Rock, AR 72205
Ph: 501-907-2430
Fax: 501-907-2410

Impact Analysis on the Hospitals and Health System

The HMP Sub-Committee has considered the vulnerability of the hospitals specifically and the overall health system in general. If a large-scale bio-hazard event were to occur in the State of Arkansas or one of the surrounding states, it would have an extreme impact on the state in many ways. Listed below are some of the consequences to be expected from the impact of a biological outbreak.

Significant illness and possible deaths due to the epidemic event would occur. This would put a significant strain on the health resources of a community.

Experienced doctors and staff may become ill and unable to treat patients; the remaining resource could then be overwhelmed as the disease continues to infect persons. Citizens would not be able to receive appropriate health care.

Key surveillance staff or researchers could become infected, that would slow the study and allow the disease to spread further before eventual containment.

Relatives of key staff could become ill; that would impact the performance of these individuals during critical times.

Hospitals, emergency rooms, and clinics could become infected. They would no longer be able to operate under normal procedures and limited staffs and resources would potentially be overwhelmed. Continuity of operations and the ability to provide primary health care services would be significantly impacted especially in rural facilities with no immediate back-up locations nearby.

Laboratories could become infected and contaminated by the disease.

Laboratories could be overwhelmed by the number of submissions for testing that would significantly slow the hazard identification and containment process.

In the case of animal pandemics, the veterinarians, support staff and critical facilities would be affected in a similar manner to the doctors and hospitals and the supporting human-related resources.

Significant national press would be given to any major biological event in the state. Responding public and private organizations would be under a microscope during this time period. Any organizational issues that hinder the treatment and containment of the outbreak would have severe repercussions on the reputations of these organizations and specific individuals. This could lead to long term effects on the organization.

Normal medical treatment (non-life-threatening surgery, routine medical appointments, etc) would be impacted by a pandemic long after the resolution of the outbreak. Scheduling issues and shortages of treatment could last for months as doctors, staff and facilities recover from the traumatic event.

Financial issues for the hospitals, clinics, labs and government agencies would arise as they all struggle to stop the outbreak with public safety at risk. This could lead to bankruptcies, court proceedings, layoffs to workers and other financial implications that could have far-reaching consequences on the state's economy.

General Vulnerability to the State Economy and Infrastructure

Any major biological outbreak in the State of Arkansas is going to have a profound effect on the population and the economy. Even events outside of the state but within the US could have adverse effects on Arkansas. The HMP Sub-Committee has analyzed the four primary vulnerabilities to a naturally occurring or a human-caused bio-hazard:

Vulnerability of the human population.

Vulnerability of the bird population.

Vulnerability of the livestock population.

Vulnerability of the hospitals and health system.

In addition to these specific areas which could be impacted, the team has decided to include a fifth category defined as the "General Vulnerability." This fifth category details the rippling effects of the first four primary vulnerabilities.

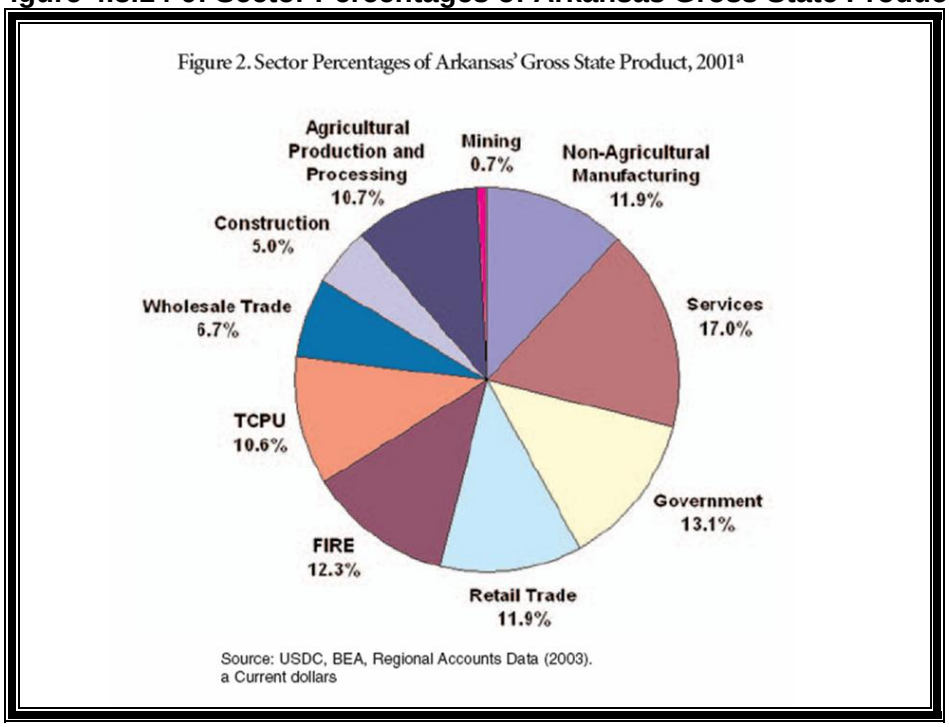
Biological hazards will not impact the state the way that floods and tornadoes do with physical damage, but rather there is a severe impact to human and animal health as detailed above. However, any type of outbreak will have a rippling effect on the state's economy and infrastructure as people deal with the disaster and then go through the recovery phase. Along with economic issues there could be significant impacts to reputations of entities, individuals and organizations involved in the response.

Locate on the following page are some statistics from the US Census about the Arkansas economy. Any or all of these sectors could be negatively impacted by a biological event in the state.

Table 4.3.14-6: Arkansas Selected Statistics by Economic Sector: US Census 2002

NAICS code	Industry description	Number of establishments	Sales, shipments, receipts, or revenue ($1,000)	Annual payroll ($1,000)	Number of employees
21	Mining	280	917,469	156,059	3,985
22	Utilities	403	Q	394,159	7,354
23	Construction	5,637	6,623,949	1,297,957	46,644
31-33	Manufacturing	(r)3,185	(r)46,721,413	(r)6,309,251	(r)210,394
42	Wholesale trade	3,498	34,470,795	1,437,962	42,875
44-45	Retail trade	12,141	25,611,630	2,347,757	134,197
48-49	Transportation & warehousing	2,514	5,222,960	1,678,344	59,011
51	Information	1,002	N	1,269,461	31,437
52	Finance & insurance	3,953	N	1,285,696	33,948
53	Real estate & rental & leasing	2,569	1,397,076	267,695	12,261
54	Professional, scientific, & technical services	5,008	2,599,015	1,069,003	30,467
55	Management of companies & enterprises	721	365,404	1,250,798	24,180
56	Administrative & support & waste management & remediation service	2,269	1,757,227	728,242	43,473
61	Educational services	282	71,850	25,690	1,574
62	Health care & social assistance	6,428	9,675,926	3,927,617	134,427
71	Arts, entertainment, & recreation	811	391,164	109,357	7,983
72	Accommodation & food services	4,659	2,766,905	751,908	77,835
81	Other services (except public administration)	4,287	1,642,468	499,748	24,105

Figure 4.3.14-9: Sector Percentages of Arkansas Gross State Product



In a major event, the state government will be involved in supporting the local immediate response. Then, in cases of great magnitude, the federal government will be involved as well. These departments and agencies will assume a lead role in the containment, and eradication of the outbreak. Federal and state resources will be vital to this effort. Also the federal and state governments are some of the largest employers in the State of Arkansas, so any disruption to their daily responsibilities will have a significant financial impact on the state's budget.

Table 4.3.14-7: ARKANSAS STATE GOVERNMENT EMPLOYMENT DATA: MARCH 2008

State	Government Function	Full-Time Equivalent Employment	Total employees	Total March Pay (whole dollars)
Arkansas	Total	61,103	70,338	206,268,970
Arkansas	Financial Administration	1,973	1,991	6,099,160
Arkansas	Other Government Administration	739	822	2,948,351
Arkansas	Judicial and Legal	1,484	1,618	4,771,486
Arkansas	Police Officers Only	593	593	2,361,176
Arkansas	Other Police Employees	628	628	1,794,026
Arkansas	Corrections	5,240	5,244	13,783,503
Arkansas	Highways	3,588	3,605	12,412,018
Arkansas	Air Transportation	0	0	0
Arkansas	Water Transport and Terminals	0	0	0
Arkansas	Public Welfare	3,987	3,987	10,189,601
Arkansas	Health	4,912	4,969	15,341,812
Arkansas	Hospitals	5,882	5,960	18,520,947
Arkansas	Social Insurance Administration	1,081	1,085	3,477,243
Arkansas	Solid Waste Management	0	0	0
Arkansas	Sewerage	0	0	0
Arkansas	Parks and Recreation	700	703	1,743,463
Arkansas	Housing and Community Development	0	0	0
Arkansas	Natural Resources	1,943	2,175	5,859,778
Arkansas	Water Supply	0	0	0
Arkansas	Electric Power	0	0	0
Arkansas	Gas Supply	0	0	0
Arkansas	Transit	0	0	0
Arkansas	Elem & Sec Instructional Employees	0	0	0
Arkansas	Elem & Sec Other Employees	0	0	0
Arkansas	Higher Ed Instructional Employees	8,458	11,190	46,938,704
Arkansas	Higher Ed Other Employees	15,888	21,698	46,789,700
Arkansas	Other Education	1,532	1,571	4,911,201
Arkansas	Local Libraries	0	0	0
Arkansas	State Liquor Stores	0	0	0
Arkansas	All Other and Unallocable	2,475	2,499	8,326,801

Impact Analysis for the Economy and Infrastructure in Arkansas

Specific impacts have been analyzed previously for the four primary vulnerabilities, however the following items are considered as general vulnerabilities for the state:

Rippling recession and economic slow-down as people adjust to the situation and deal with panic, fear and direct costs of the outbreaks.

Impacts to tourism, hunting, and fishing as visitors avoid infected areas.

Transportation issues such as traffic being slowed or halted in and around quarantined locations.

Re-prioritizing of government initiatives as people and resources are shifted to respond and recover from the disaster.

General slowdown of essential government services as staff concentrate on the biological events and not on day-to-day responsibilities.

Negative national press about the State of Arkansas and a loss of confidence in the leadership of the state.

Short and long term unemployment as businesses close and re-organize while dealing with the financial aftermath.

Continuity of operations issues for the government, the health care industry, and the affected areas.

Development in Hazard Prone Areas:

It is near impossible to determine how development may affect an outbreak. However, it is safe to assume that urban areas which are experiencing more growth would see a higher number of biological events than those areas that have fewer people and less development.

4.4 Assessing Vulnerability of State Facilities

Assessing Vulnerability of State Facilities	
IFR REQUIREMENT 201.4(c)(2)(ii):	[The risk assessment shall include an] overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2) based on estimates provided in the State risk assessment State owned critical or operated facilities located in the identified hazard areas shall also be addressed ...
Explanation:	The plan **shall** describe the State-owned or operated buildings, infrastructure, and critical facilities located in areas subject to hazards described previously. The description *should* include the uses, approximate sizes, types, and values of buildings, infrastructure, and critical facilities.

As part of the 2010 plan update process, this section of the plan has been revisited, reviewed and modified to reflect new information from the period of 2007 through 2010. When necessary and applicable, updated information has been added to enhance the existing analysis and to make the analysis more current.

Based on the results of the 2010 analysis, the HMP Sub-Committee recognized an inherent weakness due to the lack of spatial data for the state-owned and operated facilities. In order to overcome this deficiency, a major initiative to collect latitude and longitude coordinates for these state facilities was undertaken in 2007 to support this vulnerability analysis and the overall project. In conjunction with the Arkansas Geographic Information Office, the Arkansas Office of Information Technology, and the Arkansas Building Authority, Arkansas Department of Emergency Management initiated a project to analyze the various state facility databases and to send technical teams throughout the state with state-of-the-art GPS equipment for the field collection of latitudes and longitudes. The data collection process is detailed in this section and the resulting data is used for the subsequent vulnerability analysis. This finalized dataset resides with the AGIO and with ADEM and will be maintained and improved over time to accurately reflect the inventory of state-owned and operated facilities.

2010 Baseline Analysis

The Hazard Mitigation Planning Sub-Committee acquired state building and structure data from the Arkansas Insurance Department and the Arkansas Building Authority. The Arkansas Insurance Department database included information on all state-owned and state-operated buildings and structures with the exception of those in the University of Arkansas System. Experts from the Arkansas Insurance Department assessed values of structures, buildings, and contents of state buildings and structures. University of Arkansas System building data were acquired separately and combined with the Arkansas Insurance Department database to the extent possible.

Data fields in the Arkansas Insurance Department State Master Property database included agency name, division, building name, address, insurance status, fire protection class, earthquake zone, flood zone, building condition, square footage, number of stories, cost to rebuild, insured replacement cost of building, insured replacement cost of contents, date of construction, occupancy hours, among other fields. Latitude and longitude data of state facilities, however, was not available. The University of Arkansas System building / structure data was available in much less detail. Numbers of buildings and their bulk values were provided, but specific building names and functions were not. Acquiring a complete inventory of state property, including detailed University of Arkansas System data and latitude-longitude values for each structure to facilitate GIS-based risk assessment, was deemed be a high priority for the next plan revision and was included as a mitigation action in Section 5.4.

Table 4.4-1: Values Insured by County

County	Values Insured	% Of Total
Arkansas	3,830,375.70	0.07%
Ashley	1,902,222.23	0.04%
Baxter	44,992,903.31	0.84%
Benton	71,783,804.51	1.34%
Boone	68,124,834.45	1.28%
Bradley	19,999,878.93	0.37%
Calhoun	981,339.99	0.02%
Carroll	1,576,559.69	0.03%
Chicot	61,183,752.86	1.15%
Clark	262,604,137.38	4.92%
Clay	6,767,564.87	0.13%
Cleburne	27,027,381.79	0.51%
Cleveland	482,566.36	0.01%
Columbia	211,243,772.15	3.96%
Conway	35,217,723.33	0.66%
Craighead	749,523,052.50	14.04%
Crawford	12,408,167.46	0.23%
Crittenden	62,304,892.62	1.17%
Cross	18,487,626.07	0.35%
Dallas	2,013,926.75	0.04%
Desha	3,164,912.57	0.06%
Drew	4,808,892.61	0.09%
Faulkner	678,045,112.51	12.70%
Franklin	16,548,942.73	0.31%
Fulton	7,179,035.03	0.13%
Garland	134,618,782.99	2.52%
Grant	1,356,977.06	0.03%
Greene	17,181,341.27	0.32%
Hempstead	50,757,657.20	0.95%
Hot Spring	213,727,051.98	4.00%
Howard	7,027,028.24	0.13%
Independence	7,935,313.54	0.15%
Izard	71,411,631.81	1.34%
Jackson	155,152,098.21	2.91%

Jefferson	278,006,860.45	5.21%
Johnson	3,922,578.60	0.07%
Lafayette	3,261,122.80	0.06%
Lawrence	14,234,492.79	0.27%
Lee	100,292,910.25	1.88%
Lincoln	210,593,736.48	3.95%
Little River	4,244,233.24	0.08%
Logan	97,802,477.16	1.83%
Lonoke	10,794,357.91	0.20%
Madison	4,493,124.06	0.08%
Marion	2,158,930.90	0.04%
Miller	85,233,469.49	1.60%
Mississippi	82,660,649.45	1.55%
Monroe	1,531,198.26	0.03%
Montgomery	1,266,175.82	0.02%
Nevada	3,552,510.29	0.07%
Newton	2,351,636.66	0.04%
Ouachita	73,162,443.76	1.37%
Perry	930,995.27	0.02%
Phillips	14,199,576.95	0.27%
Pike	11,086,870.44	0.21%
Poinsett	15,313,488.78	0.29%
Polk	26,471,576.58	0.50%
Pope	318,408,640.88	5.97%
Prairie	2,438,263.27	0.05%
Pulaski	52,414,622.57	0.98%
Pulaski	1,636,064,540.49	30.65%
Pulaski	135,033,983.24	2.53%
Randolph	50,438,559.05	0.94%
Saint Francis	38,747,652.13	0.73%
Saline	134,275,133.84	2.52%
Scott	1,535,866.52	0.03%
Searcy	1,902,799.76	0.04%
Sebastian	10,473,654.73	0.20%
Sebastian	22,835,302.50	0.43%
Sevier	909,672.85	0.02%
Sharp	5,365,441.48	0.10%
Stone	27,085,460.40	0.51%
Union	60,087,953.00	1.13%
Van Buren	1,373,742.69	0.03%
Washington	56,098,950.40	1.05%
White	103,026,517.01	1.93%
Woodruff	997,067.43	0.02%
Yell	9,139,987.62	0.17%
Total Value	6,747,590,487.42	100%

Based on the data in Table 4.4-1, it was determined that the state owns 4,312 buildings or structures that, including contents, are valued at approximately $6.747 billion.

The number of state buildings or structures ranges from four in Cleveland County to 431 in Pulaski County. The average county had just over 57 state buildings. A map showing the value of state buildings and structures by county is presented in Figure 4.4-2. The value of state buildings and structures ranges from $482,566 in Cleveland County to over $1.6 billion dollars in Pulaski County. The average Arkansas County has state buildings worth approximately $94 million dollars. The number and value of buildings is strongly controlled by the locations of the large state universities (Pulaski, Washington, Craighead, Faulkner, and Jefferson Counties) and the location of the state capitol (Pulaski County).

Though all state-owned and operated facilities are considered important for the continuing operations of government and all are at risk to some or all of the profiled hazards, the HMP Sub-Committee had identified the locations with the highest total replacement cost and listed these as the most critical vulnerabilities in the state. The following list of facilities details all of the locations with a value of over $5 million.

Table 4.4-2: State-owned and Operated Facilities

Building Name 1	City	Total Values Insured
CAPITOL BUILDING (HISTORICAL - RC)	Little Rock	345,586,154.94
WITT STEPHENS JR NATURE CENTER	Little Rock	8,318,613.00
ADMINISTRATION HEADQUARTERS OFFICE	Little Rock	11,362,144.58
FORT SMITH NATURE CENTER	Barling	6,248,678.36
CENTRAL OFFICE ANNEX 6-60-48	Little Rock	11,429,271.01
MATERIALS LAB BUILDING 6-60-95	Little Rock	15,077,945.70
ADMINISTRATIVE HQ 6-60-51	Little Rock	36,355,154.10
EAST HALL	Arkadelphia	7,206,527.98
DUKES WELLS HPR CENTER	Arkadelphia	14,620,575.40
RUSSELL FINE ARTS	Arkadelphia	9,806,101.20
STURGIS HONORS HALL	Arkadelphia	5,471,696.00
NEWBERRY HALL	Arkadelphia	12,062,480.85
MCBRIEN HALL	Arkadelphia	9,819,674.25
EDUCATION BUILDING	Arkadelphia	7,120,785.70
WEST HALL	Arkadelphia	6,916,878.35
CHARLES D. DUNN RECREATION CENTER	Arkadelphia	6,829,650.85
REYNOLDS- MCELHANNON HALL	Arkadelphia	20,389,050.93
WOMACK HALL	Arkadelphia	8,374,770.21
SMITH HALL	Arkadelphia	12,064,633.35
CAPLINGER AIRWAY SCIENCE	Arkadelphia	6,925,848.48
ARKANSAS HALL	Arkadelphia	10,326,084.73
GARRISON ACTIVITY CENTER	Arkadelphia	19,487,353.10
HUIE LIBRARY	Arkadelphia	34,834,405.80
HKR COMPLEX #013	Magnolia	11,431,616.46
BRUCE CENTER #036	Magnolia	7,834,617.84
MAGALE LIBRARY #012	Magnolia	31,837,489.74
SCIENCE AND TECHNOLOGY CENTER	Magnolia	17,453,194.68
WILSON HALL #011	Magnolia	13,825,450.46

HONORS HALL (SOUTH/NORTH) #99/#107	Magnolia	7,193,252.48
BUSSEY HALL #090	Magnolia	6,532,442.52
REYNOLDS COMMUNITY CENTER #109	Magnolia	19,257,486.54
BUSINESS/ AG BUSINESS #032	Magnolia	12,655,813.17
OVERSTREET HALL #005	Magnolia	9,621,714.82
ENGINEERING TECH	East Camden	11,287,924.17
BUSINESS/ STUDENT CENTER	East Camden	8,823,331.63
ADMINISTRATION/ CLASSROOM	East Camden	9,683,434.13
STUDENT CENTER	Beebe	8,698,150.00
SCIENCE BUILDING	Beebe	13,383,280.48
ADMINISTRATION/ STUDENT SERVICES	Heber Springs	9,080,768.15
ACADEMIC CENTER BUILDING	Heber Springs	12,115,504.26
ABINGTON LIBRARY	Beebe	12,291,226.00
OWENS CENTER	Beebe	11,368,113.05
WILSON HALL	Jonesboro	14,865,391.98
UNIVERSITY HALL	Jonesboro	11,398,859.44
REYNOLDS CENTER FOR HEALTH SCIENCES	Jonesboro	15,090,283.70
FINE ARTS CENTER	Jonesboro	10,706,772.65
ABI/BIOTECHNOLOGY BLDG.	Jonesboro	32,219,107.55
AGRI SCIENCE COMPLEX	Jonesboro	18,198,682.67
BUSINESS EDUCATION	Jonesboro	11,635,897.23
COLLEGIATE PARK BUILDINGS 1-6	Jonesboro	10,576,480.01
FACILITIES MANAGEMENT MAIN BUILDING	Jonesboro	9,416,149.41
FOOTBALL STADIUM COMPLEX	Jonesboro	30,904,829.50
CONVOCATION CENTER	Jonesboro	44,510,208.39
FOWLER CENTER	Jonesboro	22,496,358.87
HPESS COMPLEX	Jonesboro	18,824,509.33
LAB SCIENCE/ ENGINEERING (EAST / WEST)	Jonesboro	39,261,277.84
LIBRARY COMPLEX / DEAN B. ELLIS	Jonesboro	93,874,337.47
NURSING/HEALTH PROFESSIONS	Jonesboro	10,238,427.44
RENG STUDENT SERVICES CENTER	Jonesboro	63,222,793.08
EDUCATION / COMMUNICATIONS	Jonesboro	16,864,898.84
INFORMATION & TECHNOLOGY SERVICES	Jonesboro	11,253,045.53
ARKANSAS HALL	Jonesboro	11,948,595.21
KAYS HALL	Jonesboro	17,101,705.99
PARKING GARAGE	Jonesboro	7,845,697.83
ADMINISTRATION	Jonesboro	10,665,766.96
SMITH HALL	Jonesboro	13,253,754.21
DELTA CENTER FOR ECONOMIC DEVELOPMENT	Jonesboro	6,558,978.08
RED WOLF CENTER	Jonesboro	16,236,714.43
ROLLER HALL	Mountain Home	9,445,326.83
MCCLAIN HALL	Mountain Home	5,971,191.83
WALTON HALL	Newport	10,891,242.05
PAINE HALL	Russellville	7,093,811.63
BASWELL/THONE HALL	Russellville	13,346,148.98
McEVER SCIENCE (COMPLEX &	Russellville	16,359,754.17

BOILER HOUSE)		
TUCKER COLISEUM	Russellville	15,107,794.03
WITHERSPOON BUILDING	Russellville	18,642,027.58
TOMLINSON BUILDING	Russellville	6,128,918.96
WILSON HALL	Russellville	5,972,737.46
HULL PHYSICAL EDUCATION	Russellville	19,775,678.05
ROTHWELLHALL	Russellville	11,979,262.13
CHAMBERS CAFETERIA	Russellville	8,192,472.14
NUTT HALL	Russellville	12,774,787.79
NORMAN ART CENTER	Russellville	6,368,305.18
DOC BRYAN STUDENT SERVICES BLDG.	Russellville	13,794,834.29
DEAN BUILDING	Russellville	7,710,218.30
PENDERGRAFT LIBRARY - TECHNOLOGY CENTER	Russellville	35,637,423.75
CORLEY BUILDING	Russellville	17,280,251.55
ESTES STADIUM COMPLEX #064	Conway	11,981,992.42
STUDENT CENTER #063	Conway	20,266,066.30
MASHBURN #023	Conway	14,984,047.40
PRINCE CENTER #026	Conway	7,525,816.75
MCALISTER HALL #034	Conway	11,032,481.06
PHYSICAL THERAPY BLDG #097	Conway	9,916,340.11
OLD MAIN #038	Conway	12,551,984.96
HUGHES HALL #058	Conway	6,203,140.84
CHRISTIAN CAFETERIA #054	Conway	6,168,178.34
STATE HALL #062	Conway	6,045,934.60
COLLEGE SQUARE LIVING CENTER #017	Conway	12,836,518.77
WINGO HALL #065	Conway	8,380,604.46
DOYNE HEALTH SCIENCE / GROSS ANATOMY #028	Conway	13,646,302.65
STUDENT HEALTH CLINIC #069	Conway	7,182,806.40
LEWIS SCIENCE CENTER #033A	Conway	29,626,854.68
SNOW FINE ART #041	Conway	12,494,879.44
TORREYSON LIBRARY #042	Conway	89,800,820.37
FARRIS HALL #008	Conway	13,723,138.73
BUSINESS BUILDING #009	Conway	16,671,640.38
IRBY HALL #032	Conway	16,294,782.62
HEALTH PHYSICAL EDUCATION AND RECREATION #002	Conway	9,394,077.57
MINTON HALL #050/059	Conway	6,118,446.81
THOMPSON HALL #018	Conway	8,484,619.54
LANEY SCIENCE #031	Conway	11,286,053.05
BURDICK BUSINESS #022	Conway	18,480,216.30
MCCASTLAIN HALL #055	Conway	7,610,908.56
CONWAY HALL W/BOILER HOUSE #056	Conway	7,309,727.18
REYNOLDS PERFORMANCE #004/BHCC #085/RUSS HALL #006	Conway	24,343,443.38
BERNARD OFFICE #052 / #52R	Conway	12,976,377.59
MATH TECHNOLOGY #019	Conway	11,873,177.90
DENNY/ SHORT #057/061	Conway	7,498,914.59
RESIDENCE HALL - NORTH #003	Conway	12,052,453.56
BARIDON HALL #066	Conway	11,061,820.71
CARMICHAEL HALL W/BOILER HOUSE #053	Conway	7,336,537.95

ARKANSAS HALL #051	Conway	6,788,037.77
FARRIS PHYSICAL EDUCATION #024	Conway	18,499,024.37
FINE ARTS CENTER	Forrest City	9,931,693.43
LAB SCIENCE	Hot Springs	9,379,765.78
CAMPUS CENTER	Hot Springs	10,168,256.25
NURSING AND HEALTH SCIENCES BUILDING	Hot Springs	7,594,809.25
WORKFORCE TECHNICAL CENTER	West Memphis	10,187,694.35
UNIVERSITY CENTER	West Memphis	8,091,644.18
REYNOLDS CENTER	West Memphis	17,065,523.28
BUILDING COMPLEX A, B, C, D - 2501 HWY 61 South	Blytheville	16,977,405.05
DURAND CENTER	Harrison	14,663,344.55
MAIN BUILDING	Harrison	31,469,855.45
ADMINISTRATION (HISTORICAL - RC)	El Dorado	6,929,978.88
WHITFIELD CLASSROOM BUILDING	El Dorado	6,940,216.58
GLOBAL BUSINESS DEVELOPMENT CENTER	Bentonville	8,414,269.08
STUDENT CENTER	Bentonville	18,597,539.53
SHEWMAKER CENTER FOR WORKFORCE TECHNOLOGY	Bentonville	7,547,717.68
BOB BURNS HALL	Bentonville	36,758,399.33
GRAND HALL	Little Rock	6,191,205.57
MANSION AND WALKWAYS	Little Rock	7,411,088.71
STADIUM COMPLEX	Little Rock	58,833,773.22
JUSTICE BUILDING - EAST WING	Little Rock	16,525,298.92
ABA BUILDING	Little Rock	25,610,447.15
MULTI-AGENCY COMPLEX	Little Rock	55,032,225.96
CRIME LAB BUILDING	Little Rock	20,890,593.68
MAIN STREET MALL	Little Rock	33,841,331.33
D F & A ADMINISTRATION BUILDING	Little Rock	9,285,839.80
PUBLIC SERVICE COMMISSION	Little Rock	9,041,444.03
900 WEST CAPITOL BUILDING	Little Rock	26,578,766.60
ARKANSAS SERVICES CENTER	Jonesboro	25,245,265.18
JUSTICE BUILDING - WEST WING	Little Rock	13,123,176.89
STATE OFFICE BUILDING	Fort Smith	11,298,222.40
NATURAL RESOURCES BUILDING	Little Rock	16,404,105.13
1515 BUILDING	Little Rock	9,699,005.72
VETERAN HOME DORMITORY	Little Rock	10,440,310.60
SPRING PLAZA BUILDING	Little Rock	15,264,631.69
W - 100 (101, 103, 104, 105, 112, 113, 116, 123) MAIN COMPLEX	Pine Bluff	9,831,912.75
V - 105 VO-TECH COMPLEX	Grady	5,941,483.23
G - 100 MAIN BUILDING	Newport	61,628,708.23
C - 295 WASTEWATER COMPLEX	Grady	5,040,896.70
WR - 155 FEMALE BARRACKS (200 BED)	Wrightsville	7,268,818.92
MCP - 100 MAIN BUILDING	Newport	40,594,625.83
A - 112 ADMINISTRATION EAST 2403 E. HARDING	Pine Bluff	10,826,285.87
D - 104 MAIN BUILDING (D- 105,106, 112)	Pine Bluff	17,553,171.13
T - 124 MAIN BUILDING (T-121,122,124,125,129,171)	Tucker	35,691,415.33

DM - 100 MAIN UNIT BUILDING	Dermott	34,068,259.15
MV - 100 MAIN BUILDING 134-137, 110-111	Malvern	88,040,934.88
JC - 100 JAIL BUILDING	Pine Bluff	27,419,584.35
NC - 100 MAIN BUILDING	Calico Rock	45,265,178.75
LC - 104 MAIN BUILDING	Brickeys	87,489,499.23
C - 261 TRUSTEE BARRACKS	Grady	7,203,399.68
SPECIAL NEEDS UNIT - PHASE II	Malvern	32,091,622.50
SPECIAL NEEDS UNIT - PHASE III	Malvern	22,045,344.27
M - 100 MAIN BUILDING (M: 100, 120, 122, 124, 125-128, 131-134)	Tucker	50,864,553.88
V - 100 MAIN BUILDING (V-100,119, 107,108)	Grady	82,415,122.95
C - 108 MAIN BUILDING ETC (C-105, 106, 108, 111, 125, 222, 225, 226, 227)	Grady	47,373,256.28
MAIN COMPLEX	Texarkana	75,873,454.20
MAIN BUILDING	Osceola	10,426,153.58
ROGERS HALL	Little Rock	8,933,722.01
MAIN BUILDING	Malvern	10,522,408.99
LUTHER HARDIN BUILDING	Little Rock	5,739,951.21
ARCH FORD EDUCATION BUILDING	Little Rock	16,716,560.39
ADMINISTRATION / PRIMARY #1	Little Rock	10,130,988.28
NUTT ATHLETIC COMPLEX #6	Little Rock	5,327,890.55
GURDON - STATION AND TOWER	Gurdon	6,592,097.00
NEW STUDIO BUILDING	Conway	11,792,307.25
BONO - STATION AND TOWER	Bono	6,889,900.00
OLD STUDIO BUILDING	Conway	13,070,946.58
WINSLOW - STATION AND TOWER	Winslow	7,004,425.00
FOX - STATION AND TOWER	Fox	6,619,209.00
ADMINISTRATION #1	Hot Springs	40,433,919.18
RAGLAND BUILDING	Little Rock	20,400,219.74
LEDBETTER BUILDING	Little Rock	37,766,433.53
ARKANSAS PUBLIC HEALTH LABORATORY	Little Rock	65,804,819.25
CENTRAL OFFICE COMPLEX	Little Rock	77,045,394.67
DEVELOPMENT CENTER / BUSINESS TECHNOLOGY	Pocahontas	9,613,949.58
ADMINISTRATION BUILDING A	Pocahontas	7,623,126.06
MILLER EDUCATION COMPLEX	Melbourne	8,550,951.72
MCGEORGE HALL	Pine Bluff	7,027,678.31
TECHNOLOGY	Pine Bluff	8,849,610.15
SCIENCE / LIBRARY BUILDING	North Little Rock	10,883,976.85
CAMPUS CENTER	North Little Rock	20,420,097.15
SOUTH CAMPUS - LITTLE ROCK	Little Rock	31,546,257.93
ALLIED HEALTH EDUCATION CENTER	North Little Rock	6,913,848.45
ADMINISTRATION/ CLASSROOM BLDG (A)	North Little Rock	8,983,784.70
INFORMATION TECHNOLOGY BUILDING	North Little Rock	8,391,156.35
BUILDING #80	Benton	33,227,693.36
DONAGHEY PLAZA SOUTH	Little Rock	25,767,956.94
UNIT #5 - UNIT #6 - ENTRY BUILDING	Little Rock	13,360,729.15
DONAGHEY PLAZA NORTH	Little Rock	11,400,593.91
BOND BUILDING	Alexander	16,067,399.19

PARKING DECK	Little Rock	10,479,824.99
COMMONS	Booneville	7,324,973.55
DONAGHEY PLAZA WEST	Little Rock	13,336,998.35
BUILDING #70	Benton	19,118,070.20
STATE HOSPITAL	Little Rock	37,902,934.47
WORKFORCES SERVICES BUILDING	Little Rock	21,943,340.43
COLLECTION MANAGEMENT FACILITY	Little Rock	6,550,250.20
MOSAIC TEMPLAR CULTURAL CENTER	Little Rock	12,499,802.23
OLD STATEHOUSE (HISTORICAL - RC)	Little Rock	36,021,425.35
VISITOR CENTER	Little Rock	11,774,866.62
VISITORS INFORMATION CENTER	Bull Shoals	5,658,743.54
MUSEUM 54.03	Smackover	10,857,262.26
COURTHOUSE 62.01 (HISTORICAL - RC)	Powhatan	6,154,462.85
1874 COURTHOUSE 41.22 (HISTORICAL - RC)	Washington	7,069,678.18
LODGE/ CONVENTION CENTER 20.11 - 20.27	Bismarck	15,064,668.39
AUTO MUSEUM	Morrilton	7,037,314.83
LODGE/ RESTAURANT 12.12	Mena	5,946,526.11
MATHER LODGE 41.38 (HISTORICAL - RC)	Morrilton	6,614,438.78
COURTHOUSE / MUSEUM 18.01 (HISTORICAL - RC)	Jacksonport	6,496,234.75
LODGE	Paris	45,881,327.36
MAIN OFFICE BUILDING	North Little Rock	29,839,506.95
ADMINISTRATION/ DORM COMPLEX	East Camden	10,560,636.40
STATE HEADQUARTERS BUILDING	Little Rock	54,536,440.64
A09 STATE HQS LITTLE ROCK	Little Rock	5,234,678.10
HEADQUARTERS BUILDING	North Little Rock	19,858,290.19

The State of Arkansas owns approximately 1,139 buildings or structures with a value of approximately $3.98 billion that may be classified as critical facilities. Table 4.4-1 shows the breakdown of state critical facilities by category. Over 50% of these buildings or structures fall into the High Density Occupancy category. Many of these structures are university or government buildings.

Table 4.4-3: Number, Value, and Examples of Critical Facilities Subdivided by Critical Facility Category.

Critical Facility Category	Number of Critical Facilities	Value of Critical Facilities	Examples of State Critical Facilities
High Density Occupancy	581	$3,555,429,534	State Office Buildings, Headquarters, Large University Halls, Dormitories, Gymnasiums, Barracks, etc.
Utilities	174	$98,392,554	Fuel Storage, Water Tanks, Wastewater Complex, Radio Towers, Communications Equipment, Microwave Relay Sites
Transportation	169	$94,054,534	Arkansas Highway Transportation Department (AHTD) facilities including Headquarters, Area Headquarters, Salt Storage, Bulk Storage, etc.
Industrial	140	$3,637,520	Chemical, Chemical Storage, Dynamite House, Flammable Storage, etc.
Public Safety	61	$225,445,962	Police, Emergency Response, Government Offices, Fire Station, Department of Emergency Management Complex, etc.
Agricultural	1	$2,046,115	Grain Dryer / Storage
Cultural	3	$962,697	Old State House in Little Rock, Arkansas
Totals	**1139**	**$3,979,968,916**	

The number of critical facilities ranges from two in Cleveland County to 173 in Pulaski County. The average county has just over 15 state critical facilities. Values of state critical facilities range from $131,160 in Monroe County to over 1.2 billion in Pulaski County. The average Arkansas County had critical facilities worth approximately $53 million dollars.

2010 Analysis of State-Owned and Operated Facilities

For the 2010 plan update process, the data from previous plan versions was analyzed and updated with the best available current data. The HMP Sub-Committee collected the current versions of the facility data from the Arkansas Building Authority and the Arkansas Insurance Department in order to update the analysis. Due to varying data formats and data limitations, this 2010 analysis does not match exactly with the previous analysis, however the overall process has been replicated and this updated information is detailed in Table 4.4-4. The ABA database and the AID information are not coming from the same source and they are each capturing different information. The HMP Sub-Committee has determined that this lack of consistency is a major factor limiting this analysis. The Sub-Committee has determined that the review and comparison of these varying facility databases is a high priority project that should be undertaken during future revisions of this plan.

Upon review of the two separate databases, the AID data was more consistent and was therefore used exclusively for this particular exposure analysis of state facilities. Based on the annual AID policy renewal reporting, the state inventory of facilities had a total insured value of $6,747,590,489. The following insured building quantities and value amounts for state-owned and operated facilities are listed by county.

Table 4.4-4: Facilities Insured by County

County	Values Insured	% Of Total
	$ 328,091	0.0%
Arkansas	3,830,375.70	0.07%
Ashley	1,902,222.23	0.04%
Baxter	44,992,903.31	0.84%
Benton	71,783,804.51	1.34%
Boone	68,124,834.45	1.28%
Bradley	19,999,878.93	0.37%
Calhoun	981,339.99	0.02%
Carroll	1,576,559.69	0.03%
Chicot	61,183,752.86	1.15%
Clark	262,604,137.38	4.92%
Clay	6,767,564.87	0.13%
Cleburne	27,027,381.79	0.51%
Cleveland	482,566.36	0.01%
Columbia	211,243,772.15	3.96%
Conway	35,217,723.33	0.66%
Craighead	749,523,052.50	14.04%
Crawford	12,408,167.46	0.23%
Crittenden	62,304,892.62	1.17%
Cross	18,487,626.07	0.35%
Dallas	2,013,926.75	0.04%
Desha	3,164,912.57	0.06%
Drew	4,808,892.61	0.09%
Faulkner	678,045,112.51	12.70%
Franklin	16,548,942.73	0.31%
Fulton	7,179,035.03	0.13%
Garland	134,618,782.99	2.52%
Grant	1,356,977.06	0.03%
Greene	17,181,341.27	0.32%
Hempstead	50,757,657.20	0.95%
Hot Spring	213,727,051.98	4.00%
Howard	7,027,028.24	0.13%
Independence	7,935,313.54	0.15%
Izard	71,411,631.81	1.34%
Jackson	155,152,098.21	2.91%
Jefferson	278,006,860.45	5.21%
Johnson	3,922,578.60	0.07%
Lafayette	3,261,122.80	0.06%
Lawrence	14,234,492.79	0.27%
Lee	100,292,910.25	1.88%
Lincoln	210,593,736.48	3.95%
Little River	4,244,233.24	0.08%
Logan	97,802,477.16	1.83%
Lonoke	10,794,357.91	0.20%
Madison	4,493,124.06	0.08%
Marion	2,158,930.90	0.04%
Miller	85,233,469.49	1.60%
Mississippi	82,660,649.45	1.55%
Monroe	1,531,198.26	0.03%
Montgomery	1,266,175.82	0.02%
Nevada	3,552,510.29	0.07%
Newton	2,351,636.66	0.04%
Ouachita	73,162,443.76	1.37%
Perry	930,995.27	0.02%
Phillips	14,199,576.95	0.27%
Pike	11,086,870.44	0.21%
Poinsett	15,313,488.78	0.29%

Polk	26,471,576.58	0.50%
Pope	318,408,640.88	5.97%
Prairie	2,438,263.27	0.05%
Pulaski	1,823,513,146.00	34.16%
Randolph	50,438,559.05	0.94%
Saint Francis	38,747,652.13	0.73%
Saline	134,275,133.84	2.52%
Scott	1,535,866.52	0.03%
Searcy	1,902,799.76	0.04%
Sebastian	33,308,956.00	0.63%
Sevier	909,672.85	0.02%
Sharp	5,365,441.48	0.10%
Stone	27,085,460.40	0.51%
Union	60,087,953.00	1.13%
Van Buren	1,373,742.69	0.03%
Washington	56,098,950.40	1.05%
White	103,026,517.01	1.93%
Woodruff	997,067.43	0.02%
Yell	9,139,987.62	0.17%
Total Values	6,747,590,487.42	**99.4%**

Some counties have a large number of state facilities and others have a very low number. Based on the current data the average amount per county of building and content value is $89,996,787.

Table 4.4-5: Top 10 Facility Exposure by County

County	Values Insured	% Of Total
Pulaski	1,823,513,146.00	34.16%
Faulkner	749,523,052.50	14.04%
Jefferson	678,045,112.51	12.70%
Pope	318,408,640.88	5.97%
Clark	278,006,860.45	5.21%
Lincoln	262,604,137.38	4.92%
Columbia	213,727,051.98	4.00%
Jackson	211,243,772.15	3.96%
Saline	210,593,736.48	3.95%
Hot Spring	155,152,098.21	2.91%

Though all state-owned and operated facilities are considered important for the continuing operations of government and all are at risk to some or all of the profiled hazards, the HMP Sub-Committee has identified the locations with the highest total replacement cost and listed these as the most critical vulnerabilities in the state.

Table 4.4-6: State-owned and Operated Facility Values

Building Name 1	City	Total Values Insured
BOND BUILDING	Alexander	16,067,399.19
EAST HALL	Arkadelphia	7,206,527.98
DUKES WELLS HPR CENTER	Arkadelphia	14,620,575.40
RUSSELL FINE ARTS	Arkadelphia	9,806,101.20
STURGIS HONORS HALL	Arkadelphia	5,471,696.00
NEWBERRY HALL	Arkadelphia	12,062,480.85
MCBRIEN HALL	Arkadelphia	9,819,674.25
EDUCATION BUILDING	Arkadelphia	7,120,785.70
WEST HALL	Arkadelphia	6,916,878.35
CHARLES D. DUNN RECREATION CENTER	Arkadelphia	6,829,650.85
REYNOLDS- MCELHANNON HALL	Arkadelphia	20,389,050.93
WOMACK HALL	Arkadelphia	8,374,770.21
SMITH HALL	Arkadelphia	12,064,633.35
CAPLINGER AIRWAY SCIENCE	Arkadelphia	6,925,848.48
ARKANSAS HALL	Arkadelphia	10,326,084.73
GARRISON ACTIVITY CENTER	Arkadelphia	19,487,353.10
HUIE LIBRARY	Arkadelphia	34,834,405.80
FORT SMITH NATURE CENTER	Barling	6,248,678.36
STUDENT CENTER	Beebe	8,698,150.00
SCIENCE BUILDING	Beebe	13,383,280.48
ABINGTON LIBRARY	Beebe	12,291,226.00
OWENS CENTER	Beebe	11,368,113.05
BUILDING #80	Benton	33,227,693.36
BUILDING #70	Benton	19,118,070.20
GLOBAL BUSINESS DEVELOPMENT CENTER	Bentonville	8,414,269.08
STUDENT CENTER	Bentonville	18,597,539.53
SHEWMAKER CENTER FOR WORKFORCE TECHNOLOGY	Bentonville	7,547,717.68
BOB BURNS HALL	Bentonville	36,758,399.33
LODGE/ CONVENTION CENTER 20.11 - 20.27	Bismarck	15,064,668.39
BUILDING COMPLEX A, B, C, D - 2501 HWY 61 South	Blytheville	16,977,405.05
BONO - STATION AND TOWER	Bono	6,889,900.00
COMMONS	Booneville	7,324,973.55
LC - 104 MAIN BUILDING	Brickeys	87,489,499.23
VISITORS INFORMATION CENTER	Bull Shoals	5,658,743.54
NC - 100 MAIN BUILDING	Calico Rock	45,265,178.75
ESTES STADIUM COMPLEX #064	Conway	11,981,992.42
STUDENT CENTER #063	Conway	20,266,066.30
MASHBURN #023	Conway	14,984,047.40
PRINCE CENTER #026	Conway	7,525,816.75
MCALISTER HALL #034	Conway	11,032,481.06
PHYSICAL THERAPY BLDG #097	Conway	9,916,340.11
OLD MAIN #038	Conway	12,551,984.96
HUGHES HALL #058	Conway	6,203,140.84
CHRISTIAN CAFETERIA #054	Conway	6,168,178.34
STATE HALL #062	Conway	6,045,934.60
COLLEGE SQUARE LIVING CENTER #017	Conway	12,836,518.77
WINGO HALL #065	Conway	8,380,604.46

DOYNE HEALTH SCIENCE / GROSS ANATOMY #028	Conway	13,646,302.65
STUDENT HEALTH CLINIC #069	Conway	7,182,806.40
LEWIS SCIENCE CENTER #033A	Conway	29,626,854.68
SNOW FINE ART #041	Conway	12,494,879.44
TORREYSON LIBRARY #042	Conway	89,800,820.37
FARRIS HALL #008	Conway	13,723,138.73
BUSINESS BUILDING #009	Conway	16,671,640.38
IRBY HALL #032	Conway	16,294,782.62
HEALTH PHYSICAL EDUCATION AND RECREATION #002	Conway	9,394,077.57
MINTON HALL #050/059	Conway	6,118,446.81
THOMPSON HALL #018	Conway	8,484,619.54
LANEY SCIENCE #031	Conway	11,286,053.05
BURDICK BUSINESS #022	Conway	18,480,216.30
MCCASTLAIN HALL #055	Conway	7,610,908.56
CONWAY HALL W/BOILER HOUSE #056	Conway	7,309,727.18
REYNOLDS PERFORMANCE #004/BHCC #085/RUSS HALL #006	Conway	24,343,443.38
BERNARD OFFICE #052 / #52R	Conway	12,976,377.59
MATH TECHNOLOGY #019	Conway	11,873,177.90
DENNY/ SHORT #057/061	Conway	7,498,914.59
RESIDENCE HALL - NORTH #003	Conway	12,052,453.56
BARIDON HALL #066	Conway	11,061,820.71
CARMICHAEL HALL W/BOILER HOUSE #053	Conway	7,336,537.95
ARKANSAS HALL #051	Conway	6,788,037.77
FARRIS PHYSICAL EDUCATION #024	Conway	18,499,024.37
NEW STUDIO BUILDING	Conway	11,792,307.25
OLD STUDIO BUILDING	Conway	13,070,946.58
DM - 100 MAIN UNIT BUILDING	Dermott	34,068,259.15
ENGINEERING TECH	East Camden	11,287,924.17
BUSINESS/ STUDENT CENTER	East Camden	8,823,331.63
ADMINISTRATION/ CLASSROOM	East Camden	9,683,434.13
ADMINISTRATION/ DORM COMPLEX	East Camden	10,560,636.40
ADMINISTRATION (HISTORICAL - RC)	El Dorado	6,929,978.88
WHITFIELD CLASSROOM BUILDING	El Dorado	6,940,216.58
FINE ARTS CENTER	Forrest City	9,931,693.43
STATE OFFICE BUILDING	Fort Smith	11,298,222.40
FOX - STATION AND TOWER	Fox	6,619,209.00
V - 105 VO-TECH COMPLEX	Grady	5,941,483.23
C - 295 WASTEWATER COMPLEX	Grady	5,040,896.70
C - 261 TRUSTEE BARRACKS	Grady	7,203,399.68
V - 100 MAIN BUILDING (V-100,119, 107,108)	Grady	82,415,122.95
C - 108 MAIN BUILDING ETC (C-105, 106, 108, 111, 125, 222, 225, 226, 227)	Grady	47,373,256.28
GURDON - STATION AND TOWER	Gurdon	6,592,097.00
DURAND CENTER	Harrison	14,663,344.55
MAIN BUILDING	Harrison	31,469,855.45
ADMINISTRATION/ STUDENT SERVICES	Heber Springs	9,080,768.15
ACADEMIC CENTER BUILDING	Heber Springs	12,115,504.26
LAB SCIENCE	Hot Springs	9,379,765.78

CAMPUS CENTER	Hot Springs	10,168,256.25
NURSING AND HEALTH SCIENCES BUILDING	Hot Springs	7,594,809.25
ADMINISTRATION #1	Hot Springs	40,433,919.18
COURTHOUSE / MUSEUM 18.01 (HISTORICAL - RC)	Jacksonport	6,496,234.75
WILSON HALL	Jonesboro	14,865,391.98
UNIVERSITY HALL	Jonesboro	11,398,859.44
REYNOLDS CENTER FOR HEALTH SCIENCES	Jonesboro	15,090,283.70
FINE ARTS CENTER	Jonesboro	10,706,772.65
ABI/BIOTECHNOLOGY BLDG.	Jonesboro	32,219,107.55
AGRI SCIENCE COMPLEX	Jonesboro	18,198,682.67
BUSINESS EDUCATION	Jonesboro	11,635,897.23
COLLEGIATE PARK BUILDINGS 1-6	Jonesboro	10,576,480.01
FACILITIES MANAGEMENT MAIN BUILDING	Jonesboro	9,416,149.41
FOOTBALL STADIUM COMPLEX	Jonesboro	30,904,829.50
CONVOCATION CENTER	Jonesboro	44,510,208.39
FOWLER CENTER	Jonesboro	22,496,358.87
HPESS COMPLEX	Jonesboro	18,824,509.33
LAB SCIENCE/ ENGINEERING (EAST / WEST)	Jonesboro	39,261,277.84
LIBRARY COMPLEX / DEAN B. ELLIS	Jonesboro	93,874,337.47
NURSING/HEALTH PROFESSIONS	Jonesboro	10,238,427.44
RENG STUDENT SERVICES CENTER	Jonesboro	63,222,793.08
EDUCATION / COMMUNICATIONS	Jonesboro	16,864,898.84
INFORMATION & TECHNOLOGY SERVICES	Jonesboro	11,253,045.53
ARKANSAS HALL	Jonesboro	11,948,595.21
KAYS HALL	Jonesboro	17,101,705.99
PARKING GARAGE	Jonesboro	7,845,697.83
ADMINISTRATION	Jonesboro	10,665,766.96
SMITH HALL	Jonesboro	13,253,754.21
DELTA CENTER FOR ECONOMIC DEVELOPMENT	Jonesboro	6,558,978.08
RED WOLF CENTER	Jonesboro	16,236,714.43
ARKANSAS SERVICES CENTER	Jonesboro	25,245,265.18
CAPITOL BUILDING (HISTORICAL - RC)	Little Rock	345,586,154.94
WITT STEPHENS JR NATURE CENTER	Little Rock	8,318,613.00
ADMINISTRATION HEADQUARTERS OFFICE	Little Rock	11,362,144.58
CENTRAL OFFICE ANNEX 6-60-48	Little Rock	11,429,271.01
MATERIALS LAB BUILDING 6-60-95	Little Rock	15,077,945.70
ADMINISTRATIVE HQ 6-60-51	Little Rock	36,355,154.10
GRAND HALL	Little Rock	6,191,205.57
MANSION AND WALKWAYS	Little Rock	7,411,088.71
STADIUM COMPLEX	Little Rock	58,833,773.22
JUSTICE BUILDING - EAST WING	Little Rock	16,525,298.92
ABA BUILDING	Little Rock	25,610,447.15
MULTI-AGENCY COMPLEX	Little Rock	55,032,225.96
CRIME LAB BUILDING	Little Rock	20,890,593.68
MAIN STREET MALL	Little Rock	33,841,331.33
D F & A ADMINISTRATION BUILDING	Little Rock	9,285,839.80
PUBLIC SERVICE COMMISSION	Little Rock	9,041,444.03

900 WEST CAPITOL BUILDING	Little Rock	26,578,766.60
JUSTICE BUILDING - WEST WING	Little Rock	13,123,176.89
NATURAL RESOURCES BUILDING	Little Rock	16,404,105.13
1515 BUILDING	Little Rock	9,699,005.72
VETERAN HOME DORMITORY	Little Rock	10,440,310.60
SPRING PLAZA BUILDING	Little Rock	15,264,631.69
ROGERS HALL	Little Rock	8,933,722.01
LUTHER HARDIN BUILDING	Little Rock	5,739,951.21
ARCH FORD EDUCATION BUILDING	Little Rock	16,716,560.39
ADMINISTRATION / PRIMARY #1	Little Rock	10,130,988.28
NUTT ATHLETIC COMPLEX #6	Little Rock	5,327,890.55
RAGLAND BUILDING	Little Rock	20,400,219.74
LEDBETTER BUILDING	Little Rock	37,766,433.53
ARKANSAS PUBLIC HEALTH LABORATORY	Little Rock	65,804,819.25
CENTRAL OFFICE COMPLEX	Little Rock	77,045,394.67
SOUTH CAMPUS - LITTLE ROCK	Little Rock	31,546,257.93
DONAGHEY PLAZA SOUTH	Little Rock	25,767,956.94
UNIT #5 - UNIT #6 - ENTRY BUILDING	Little Rock	13,360,729.15
DONAGHEY PLAZA NORTH	Little Rock	11,400,593.91
PARKING DECK	Little Rock	10,479,824.99
DONAGHEY PLAZA WEST	Little Rock	13,336,998.35
STATE HOSPITAL	Little Rock	37,902,934.47
WORKFORCES SERVICES BUILDING	Little Rock	21,943,340.43
COLLECTION MANAGEMENT FACILITY	Little Rock	6,550,250.20
MOSAIC TEMPLAR CULTURAL CENTER	Little Rock	12,499,802.23
OLD STATEHOUSE (HISTORICAL - RC)	Little Rock	36,021,425.35
VISITOR CENTER	Little Rock	11,774,866.62
STATE HEADQUARTERS BUILDING	Little Rock	54,536,440.64
A09 STATE HQS LITTLE ROCK	Little Rock	5,234,678.10
HKR COMPLEX #013	Magnolia	11,431,616.46
BRUCE CENTER #036	Magnolia	7,834,617.84
MAGALE LIBRARY #012	Magnolia	31,837,489.74
SCIENCE AND TECHNOLOGY CENTER	Magnolia	17,453,194.68
WILSON HALL #011	Magnolia	13,825,450.46
HONORS HALL (SOUTH/NORTH) #99/#107	Magnolia	7,193,252.48
BUSSEY HALL #090	Magnolia	6,532,442.52
REYNOLDS COMMUNITY CENTER #109	Magnolia	19,257,486.54
BUSINESS/ AG BUSINESS #032	Magnolia	12,655,813.17
OVERSTREET HALL #005	Magnolia	9,621,714.82
MV - 100 MAIN BUILDING 134-137, 110-111	Malvern	88,040,934.88
SPECIAL NEEDS UNIT - PHASE II	Malvern	32,091,622.50
SPECIAL NEEDS UNIT - PHASE III	Malvern	22,045,344.27
MAIN BUILDING	Malvern	10,522,408.99
MILLER EDUCATION COMPLEX	Melbourne	8,550,951.72
LODGE/ RESTAURANT 12.12	Mena	5,946,526.11
AUTO MUSEUM	Morrilton	7,037,314.83
MATHER LODGE 41.38 (HISTORICAL - RC)	Morrilton	6,614,438.78

ROLLER HALL	Mountain Home	9,445,326.83
MCCLAIN HALL	Mountain Home	5,971,191.83
WALTON HALL	Newport	10,891,242.05
G - 100 MAIN BUILDING	Newport	61,628,708.23
MCP - 100 MAIN BUILDING	Newport	40,594,625.83
SCIENCE / LIBRARY BUILDING	North Little Rock	10,883,976.85
CAMPUS CENTER	North Little Rock	20,420,097.15
ALLIED HEALTH EDUCATION CENTER	North Little Rock	6,913,848.45
ADMINISTRATION/ CLASSROOM BLDG (A)	North Little Rock	8,983,784.70
INFORMATION TECHNOLOGY BUILDING	North Little Rock	8,391,156.35
MAIN OFFICE BUILDING	North Little Rock	29,839,506.95
HEADQUARTERS BUILDING	North Little Rock	19,858,290.19
MAIN BUILDING	Osceola	10,426,153.58
LODGE	Paris	45,881,327.36
W - 100 (101, 103, 104, 105, 112, 113, 116, 123) MAIN COMPLEX	Pine Bluff	9,831,912.75
A - 112 ADMINISTRATION EAST 2403 E. HARDING	Pine Bluff	10,826,285.87
D - 104 MAIN BUILDING (D- 105,106, 112)	Pine Bluff	17,553,171.13
JC - 100 JAIL BUILDING	Pine Bluff	27,419,584.35
MCGEORGE HALL	Pine Bluff	7,027,678.31
TECHNOLOGY	Pine Bluff	8,849,610.15
DEVELOPMENT CENTER / BUSINESS TECHNOLOGY	Pocahontas	9,613,949.58
ADMINISTRATION BUILDING A	Pocahontas	7,623,126.06
COURTHOUSE 62.01 (HISTORICAL - RC)	Powhatan	6,154,462.85
PAINE HALL	Russellville	7,093,811.63
BASWELL/THONE HALL	Russellville	13,346,148.98
McEVER SCIENCE (COMPLEX & BOILER HOUSE)	Russellville	16,359,754.17
TUCKER COLISEUM	Russellville	15,107,794.03
WITHERSPOON BUILDING	Russellville	18,642,027.58
TOMLINSON BUILDING	Russellville	6,128,918.96
WILSON HALL	Russellville	5,972,737.46
HULL PHYSICAL EDUCATION	Russellville	19,775,678.05
ROTHWELLHALL	Russellville	11,979,262.13
CHAMBERS CAFETERIA	Russellville	8,192,472.14
NUTT HALL	Russellville	12,774,787.79
NORMAN ART CENTER	Russellville	6,368,305.18
DOC BRYAN STUDENT SERVICES BLDG.	Russellville	13,794,834.29
DEAN BUILDING	Russellville	7,710,218.30
PENDERGRAFT LIBRARY - TECHNOLOGY CENTER	Russellville	35,637,423.75
CORLEY BUILDING	Russellville	17,280,251.55
MUSEUM 54.03	Smackover	10,857,262.26
MAIN COMPLEX	Texarkana	75,873,454.20

T - 124 MAIN BUILDING (T-121,122,124,125,129,171)	Tucker	35,691,415.33
M - 100 MAIN BUILDING (M: 100, 120, 122, 124, 125-128, 131-134)	Tucker	50,864,553.88
1874 COURTHOUSE 41.22 (HISTORICAL - RC)	Washington	7,069,678.18
WORKFORCE TECHNICAL CENTER	West Memphis	10,187,694.35
UNIVERSITY CENTER	West Memphis	8,091,644.18
REYNOLDS CENTER	West Memphis	17,065,523.28
WINSLOW - STATION AND TOWER	Winslow	7,004,425.00
WR - 155 FEMALE BARRACKS (200 BED)	Wrightsville	7,268,818.92

Spatial Data Collection Project

The HMP Sub-Committee continued to coordinate closely with the Arkansas Building Authority and the Arkansas Insurance Department during the development of this vulnerability analysis, however based on the overriding recommendations from the original team, the collection of spatial data for the state facilities was made a high priority during this plan revision. This initiative was the first of its kind in the state and was a major undertaking.

The HMP Sub-Committee agreed that the field collection of precise latitude and longitude coordinates for state-owned and operated facilities was a necessary step for improving this vulnerability analysis. Based on this decision, the Arkansas Department of Emergency Management initiated this project in conjunction with the previous plan update process. ADEM and the HMP Sub-Committee both recognized that this effort is a starting point and that an on-going effort is necessary to enhance this dataset and to keep it maintained and up-to-date. However this initial effort was a huge success and the resulting data has been incorporated into this overall vulnerability analysis. ADEM was the lead agency for this effort; however a number of other agencies played supporting roles in this massive data collection effort.

- Arkansas Geographic Information Office (AGIO) – This agency is responsible for the maintenance of all GIS data at the state level. AGIO acted as the primary technical resource in this project, offering guidance and assistance during the data collection process and then reviewing and providing final technical approval for the final dataset product and the associated meta-data.
- Arkansas Office of Information Technology Office (OIT) – This agency along with the AGIO was one of the leading proponents of this project. AIT had initiated a prior project related to continuity of operations planning (COOP) that involved the collection of facility information from various state agencies. AIT desired lat/long data for these COOP facilities and these 400 locations became the first group of facilities visited and located with spatial coordinates.
- Arkansas Building Authority (ABA) – As the primary agency responsible for facility management within the state government, this agency provided the source database that detailed the inventory of state facilities.
- Arkansas Insurance Department (AID) – The AID maintains a database of state facilities for insurance purposes. This database was used in comparison with the ABA database to ensure completeness of the state inventory.

Data Collection Process and Methodology

In December 2006, the project team began the process for identifying and then field collecting the spatial data for state facilities. There were a number of steps that were taken to ensure the successful completion of this extensive effort.

- Collection and Review of Facility Databases – There were three data sources that were gathered and reviewed in order to identify the state facilities for field collection. The three files were from the ABA, the AID and the OIT. These files were not consistent with the numbers and locations and the project team reviewed all three lists. The ABA list was used as the primary facility inventory and the OIT list was completely incorporated due to the high priority placed on these locations by the AGIO and ADEM. The AID database was used as a comparison with the ABA list to ensure completeness and correctness.
- Physical Address Review – Once the complete list of state facilities had been identified, the physical addresses were considered. All locations without an address were removed from the list due to the inability of the field crews to find these locations throughout the state. Also all locations with addresses that were incomplete or vague were removed.
- De-duplication of Locations – A large number of facilities in the ABA database had non-unique addresses. There were multiple facility listings all located at the same physical location that only required a single latitude/longitude coordinate. All locations with duplicate addresses were also removed from the overall list.
- Geocoding of Physical Addresses – In order to better locate these facilities throughout the state, the project team in coordination with the AGIO used state-of-the art geocoding services to determine approximate latitude/longitude coordinates for each listed facility. Addresses that failed to geocode accurately were removed from the list due to the inability of the field collection teams to efficiently locate these places.
- Mapping and Route Selection – The state facility locations with approximate lat/longs were mapped using GIS technology and these maps became the basis for the field collection process. Maps and lists were produced for each county throughout the state and these guided the field collection teams to the state facilities so that exact spatial coordinates could be gathered.

Field Collection of Spatial Data

Once the existing data had been analyzed and processed, the actual field collection process began. Based on the process detailed above, the field collection list consisted of 863 locations of state facilities located in all of the counties. The field teams began traveling across the state in January 2007 and completed the data collection effort in April 2007 with a total of 784 facilities locations equaling a 91% success rate in locating these facilities. This data collection effort consisted of the following elements:

- Equipment and Training – Field crews used the state-of-the-art Thales Mobile Mapper GPS unit, the ESRI ArcPad software suite, and an automobile GPS navigation system to find the locations and then collect the spatial coordinates.
- Precision Locations – Field crews collected lat/long data from the “front door” location of each facility to ensure exact accuracy.
- Altitude – Field crews used the GPS unit to collect data about the altitude above sea level for each location. This data has recognized deficiencies however it was collected as the best available reference for a Base Flood Elevation (BFE).

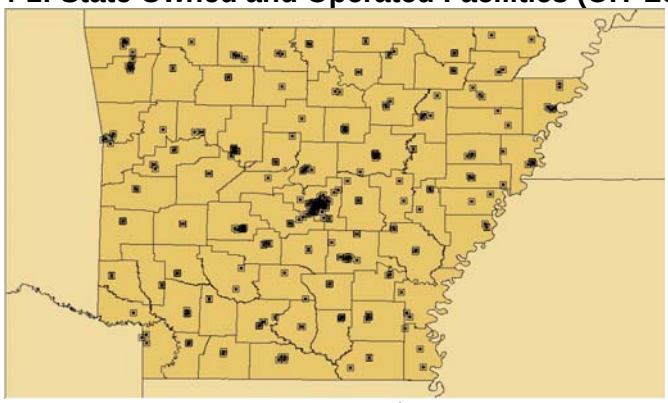
- Digital Images - Cameras were also used to take digital photographs of each location.
- Field Collection Missions – Trained technical crews traveled across the entire State of Arkansas in five extended data collection missions in order to locate the state facilities identified.

Once all the field collection was completed, the spatial coordinates were merged with the source databases into two finalized datasets for use in standard GIS systems. Metadata was also developed for these datasets. The first dataset consisted of the locations identified by the OIT related to the COOP facilities. The second dataset consisted of the remaining locations from the ABA database. The following information is provided for further details on these two datasets.

1. State-Owned and Operated Facilities - OIT Locations

- File Name: LDRPSLocations.shp
- Point File - 351 locations
- Data includes name, address, county, ABA-Owned ID, ABA Lease ID, stories, construction type, altitude
- Source – Office of Information Technology. Field Collection of Lat/Long.

Figure 4.4-1: State Owned and Operated Facilities (OIT Locations)



Source: ABA Database

2. State-Owned Facilities - Arkansas Building Authority

- File Name: ABAOwnedLocations.shp
- Point File – 433 locations
- Data includes name, address, county, ABA-Owned ID, stories, construction type, altitude, contact, LDRPS ID, building value, square footage, and various other ABA fields
- Source Arkansas Building Authority Database. Field Collection of Lat/Long

Figure 4.4-2: State Owned Facilities

Source: ABA Database

The GIS data detailed on the previous page is the baseline for analyzing the vulnerability of the state facilities. Over time, this dataset will be enhanced to include additional locations and therefore this baseline will be continually improved. The data from this baseline will be used for each individual hazard analysis.The two maps for state owned facilities are the latest versions on file with Arkansas' GeoStor database.

4.4.1 Assessing Vulnerability of State Facilities to Tornado Events

The entire State of Arkansas is at high risk to tornado events (Figure 4.2.1-1). A northeast-trending zone across the central part of the state, however, lies within the area of highest risk (Figures 4.2.1-1). The counties within this highest risk zone include Clark, Hot Spring, Saline, Pulaski, Faulkner, Lonoke, White, Woodruff, Independence, Jackson, Poinsett, Craighead, and Mississippi. Counties outside of this zone that have had frequent tornadoes include Benton and Johnson. These 15 highest risk counties have 1662 state facilities worth over $4.1 billion dollars (Table 4.4.1-1; Figures 4.4-1 and 4.4-2). There are 478 state critical facilities in these same counties with a combined value of over $2.3 billion (Table 4.4.1-1; Figures 4.4-3 and 4.4-4).

Table 4.4.1-1: Exposure of state-owned and state-operated structures and critical facilities in 15 high tornado-risk counties.

County	Number of Tornadoes, 1950-2003	Number of State Structures	Value of State Structures ($x1000)	Number of State Critical Facilities	Value of Critical State Facilities ($x1000)
Pulaski	62	431	$1,963,075	173	$1,240,387
White	57	66	$58,387	18	$35,834
Lonoke	48	37	$52,626	5	$23,805
Jackson	46	56	$90,338	16	$43,755
Faulkner	42	286	$376,100	78	$285,061
Mississippi	37	64	$54,882	21	$46,000
Independence	35	41	$19,192	17	$11,299
Poinsett	32	33	$9,719	6	$464
Benton	31	56	$35,406	12	$29,897
Craighead	30	210	$1,106,136	48	$372,710
Hot Spring	30	123	$63,463	17	$30,998
Clark	29	97	$167,520	31	$136,845
Johnson	29	18	$3,197	6	$2,270
Saline	29	136	$116,811	27	$75,400
Woodruff	29	8	$643	3	$441
Total		1662	$4,117,495	478	$2,335,165

2010 Arkansas Insurance Department Data Update

Based on the 2010 Report from the AID, the following insured values are updates to the table above.

Table 4.4.1-2: AID Date Update 2010

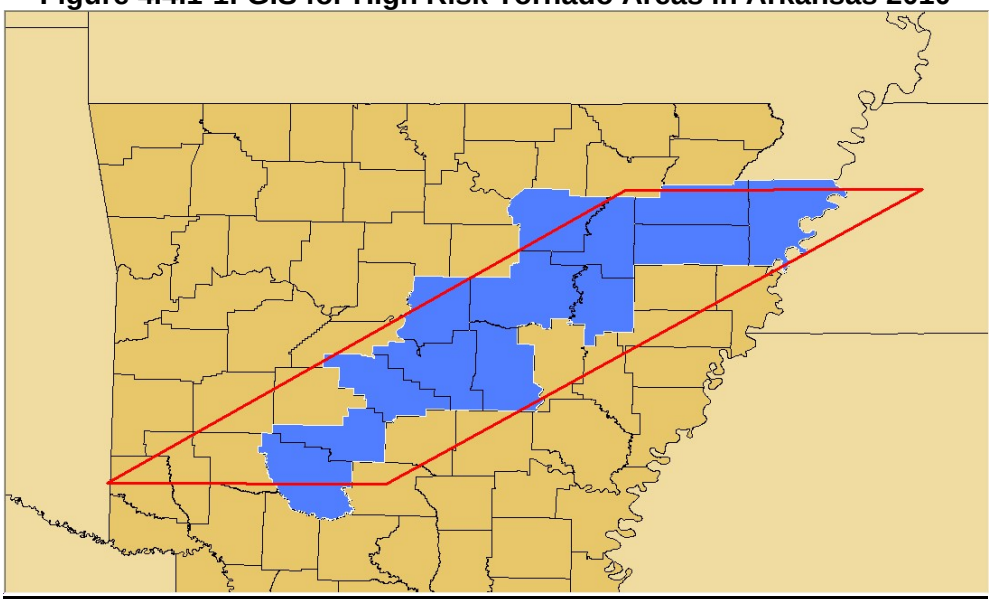
County	Values Insured
Pulaski	$1,823,513,146.00
White	$103,026,517.01
Lonoke	$10,794,357.91

Jackson	$155,152,098.21
Faulkner	$678,045,112.51
Mississippi	$82,660,649.45
Independence	7,935,313.54
Poinsett	15,313,488.78
Benton	71,783,804.51
Craighead	749,523,052.50
Hot Spring	213,727,051.98
Clark	262,604,137.38
Johnson	3,922,578.60
Saline	134,275,133.84
Woodruff	997,067.43
Total Values Insured	$4,313,273,509.65

State Facility GIS Dataset

Based on the geographic extents determined in the hazard profile, the counties in blue have the highest risk factor with respect to tornadoes. The corridor outlined in red marks the extent of this high risk area.

Figure 4.4.1-1: GIS for High Risk Tornado Areas in Arkansas 2010



Source: GeoStor

Using the state facility GIS dataset, the following summarizes the details of the overall region's vulnerability to tornadoes.

Arkansas Counties	33 records
State-Owned Locations (ABA)	223 records
OIT Locations	168 records

4.4.2 Assessing Vulnerability of State Facilities to Severe Winter Weather

State facilities in all parts of the state are vulnerable to severe winter weather events. Severe winter weather events are most common in the northwest/north central and central parts of the state (Figure 4.2.3-1). Forty-two of the 75 counties in the state (those experiencing 33 or more severe winter events since 1978) can be considered at high risk to severe winter weather.

Table 4.4.2-1: Exposure of state-owned and state-operated structures and critical facilities in 42 highest severe winter weather risk counties.

County	Number of Severe Winter Weather Events 1978-2003	Number of State Structures	Value of State Structures ($x1000)	Number of State Critical Facilities	Value of Critical State Facilities ($x1000)
Benton	41	56	$35,406	12	$29,897
Carroll	41	10	$758	3	$221
Boone	38	40	$36,864	13	$23,661
Madison	35	24	$2,989	6	$1,162
Marion	35	22	$2,014	4	$657
Washington	35	220	$1,076	57	$536,305
Newton	34	7	$1,017	5	$1,011
Baxter	33	36	$20,123	8	$16,172
Lonoke	31	37	$52,626	5	$23,805
Searcy	31	9	$1,532	4	$994
Fulton	30	27	$10,605	5	$437
Izard	30	29	$49,235	15	$45,309
Pulaski	30	431	$1,963,075	173	$1,240,387
Van Buren	30	10	$977	5	$689
Cleburne	29	7	$431	5	$1,167
Conway	29	89	$49,689	5	$12,702
Faulkner	29	286	$376,100	78	$285,061
Pope	29	89	$181,225	36	$138,270
Prairie	29	15	$1,709	5	$660
Saline	29	136	$116,811	27	$75,400
Sharp	29	9	$650	6	$338
Stone	29	50	$17,765	8	$5,338
White	29	66	$58,387	18	$35,834
Jackson	28	56	$90,338	16	$43,756
Logan	28	108	$51,231	12	$22,277
Polk	28	34	$15,815	9	$9,005
Garland	27	131	$89,051	38	$65,829
Grant	27	7	$658	4	$619
Independence	27	41	$19,192	17	$11,299
Johnson	27	18	$3,197	6	$2,270
Perry	27	4	$635	3	$633
Woodruff	27	8	$643	3	$441
Monroe	26	10	$967	2	$131
Montgomery	26	12	$900	4	$667
Scott	26	18	$1,232	5	$677
Yell	26	47	$6,148	5	$697
Greene	25	58	$11,884	7	$4,157

Hot Spring	25	123	$63,463	17	$30,998
Jefferson	25	215	$361,926	85	$227,088
Clark	24	97	$167,520	31	$136,845
Franklin	24	20	$9,684	7	$2,165
Pike	24	55	$5,659	3	$500
Totals		**2,767**	**$4,955,919**	**777**	**$3,035,526**

2010 Arkansas Insurance Department Data Update

Based on the 2010 Report from the AID, the following insured values update the table on the previous page.

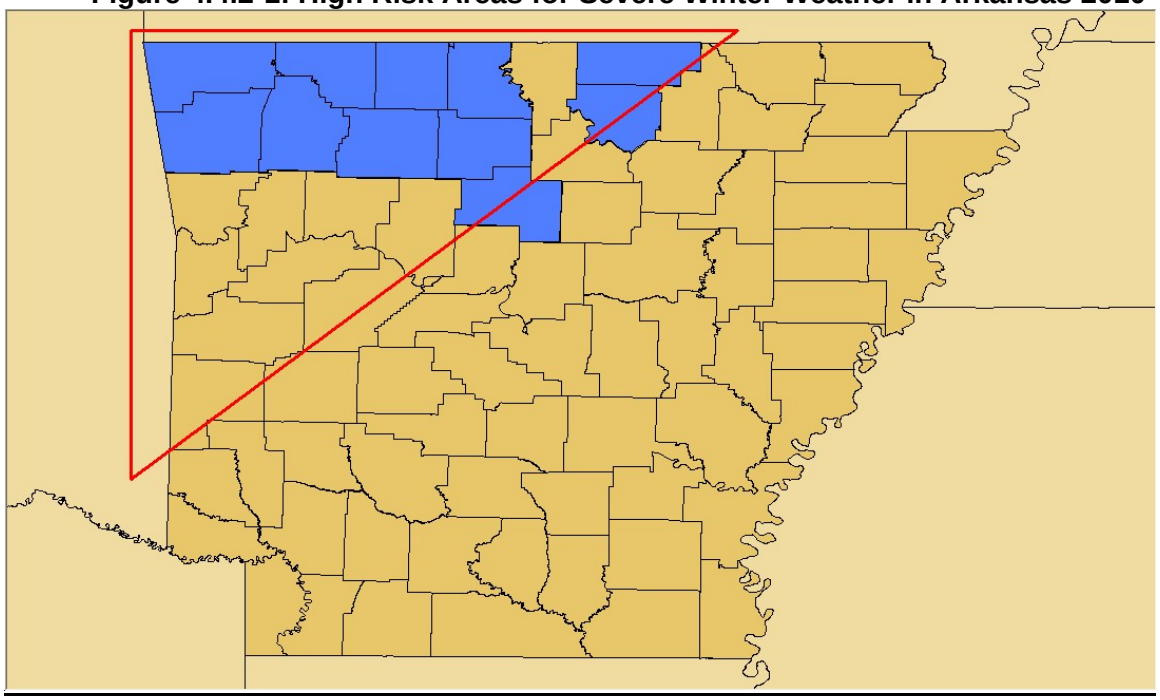
Table 4.4.2-2: AID Data Update

Pulaski	1,823,513,146.00
Baxter	44,992,903.31
Benton	71,783,804.51
Boone	68,124,834.45
Carroll	1,576,559.69
Clark	262,604,137.38
Cleburne	27,027,381.79
Conway	35,217,723.33
Faulkner	678,045,112.51
Franklin	16,548,942.73
Fulton	7,179,035.03
Garland	134,618,782.99
Grant	1,356,977.06
Greene	17,181,341.27
Hot Spring	213,727,051.98
Independence	7,935,313.54
Izard	71,411,631.81
Jackson	155,152,098.21
Jefferson	278,006,860.45
Johnson	3,922,578.60
Logan	97,802,477.16
Lonoke	10,794,357.91
Madison	4,493,124.06
Marion	2,158,930.90
Monroe	1,531,198.26
Montgomery	1,266,175.82
Nevada	3,552,510.29
Newton	2,351,636.66
Perry	930,995.27
Pike	11,086,870.44
Polk	26,471,576.58
Prairie	2,438,263.27
Saline	134,275,133.84
Scott	1,535,866.52
Searcy	1,902,799.76
Sharp	5,365,441.48
Stone	27,085,460.40
Van Buren	1,373,742.69
Washington	56,098,950.40
White	103,026,517.01
Woodruff	997,067.43
Yell	9,139,987.62

State Facility GIS Dataset

Based on the geographic extents determined in the hazard profile, the counties in blue have the highest risk factor with respect to Severe Winter Weather. The corridor outlined in red marks the extent of this high risk area.

Figure 4.4.2-1: High Risk Areas for Severe Winter Weather in Arkansas 2010



Source: GeoStor

Using the state facility GIS dataset, the following summarizes the details of the overall region's vulnerability to winter weather.

Arkansas Counties	28 records
State-Owned Locations (ABA)	129 records
OIT Locations	61 records

4.4.3 Assessing Vulnerability of State Facilities to Flooding

Although addresses are available for most state structures, accurate latitude and longitude coordinates that would assist with flood vulnerability assessment are not available. The Arkansas Building Authority and the Arkansas Geographic Information Office are developing a plan of work that will accurately locate state assets using Global Positioning Systems (GPS). This information will be used to determine the accurate location of buildings within the 1%-annual-chance floodplain (as well as assist in locating structures for assessment of other mapped hazards as well). This task is included as a high priority mitigation action in Section 5.4.

The Arkansas Insurance Department has provided information on the number of state-owned buildings in the 1%-annual-chance floodplain and has included FEMA flood zone designations for each building. A summary of the number of state buildings in the 1%-annual-chance floodplain by county has been analyzed and Lincoln County has the most state buildings (60) located in the floodplain. Likewise, several counties have no state buildings exposed. Assessors at the Arkansas Insurance Department determined the values of state buildings and contents in the 1%-annual-chance floodplain. The values of state buildings by county were calculated and Lee County has the largest state building exposure ($100,292,910). Likewise, several counties show no exposure.

Lincoln County contains the highest number of State Critical Facilities and 57 of the state's 75 counties contain none. The State Insurance Department also determined the value of State Critical Facilities and their contents within the floodplain.

Determination of vulnerability of state facilities, including critical facilities, to dam failure floods is not possible at this time as the locations of state buildings by latitude and longitude are not available. Thus it is not possible to determine which state structures are downstream and vulnerable to the located dams. As discussed above, determining the GPS location of all state facilities has been included as a high priority mitigation action in Section 5.4.

State Facility GIS Dataset

Based on the recommendation of the original planning effort, GPS coordinates were collected for state facilities; however the floodplain analysis could not be completed as part of this 2010 revision. There were two main reasons for the inability to perform this vulnerability analysis:

- Lack of Q3 Data – Digital Q3 floodplain data is only available for 33 of the 76 counties for a total of only 43%. The HMP Sub-Committee determined that this was not enough data for a statewide analysis. The development of digital Q3 data for the remaining 43 counties is a high priority action item for the next plan revision cycle.
- Lack of technical resources – The HMP Sub-Committee did not have sufficient technical resources at the time of this plan revision to conduct a vulnerability analysis using the existing Q3 data and the state facility datasets.

The HMP Sub-Committee has considered this hazard with respect to state facilities and determined that the enhancement of the existing analysis is a priority action item. This action item is detailed in the mitigation goals and objectives section of this plan. The Sub-Committee did however develop a simplified model based on the state facility data to determine the

statewide vulnerability to flooding. The HMP Sub-Committee reviewed the FEMA FIRM maps and the existing Q3 data and together with flood experts from ADEM made the following high-level, qualitative assumptions.

- There is less than 1% of the total state area within the 100-year floodplain of the river systems.
- There is less than 3% of the total state area within the 500-year floodplain of the river systems.

Based on these high-level qualitative assumptions, the HMP Sub-Committee used the state facility database to calculate the total amounts for 1% and 3% of the states vulnerability both in value and total facilities by county. The tables below use the state facility database values and facility numbers to calculate the vulnerability estimate totals for these two flood zones.

Table 4.4.3-1: Vulnerability Estimate Totals for Flood Zones

County	Values Insured	1% for 100 Year	3% for 500 year
Arkansas	3,830,375.70	$38,303.76	$114,911.27
Ashley	1,902,222.23	$19,022.22	$57,066.67
Baxter	44,992,903.31	$449,929.03	$1,349,787.10
Benton	71,783,804.51	$717,838.05	$2,153,514.14
Boone	68,124,834.45	$681,248.34	$2,043,745.03
Bradley	19,999,878.93	$199,998.79	$599,996.37
Calhoun	981,339.99	$9,813.40	$29,440.20
Carroll	1,576,559.69	$15,765.60	$47,296.79
Chicot	61,183,752.86	$611,837.53	$1,835,512.59
Clark	262,604,137.38	$2,626,041.37	$7,878,124.12
Clay	6,767,564.87	$67,675.65	$203,026.95
Cleburne	27,027,381.79	$270,273.82	$810,821.45
Cleveland	482,566.36	$4,825.66	$14,476.99
Columbia	211,243,772.15	$2,112,437.72	$6,337,313.16
Conway	35,217,723.33	$352,177.23	$1,056,531.70
Craighead	749,523,052.50	$7,495,230.52	$22,485,691.57
Crawford	12,408,167.46	$124,081.67	$372,245.02
Crittenden	62,304,892.62	$623,048.93	$1,869,146.78
Cross	18,487,626.07	$184,876.26	$554,628.78
Dallas	2,013,926.75	$20,139.27	$60,417.80
Desha	3,164,912.57	$31,649.13	$94,947.38
Drew	4,808,892.61	$48,088.93	$144,266.78
Faulkner	678,045,112.51	$6,780,451.13	$20,341,353.38
Franklin	16,548,942.73	$165,489.43	$496,468.28
Fulton	7,179,035.03	$71,790.35	$215,371.05
Garland	134,618,782.99	$1,346,187.83	$4,038,563.49
Grant	1,356,977.06	$13,569.77	$40,709.31
Greene	17,181,341.27	$171,813.41	$515,440.24
Hempstead	50,757,657.20	$507,576.57	$1,522,729.72
Hot Spring	213,727,051.98	$2,137,270.52	$6,411,811.56
Howard	7,027,028.24	$70,270.28	$210,810.85
Independence	7,935,313.54	$79,353.14	$238,059.41
Izard	71,411,631.81	$714,116.32	$2,142,348.95

Jackson	155,152,098.21	$1,551,520.98	$4,654,562.95
Jefferson	278,006,860.45	$2,780,068.60	$8,340,205.81
Johnson	3,922,578.60	$39,225.79	$117,677.36
Lafayette	3,261,122.80	$32,611.23	$97,833.68
Lawrence	14,234,492.79	$142,344.93	$427,034.78
Lee	100,292,910.25	$1,002,929.10	$3,008,787.31
Lincoln	210,593,736.48	$2,105,937.36	$6,317,812.09
Little River	4,244,233.24	$42,442.33	$127,327.00
Logan	97,802,477.16	$978,024.77	$2,934,074.31
Lonoke	10,794,357.91	$107,943.58	$323,830.74
Madison	4,493,124.06	$44,931.24	$134,793.72
Marion	2,158,930.90	$21,589.31	$64,767.93
Miller	85,233,469.49	$852,334.69	$2,557,004.08
Mississippi	82,660,649.45	$826,606.49	$2,479,819.48
Monroe	1,531,198.26	$15,311.98	$45,935.95
Montgomery	1,266,175.82	$12,661.76	$37,985.27
Nevada	3,552,510.29	$35,525.10	$106,575.31
Newton	2,351,636.66	$23,516.37	$70,549.10
Ouachita	73,162,443.76	$731,624.44	$2,194,873.31
Perry	930,995.27	$9,309.95	$27,929.86
Phillips	14,199,576.95	$141,995.77	$425,987.31
Pike	11,086,870.44	$110,868.70	$332,606.11
Poinsett	15,313,488.78	$153,134.89	$459,404.66
Polk	26,471,576.58	$264,715.77	$794,147.30
Pope	318,408,640.88	$3,184,086.41	$9,552,259.23
Prairie	2,438,263.27	$24,382.63	$73,147.90
Pulaski	1,823,513,146.00	$18,235,131.46	$54,705,394.38
Randolph	50,438,559.05	$504,385.59	$1,513,156.77
Saint Francis	38,747,652.13	$387,476.52	$1,162,429.56
Saline	134,275,133.84	$1,342,751.34	$4,028,254.02
Scott	1,535,866.52	$15,358.67	$46,076.00
Searcy	1,902,799.76	$19,028.00	$57,083.99
Sebastian	33,308,956.00	$333,089.56	$999,268.68
Sevier	909,672.85	$9,096.73	$27,290.19
Sharp	5,365,441.48	$53,654.41	$160,963.24
Stone	27,085,460.40	$270,854.60	$812,563.81
Union	60,087,953.00	$600,879.53	$1,802,638.59
Van Buren	1,373,742.69	$13,737.43	$41,212.28
Washington	56,098,950.40	$560,989.50	$1,682,968.51
White	103,026,517.01	$1,030,265.17	$3,090,795.51
Woodruff	997,067.43	$9,970.67	$29,912.02
Yell	9,139,987.62	$91,399.88	$274,199.63
Total Values Insured	6,747,590,487.42	$674,759,048.89	$2,024,277,146.68

Based on the State Facility GIS dataset, the following numbers of facilities are assumed to be within the floodplain risk areas.

Source	Total	1%	3%
ABA	433	4.3	13.0
OIT	351	3.5	10.5

4.4.4 Assessing Vulnerability of State Facilities to Earthquakes

Twenty-seven counties were identified in Section 4.3.4 as high earthquake risk counties (Table 4.3.4-1). There are a total of 1,603 state structures in these counties with a combined value of over $4.4 billion (Table 4.4.4-1). Of these structures, 516 are classified as state critical facilities. These critical facilities have a combined value of over $2.7 billion. Also, there is additional data regarding the vulnerability of state facilities in the separate Earthquake Vulnerability Analysis of this plan.

Table 4.4.4-1: Exposure of state-owned and state-operated structures and critical facilities in 27 high earthquake-risk counties.

County	Maximum PGA With 10% Probability of Exceedance 50 yrs	Number of State Structures	Value of State Structures ($x1000)	Number State Critical Facilities	Value of Critical State Facilities ($x1000)
Mississippi	45	64	54,882	21	46,000
Craighead	43	55	472,183	48	372,710
Poinsett	43	33	9,719	6	463,902
Crittenden	40	29	27,655	9	23,248
Green	32	58	11,884	7	4,157
Clay	30	31	2,667	8	1,224
St. Francis	24	68	27,414	14	15,469
Jackson	22	56	90,338	16	43,775
Lawrence	22	50	9,957	5	604
Woodruff	21	8	643	3	441
Randolph	19	38	27,059	13	22,427
Lee	17	35	75,173	12	68,881
Independence	16	41	19,191	17	11,299
White	14	66	58,387	18	35,834
Monroe	13	10	96,7307	2	131
Sharp	13	9	650	6	338
Prairie	12	15	17,09	5	660
Cleburne	11	7	431	5	1,167
Fulton	11	27	10,605	5	437
Phillips	11	26	63,566	5	23,470
Izard	10	29	49,235	15	45,309
Lonoke	10	37	52,626	5	23,805
Stone	10	50	17,764	8	5,338
Arkansas	9	34	19,529	7	11,829
Faulkner	9	286	376,099	78	285,060
Pulaski	9	431	1,963,075	173	1,240,387
Van Buren	9	10	977	5	689

2010 Arkansas Insurance Department Data Update

Based on the 2010 report from the AID, the following insured values are provided to update Table 4.4.4-1.

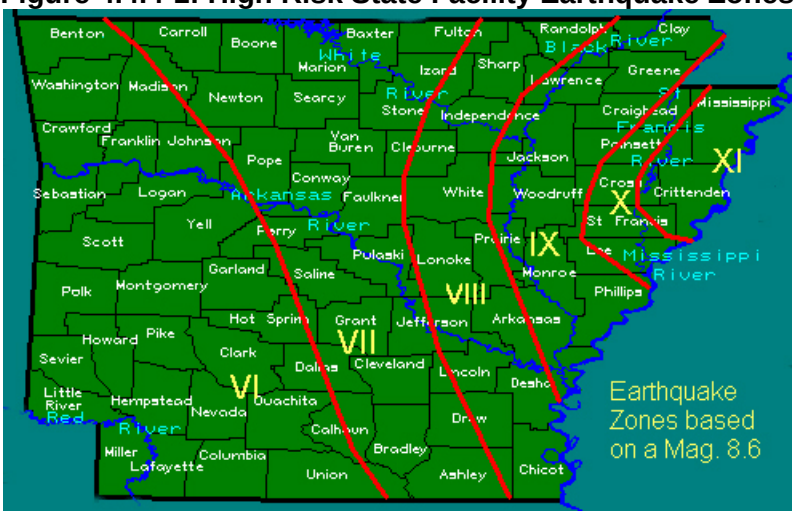
Table 4.4.4-2: AID Data Update

County	Values Insured
Mississippi	82,660,649.45
Craighead	749,523,052.50
Poinsett	15,313,488.78
Crittenden	62,304,892.62
Greene	17,181,341.27
Clay	6,767,564.87
Sharp	5,365,441.48
Jackson	155,152,098.21
Lawrence	14,234,492.79
Woodruff	997,067.43
Randolph	50,438,559.05
Lee	100,292,910.25
Independence	7,935,313.54
White	103,026,517.01
Monroe	1,531,198.26
Saint Francis	38,747,652.13
Prairie	2,438,263.27
Cleburne	27,027,381.79
Fulton	7,179,035.03
Phillips	14,199,576.95
Izard	71,411,631.81
Lonoke	10,794,357.91
Stone	27,085,460,40
Arkansas	3,830,375.70
Faulkner	678,045,112.51
Pulaski	1,823,513,146.00
Van Buren	1,373,742.69
Total Values Insured	4,078,370,363.3

State Facility GIS Dataset

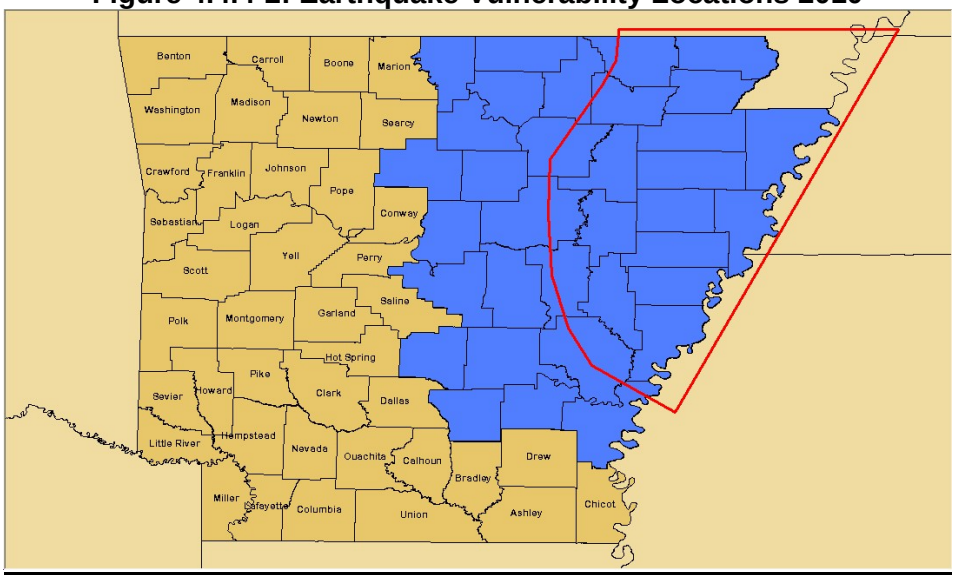
The area in the northeast of the state is most susceptible to earthquakes due to the New Madrid Fault Zone. The high risk counties as identified by ADEM have been selected in blue. The region with the highest risk is shown with the red line and used for the modeling and the development of the following report of vulnerable state facilities. The red line model is based on the Modified Mercalli Index (MMI) regions in the map below with greater than nine (IX).

Figure 4.4.4-1: High Risk State Facility Earthquake Zones



Source: ADEM

Figure 4.4.4-2: Earthquake Vulnerability Locations 2010



Source: GeoStor

Using the state facility GIS dataset, the following summarizes the details of the overall region's vulnerability to earthquakes.

Arkansas Counties	29 records
State-Owned Locations (ABA)	31 records
OIT Locations	60 records

4.4.5 Assessing Vulnerability of State Facilities to Wildfire

A vulnerability ranking of jurisdictions to wildfires was presented in Section 4.3.5. The 25 highest vulnerability counties to wildfires are shown below in Table 4.4.5-1. There are a total of 2,118 state structures in these 25 counties with a building and contents value of over $3.6 billion. Of these state structures, 619 are considered critical facilities. A total state critical facility value for these high wildfire risk counties is almost $2.4 billion.

Table 4.4.5-1: 25 Highest Vulnerability Counties to Wildfire

County	Overall Fire Vulnerability Rank	Number of State Structures	Value of State Structures ($x1000)	Number of State Critical Facilities	Value of Critical State Facilities ($x1000)
Saline	1	136	$116,811	27	$75,400
Hot Spring	2	123	$63,463	17	$30,998
Union	3	58	$40,404	13	$24,352
Independence	4	41	$19,192	17	$11,299
Miller	5	23	$51,609	5	$47,082
White	6	66	$58,387	18	$35,834
Clark	7	97	$167,520	31	$136,845
Conway	8	89	$49,689	5	$12,702
Sharp	9	9	$650	6	$338
Garland	10	131	$89,051	38	$65,829
Pulaski	11	431	$1,963,075	173	$1,240,387
Ouachita	12	41	$10,189	7	$4,063
Marion	13	22	$2,014	4	$657
Jefferson	14	215	$361,926	85	$227,088
Grant	15	7	$658	4	$619
Polk	16	34	$15,815	9	$9,005
Izard	17	29	$49,235	15	$45,309
Columbia	18	103	$114,214	28	$103,532
Sevier	19	6	$345	3	$331
Fulton	20	27	$10,605	5	$437
Ashley	21	8	$8,426	6	$3,191
Crawford	22	27	$3,011	10	$1,357
Hempstead	23	99	$60,548	12	$18,170
Carroll	24	10	$758	3	$221
Faulkner	25	286	$376,100	78	$285,061
Totals		**2,118**	**$3,633,695**	**619**	**$2,380,107**

2010 Arkansas Insurance Department Data Update

Based on the 2010 report from the AID, the following insured values are provided to update Table 4.4.5-1.

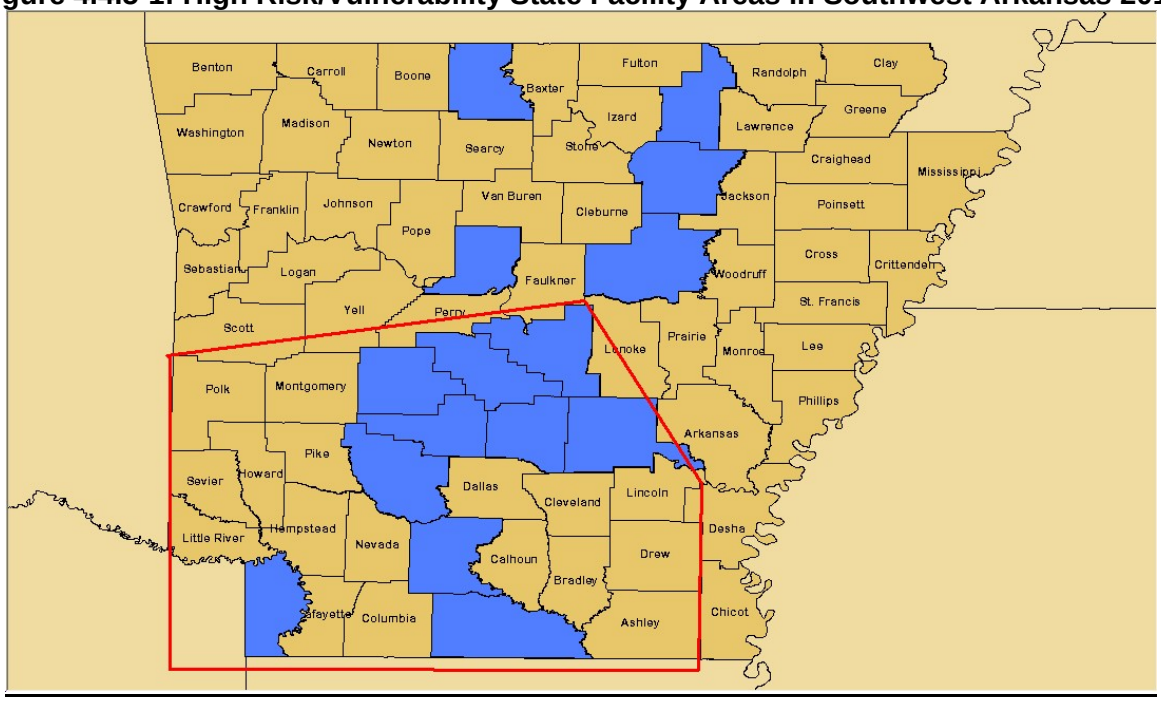
Table 4.4.5-2: AID Data Update

County	Values Insured
Saline	134,275,133.84
Hot Spring	213,727,051.98
Union	60,087,953,00
Independence	7,935,313.54
Miller	85,233,469,49
White	103,026,517.01
Clark	262,604,137.38
Conway	35,217,723.33
Sharp	5,365,441.48
Garland	134,618,782.99
Pulaski	1,823,513,146.00
Ouachita	73,162,443.76
Marion	2,158,930.90
Jefferson	278,006,860.45
Grant	1,356,977.06
Polk	26,471,576.58
Izard	71,411,631.81
Columbia	211,243,772.15
Sevier	909,672.85
Fulton	7,179,035.03
Arkansas	3,830,375.70
Crawford	12,408,167.46
Hempstead	50,757,657.20
Carroll	1,576,559.69
Faulkner	678,045,112.51
Total Values Insured	4,284,123,491.70

State Facility GIS Dataset

The area in the southwest of the state is most susceptible to wildfires due to the topography and the higher levels of forest and timber. The 15 high risk counties have been selected in blue based on the rankings from the hazard profile section. Based on the overall geographic risk, the high risk region in the southwest is shown with the red line and this region is used for this state facility GIS dataset vulnerability analysis.

Figure 4.4.5-1: High Risk/Vulnerability State Facility Areas in Southwest Arkansas 2010



Source: GeoStor

Using the state facility GIS dataset, the following summarizes the details of the overall region's vulnerability to wildfires.

Arkansas Counties	35 records
State-Owned Locations (ABA)	239 records
OIT Locations	186 records

4.4.6 Assessing Vulnerability of State Facilities to Landslides

Based on the landslide susceptibility mapping (Figure 4.2.6-5), 44 Arkansas counties were found to be susceptible to landslide events. The number and value of state structures and critical facilities in the at-risk landslide counties is shown in Table 4.4.6-1. A total of 3,074 state structures valued at over $5.9 billion are potentially exposed to landslide events. Critical facilities in this same area number 796 and are valued at $3.28 billion.

Table 4.4.6-1: Exposure of state-owned and state-operated structures and critical facilities in 44 high landslide risk counties.

County	Number of State Structures	Value of State Structures ($x1000)	Number of State Critical Facilities	Value of Critical State Facilities ($x1000)
Chicot	60	$35,080	7	$273
Clark	97	$167,520	31	$136,844
Clay	31	$2,667	8	$1,223
Cleburne	7	$431	5	$1,166
Conway	89	$49,688	5	$12,701
Craighead	210	$1,106,135	48	$372,710
Crawford	27	$3,011	10	$1,357
Crittenden	29	$27,655	9	$23,247
Cross	63	$12,448	7	$4,324
Desha	12	$7,430	6	$3,839
Faulkner	286	$376,099	78	$285,060
Franklin	20	$9,684	7	$2,165
Garland	131	$89,051	38	$65,828
Greene	58	$11,884	7	$4,157
Hempstead	99	$60,547	12	$18,169
Hot Spring	123	$63,463	17	$30,997
Independence	41	$19,191	17	$11,298
Jackson	56	$90,338	16	$43,755
Johnson	18	$3,196	6	$2,270
Lee	35	$75,173	12	$68,880
Logan	108	$51,231	12	$22,276
Lonoke	37	$52,625	5	$23,804
Madison	24	$2,989	6	$1,162
Mississippi	64	$54,882	21	$46,000
Montgomery	12	$900	4	$666
Nevada	31	$2,237	6	$803
Newton	7	$1,017	5	$1,010
Perry	4	$635	3	$632
Phillips	26	$63,566	5	$23,469
Poinsett	33	$9,719	6	$463

Polk	34	$15,815	9	$9,005
Pope	89	$181,224	36	$138,270
Prairie	15	$1,708	5	$660
Pulaski	431	$1,963,075	173	$1,240,387
St. Francis	68	$27,413	14	$15,469
Saline	136	$116,810	27	$75,399
Scott	18	$1,232	5	$676
Searcy	9	$1,531	4	$993
Sebastian	43	$19,783	11	$12,056
Stone	50	$17,764	8	$5,337
Van Buren	10	$977	5	$689
Washington	220	$1,075,785	57	$536,304
White	66	$58,387	18	$35,834
Yell	47	$6,148	5	$694
Totals	**3,074**	**$5,938,162**	**796**	**$3,282,345**

2010 Arkansas Insurance Department Data Update

Based on the 2010 report from the AID, the following insured values are provided to update the table above.

Table 4.4.6-2: AID Date Update

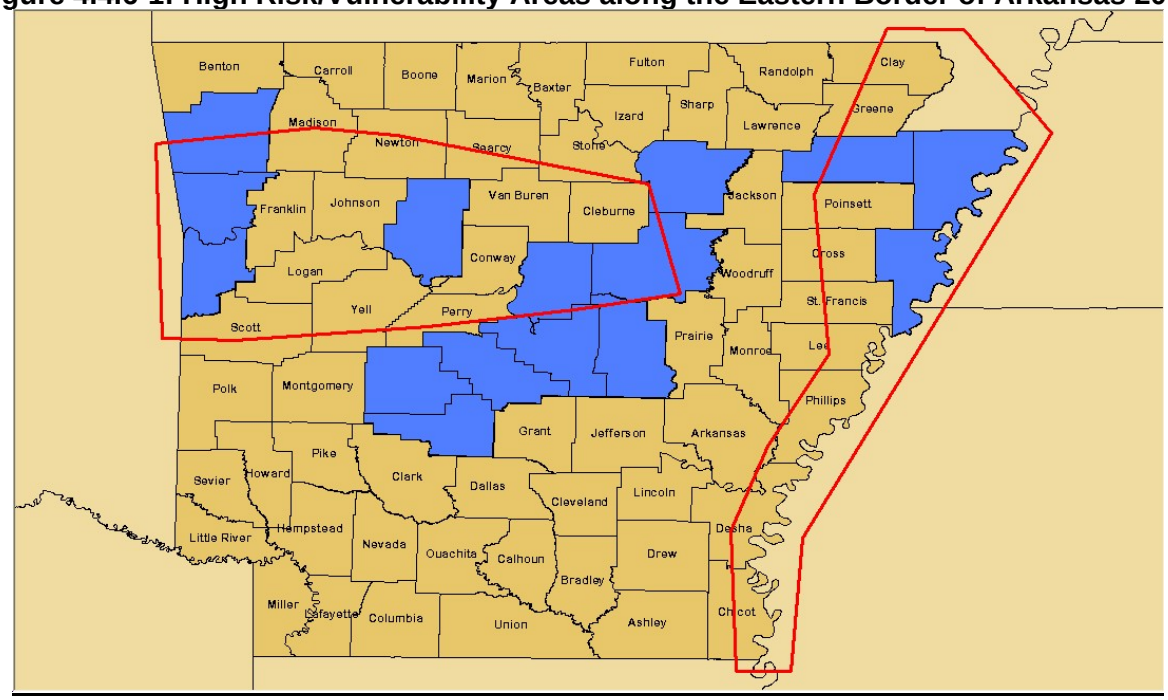
County	Values Insured
Chicot	61,183,752.86
Clark	262,604,137.38
Clay	6,767,564.87
Cleburne	27,027,381.79
Conway	35,217,723.33
Craighead	749,523,052.50
Crawford	12,408,167.46
Crittenden	62,304,892.62
Cross	18,487,626.07
Desha	3,164,912.57
Faulkner	678,045,112.51
Franklin	16,548,942.73
Garland	134,618,782.99
Greene	17,181,341.27
Hempstead	50,757,657.20
Hot Spring	213,727,051.98
Independence	7,935,313.54
Jackson	155,152,098.21
Johnson	3,922,578.60
Lee	100,292,910.25
Logan	97,802,477.16
Lonoke	10,794,357.91
Madison	4,493,124.06

Mississippi	82,660,649.45
Montgomery	1,266,175.82
Nevada	3,552,510.29
Newton	2,351,636.66
Perry	930,995.27
Phillips	14,199,576.95
Polk	26,471,576.58
Pope	318,408,640.88
Prairie	2,438,263.27
Pulaski	1,823,513,146.00
Saint Francis	38,747,652.13
Saline	134,275,133.84
Scott	1,535,866.52
Searcy	1,902,799.76
Sebastian	33,308,956.00
Stone	27,085,460.40
Van Buren	1,393,742.69
Washington	56,098,950.40
White	103,026,517.01
Yell	9,139,987.62
Total Values Insured	5,412,269,197.40

State Facility GIS Dataset

The area along the eastern border of the state along the Mississippi River is most susceptible to landslides due to the basic geology and topography. The 15 high exposure counties have been defined in blue based on the rankings from figure 4.3.6-1. Based on the overall geographic risk, the high risk region along the eastern border and in the area along the Arkansas River Valley and the Ouachita Mountain range is shown enclosed by the red line and this region is used for this state facility GIS baseline vulnerability analysis.

Figure 4.4.6-1: High Risk/Vulnerability Areas along the Eastern Border of Arkansas 2010



Source: GeoStor

Using the baseline dataset, the following summarizes the details of the overall region's vulnerability to landslides.

Arkansas Counties	37 records
State-Owned Locations (ABA)	133 records
OIT Locations	80 records

4.4.7 Assessing Vulnerability of State Facilities to Expansive Soils

Based on the expansive soil mapping (Figure 4.2.7-1), 46 Arkansas counties were found to be at risk to damage from expansive soils. The number and value of state structures and critical facilities in the at-risk expansive counties is shown in Table 4.4.7-1. A total of 2,830 state structures valued at over $5 billion are potentially exposed to expansive soil damage. Critical facilities in this same area number 760 and are valued at $2.77 billion.

Table 4.4.7-1: Exposure of state-owned and state-operated structures and critical facilities in 46 counties potentially underlain by expansive soils.

County	Number of State Structures	Value of State Structures ($x1000)	Number of State Critical Facilities	Value of Critical State Facilities ($x1000)
Arkansas	34	$19,529	7	$11,829
Ashley	8	$8,426	6	$3,190
Bradley	42	$12,142	8	$1,977
Calhoun	57	$50,030	15	$30,058
Chicot	60	$35,080	7	$274
Clark	97	$167,520	31	$136,845
Clay	31	$2,667	8	$1,224
Cleveland	4	$243	2	$171
Columbia	103	$114,214	28	$103,533
Craighead	210	$1,106,136	48	$372,710
Crittenden	29	$27,655	9	$23,248
Cross	63	$12,448	7	$4,325
Dallas	5	$960	4	$957
Desha	12	$7,431	6	$3,839
Drew	35	$108,013	15	$50,918
Grant	7	$658	4	$619
Greene	58	$11,884	7	$4,157
Hempstead	99	$60,548	12	$18,170
Hot Spring	123	$63,463	17	$30,998
Howard	18	$1,767	3	$830
Independence	41	$19,192	17	$11,299
Jackson	56	$90,338	16	$43,755
Jefferson	215	$361,926	85	$227,088
Lafayette	14	$2,107	3	$308
Lawrence	50	$9,957	5	$604
Lee	35	$75,173	12	$68,881
Lincoln	160	$148,292	46	$57,971
Little River	18	$3,029	3	$739

Lonoke	37	$52,625	5	$23,805
Miller	23	$51,609	5	$47,082
Mississippi	64	$54,882	21	$46,000
Monroe	10	$967	2	$131
Nevada	31	$2,237	6	$803
Ouachita	41	$10,189	7	$4,063
Phillips	26	$63,566	5	$23,470
Pike	55	$5,659	3	$500
Poinsett	33	$9,719	6	$464
Prairie	15	$1,709	5	$660
Pulaski	431	$1,963,075	173	$1,240,387
Randolph	38	$27,059	13	$22,427
St. Francis	68	$27,414	14	$15,469
Saline	136	$116,811	27	$75,400
Sevier	6	$345	3	$331
Union	58	$40,404	13	$24,352
White	66	$58,387	18	$35,834
Woodruff	8	$643	3	$441
Totals	**2830**	**$5,008,131**	**760**	**$2,772,137**

2010 Arkansas Insurance Department Data Update

Based on the 2010 report from the AID, the following insured values are provided to update the table above.

Table 4.4.7-2: AID Date Update

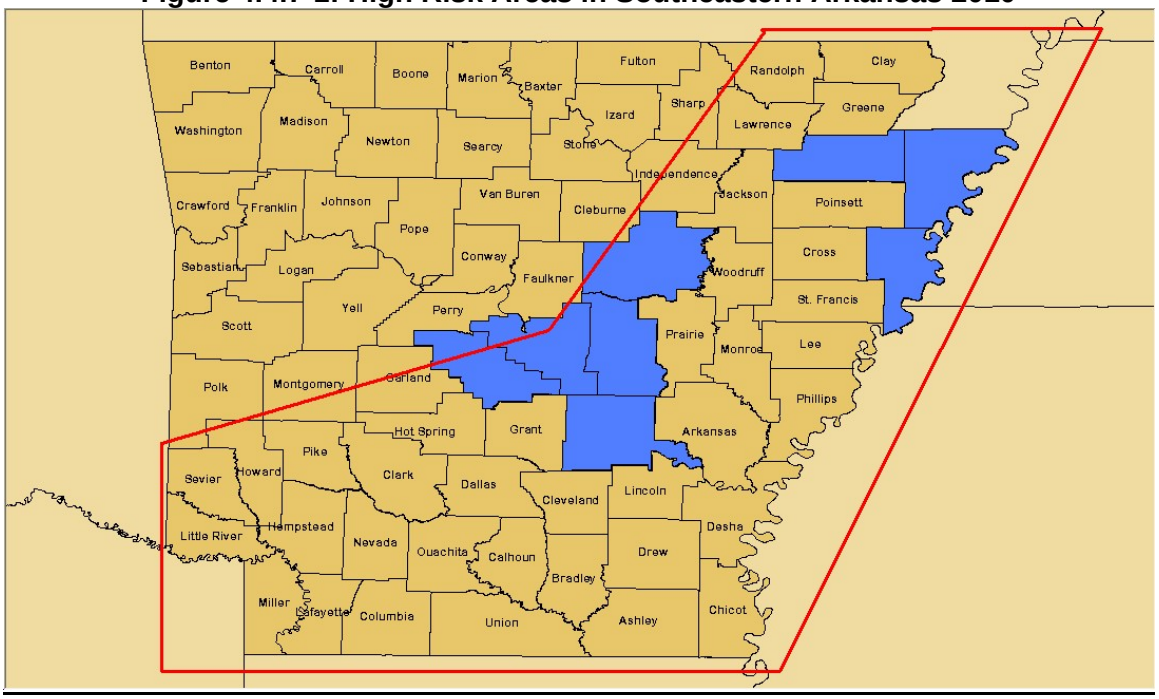
County	Values Insured
Arkansas	3,830,375.70
Ashley	1,902,222.23
Bradley	19.999.878.93
Calhoun	981,339.99
Chicot	61,183,752.86
Clark	262,604,137.38
Clay	6,767,564.87
Cleveland	482,566.36
Columbia	211,243,772.15
Craighead	749,523,052.50
Crittenden	62,304,892.62
Cross	18,487,626.07
Dallas	2013,926.75
Desha	3,164,912.57
Drew	4,808,892.61
Grant	1,356,977.06
Greene	17,181,341.27
Hempstead	50,757,657.20
Hot Spring	213,727,051.98

Howard	7,027,028.24
Independence	7,935,313.54
Jackson	155,152,098.21
Jefferson	278,006,860.45
Lafayette	3,261,122.80
Lawrence	14,234,492.79
Lee	100,292,910.25
Lincoln	210,593,736.48
Little River	4,244,233.24
Lonoke	10,794,357.91
Miller	85,233,469.49
Mississippi	82,660,649.45
Monroe	1,531,198.28
Nevada	3,552,510,29
Ouachita	73,162,443.76
Phillips	14,199,576.95
Pike	11,086,870.44
Poinsett	15,313,488.78
Prairie	2,438,263.27
Pulaski	1,823,513,146.00
Randolph	50,438,559.05
Saint Francis	38,747,652.13
Saline	134,275,133.84
Sevier	909,672.85
Union	60,087,953.00
White	103,026,517.10
Woodruff	997,067.43
Total Values Insured	4,965,038,438.707

State Facility GIS Dataset

The area in the southeastern part of the state within the Mississippi Alluvial Plain and Gulf Coastal Plain Physiographic Provinces is most susceptible to expansive soils due to the basic geology and topography. The 9 counties have been defined in blue based on their proximity to the high risk geological areas rankings from figure 4.3.7-1 (the counties marked with an asterisk). Based on the overall geographic risk, the high risk region in the southeast of the state is shown enclosed by the red line and this region is used for this state facility baseline vulnerability analysis.

Figure 4.4.7-1: High Risk Areas in Southeastern Arkansas 2010



Source: GeoStor

Using the state facility GIS dataset, the following summarizes the details of the overall region's vulnerability to expansive soils.

Arkansas Counties	53 records
State-Owned Locations (ABA)	283 records
OIT Locations	267 records

4.4.8 Assessing Vulnerability of State Facilities to Straight-line Winds

Twenty counties in Arkansas experienced over 100 straight-line high wind events since 1983 and are considered to be at risk to this wind hazard (Figure 4.2.8-1). There are a total of 2,177 state structures in these 25 counties with a building and contents value of over $4.7 billion. Of these state structures, 639 are considered critical facilities. Total state critical facility value for these high straigt-line wind risk counties is almost $2.9 billion (Table 4.4.8-1).

Table 4.4.8-1: Exposure of state-owned and state-operated structures and critical facilities in 20 counties most vulnerable to straight-line winds.

County	Number of Wind Events (1983-2003)	Number of State Structures	Value of State Structures ($x1000)	Number of State Critical Facilities	Value of Critical State Facilities ($x1000)
Pulaski	233	431	$1,963,075	173	$1,240,387
Benton	186	56	$35,406	12	$29,896
Washington	169	220	$1,075,786	57	$536,304
Sebastian	166	43	$19,783	11	$12,056
White	158	66	$58,387	18	$35,834
Jefferson	150	215	$361,926	85	$227,088
Garland	146	131	$89,051	38	$65,829
Hot Spring	140	123	$63,463	17	$30,998
Faulkner	138	286	$376,100	78	$285,061
Crawford	134	27	$3,011	10	$1,357
Saline	130	136	$116,811	27	$75,400
Lonoke	128	37	$52,626	5	$23,801
Madison	124	24	$2,990	6	$1,162
Franklin	120	20	$9,684	7	$2,165
Miller	117	23	$51,609	5	$47,082
Clark	115	97	$167,520	31	$136,844
Pope	111	89	$181,225	36	$138,270
Howard	110	18	$1,767	3	$830
Baxter	105	36	$20,123	8	$16,172
Hempstead	103	99	$60,548	12	$18,170
Totals		**2177**	**$4,710,890**	**639**	**$2,924,712**

2010 Arkansas Insurance Department Data Update

Based on the 2010 report from the AID, the following insured values are provided to update the table on the previous page.

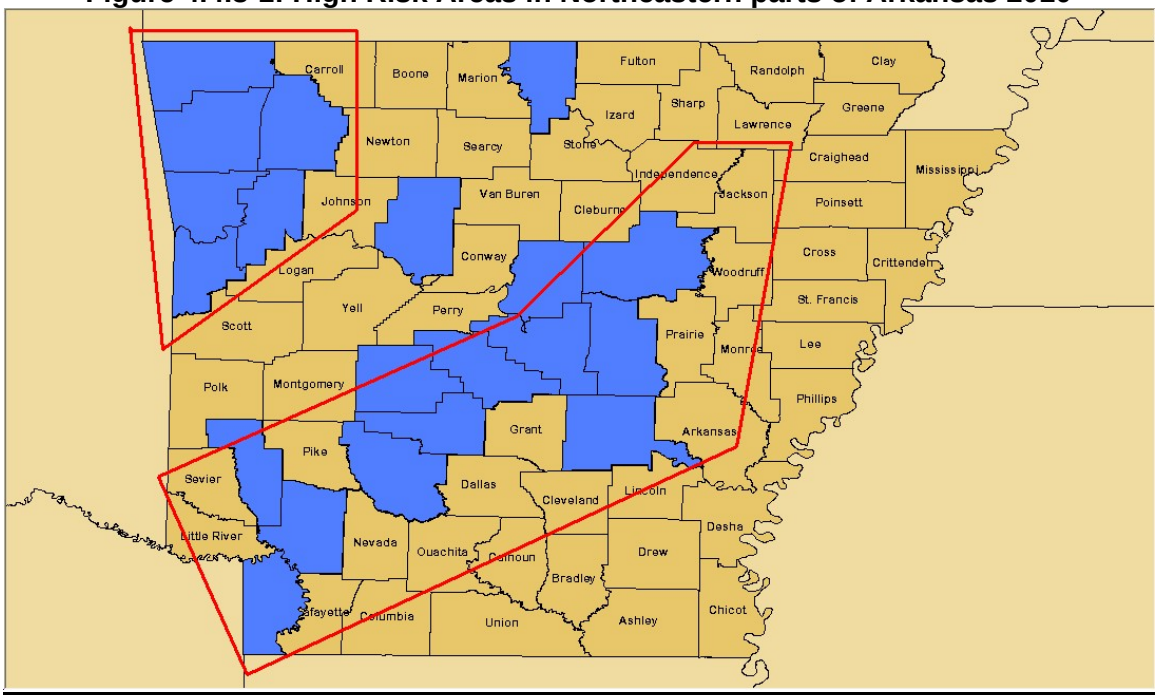
Table 4.4.8-2: AID Data Update

County	Values Insured
Pulaski	1,823,513,146.00
Benton	71,783,804.51
Washington	56,098,950.40
Sebastian	33,308,956.00
White	103,026,517.01
Jefferson	278,006,860.45
Garland	134,618,782.99
Hot Spring	213,727,051.98
Faulkner	678,045,112.51
Crawford	12,408,167.46
Saline	134,275,133.84
Lonoke	10,794,357.91
Madison	4,493,124.06
Franklin	16,548,942.73
Miller	85,233,469.49
Clark	262,604,137.38
Pope	318,408,460.88
Howard	7,027,028.24
Baxter	44,992,903.31
Hempstead	50,757,657.20
Total Values Insured	4,339,672,564.35

State Facility GIS Dataset

The area in the northeastern part of the state is particularly susceptible to straight-line wind in conjunction with strong thunderstorms. Also the corridor from the south west to the northeast also experiences a large number of wind events. The 20 counties have been colored in blue based on the historic number of high wind events over the past 25 years in Figure 4.3.8-1. Each of the counties has experienced at least 100 high wind events thereby placing the county in an area of high risk to this hazard. Based on the overall geographic risk, the high risk region in the northeast part of the state is shown within the red line and this region is used for this state facility GIS baseline vulnerability analysis.

Figure 4.4.8-1: High Risk Areas in Northeastern parts of Arkansas 2010



Source: GeoStor

Using the state facility GIS baseline dataset, the following summarizes the details of the overall region's vulnerability to straight-line winds.

Arkansas Counties	51 records
State-Owned Locations (ABA)	336 records
OIT Locations	225 records

4.4.9 Assessing Vulnerability of State Facilities to Drought

Based upon geologic, hydrologic, and other conditions, 48 counties in Arkansas were found to be most vulnerable to drought (Figure 4.2.9-1). There are a total of 4,312 state structures in these 25 counties with a building and contents value of over $7 billion. Of these state structures, 865 are considered critical facilities. Total state critical facility value for these high drought vulnerability counties is over $2 billion (Table 4.4.9-1). Although numerous state facilities are within areas susceptible to drought, the structures themselves are not considered to be vulnerable to damage from this hazard.

Table 4.4.9-1: Exposure of state-owned and state-operated structures and critical facilities in 48 counties most vulnerable to drought.

County	Number of State Structures	Value of State Structures ($x1000)	Number of State Critical Facilities	Value of Critical State Facilities ($x1000)
Arkansas	34	$19,529	7	$1,828
Baxter	36	$20,123	8	$16,171
Benton	56	$35,405	12	$29,896
Boone	40	$36,864	13	$23,661
Bradley	42	$12,142	8	$1,977
Calhoun	57	$50,029	15	$30,057
Carroll	10	$757	3	$220
Clark	97	$167,520	31	$136,844
Cleburne	7	$431	5	$1,166
Columbia	103	$114,214	28	$103,532
Conway	89	$49,688	5	$701
Crawford	27	$3,011	10	$957
Faulkner	286	$376,099	78	$285,060
Franklin	20	$9,684	7	$2,165
Fulton	27	$10,605	5	$436
Garland	131	$89,051	38	$63,328
Hot Spring	123	$63,463	17	$30,997
Howard	18	$1,767	3	$830
Independence	41	$19,191	17	$3,298
Izard	29	$49,234	15	$45,309
Jefferson	215	$361,926	85	$147,087
Johnson	18	$3,196	6	$2,020
Lawrence	50	$9,956	5	$604
Logan	108	$51,231	12	$22,276
Lonoke	37	$52,625	5	$804

Madison	24	$2,989	6	$1,162
Marion	22	$2,014	4	$656
Montgomery	12	$900	4	$666
Newton	7	$1,017	5	$1,010
Ouachita	41	$10,188	7	$4,062
Perry	4	$635	3	$632
Pike	55	$5,659	3	$500
Polk	34	$15,815	9	$9,005
Pope	89	$181,224	36	$138,270
Prairie	15	$1,708	5	$660
Pulaski	431	$1,963,075	173	$715,387
Randolph	38	$27,058	13	$22,427
Saline	136	$116,810	27	$75,399
Scott	18	$1,232	5	$676
Searcy	9	$1,531	4	$993
Sebastian	43	$19,783	11	$12,056
Sharp	9	$650	6	$337
Stone	50	$17,764	8	$5,337
Union	58	$40,403	13	$24,352
Van Buren	10	$977	5	$689
Washington	220	$1,075,785	57	$14,304
White	66	$58,387	18	$35,833
Yell	47	$6,148	5	$693
Totals	**4,312**	**$7,071,985**	**865**	**$2,016,357**

2010 Arkansas Insurance Department Data Update

Based on the 2010 report from the AID, the following insured values are provided to update Tble 4.4.9-1.

Table 4.4.9-2: AID Data Update

County	Values Insured
Arkansas	3,830,375.70
Baxter	44,992,903.31
Benton	71,783,804.51
Boone	68,124,834.45
Bradley	19,999,878.93
Calhoun	981,339.99
Carroll	1,576,559.69
Clark	262,604,137.38
Clay	6,767,564.87
Cleburne	27,027,381.79
Columbia	211,243,772.15
Conway	35,217,723.33
Crawford	12,408,167.46
Faulkner	678,045,112.51
Franklin	16,548,942.73
Fulton	7,179,035.03
Garland	134,618,782.99
Hot Spring	213,727,051.98
Howard	7,027,028.24
Independence	7,935,313.54
Izard	71,411,631.81
Jefferson	278,006,860.45
Johnson	3,922,578.60
Lawrence	14,234,492.79
Logan	97,802,477.16
Lonoke	10,794,357.91
Madison	4,493,124.06
Marion	2,158,930.90
Montgomery	1,266,175.82
Newton	2,351,636.66
Ouachita	73,162,443.76
Perry	930,995.27
Pike	11,086,870.44
Polk	26,471,576.58
Pope	318,408,640.88
Prairie	2,438,263.27
Pulaski	1,823,513,146.00
Randolph	50,438,559.05
Saline	134,275,133.84
Scott	1,535,866.52

Searcy	1,902,799.76
Sebastian	33,308,956.00
Sharp	5,365,441.48
Stone	27,085,460.40
Union	60,087,953.00
Van Buren	1,373,742.69
Washington	56,098,950.40
White	103,026,517.01
Yell	9,139,987.62
Total Values Insured	5,057,733,280.71

As the HMP Sub-Committee considered the drought hazard, the AID values in Table 4.4.9-2 were submitted to update the previous analysis. However the Sub-Committee re-assessed the drought hazard and determined that drought does not pose a risk to the actual structures of government facilities. The impacts from this hazard are primarily on the human, animal and plant populations of the state and not on the buildings and infrastructure. Due to this new analysis, the HMP Sub-Committee does not believe that state facilities are vulnerable to this hazard.

4.4.10 Assessing Vulnerability of State Facilities to Thunderstorms, Hail and Lightning

This hazard was not included in the original plan as a separate hazard therefore there is no prior analysis. The HMP Sub-Committee determined that this hazard is closely related to a number of other profiled hazards particularly flooding, tornadoes and high winds. The analysis for these three hazards should be considered along with this subsequent analysis.

2010 Arkansas Insurance Department Data Update

Based on the 2010 report from the AID, the following insured values are provided for the 34 counties that the HMP Sub-Committee has determined to be at high risk to storms, hail and lightning.

Table 4.4.10-1: AID Data Update

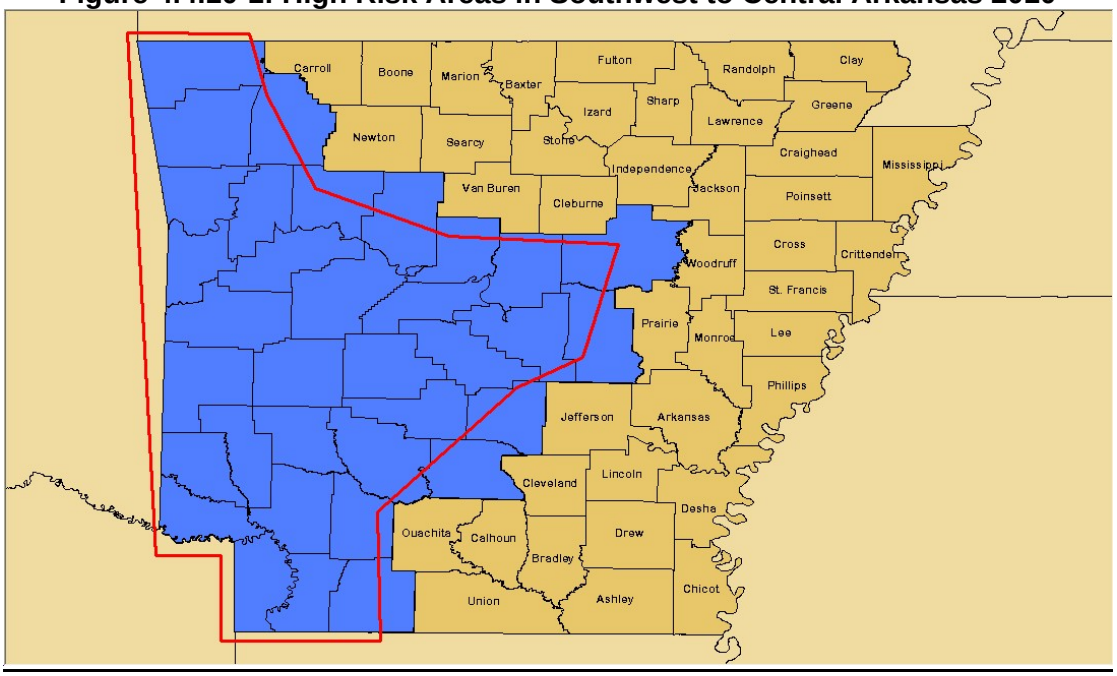
County	Values Insured
Benton	71,783,804.51
Clark	262,604,137.38
Columbia	211,243,772.15
Conway	35,217,723,33
Crawford	12,408,167.46
Dallas	2,013,926.75
Faulkner	678,045,112.51
Franklin	16,548,942.73
Garland	134,618,782.99
Grant	1,356,977.06
Hempstead	50,757,657.20
Hot Spring	213,727,051.98

Howard	7,027,028.24
Johnson	3,922,578
Lafayette	3,261,122.80
Little River	4,244,233.24
Logan	97,802,477.16
Lonoke	10,794,357.91
Madison	4,493,124.06
Miller	85,233,469.49
Montgomery	1,266,175.82
Nevada	3,552,510.29
Perry	930,995.27
Pike	11,086,870.44
Polk	26,471,576.58
Pope	318,408,640.88
Pulaski	1,823,513,146.00
Saline	134,275,133.84
Scott	1,535,866.52
Sebastian	33,308,956.00
Sevier	909,672.85
Washington	56,098,950.40
White	103,026,517.01
Yell	9,139,987.62
Total Values Insured	**4,430,629,479.14**

State Facility GIS Dataset

The corridor from the south west to the central area of the state experiences a large number of thunderstorms. The 34 counties have been colored in blue based on the analysis by the HMP Sub-Committee. Based on the overall geographic risk, the high risk region is shown enclosed in the red line and this region is used for this state facility GIS baseline vulnerability analysis.

Figure 4.4.10-1: High Risk Areas in Southwest to Central Arkansas 2010



Source: GeoStor

Using the state facility GIS dataset, the following summarizes the details of the overall region's vulnerability to thunderstorms, hail and lightning.

Arkansas Counties	34 records
State-Owned Locations (ABA)	342 records
OIT Locations	192 records

4.4.11 Assessing Vulnerability of State Facilities to Hazardous Material Events

The top six potential HAZMAT event categories have been identified, profiled, and analyzed in detail relating to the vulnerability of state facilities.

Fixed site HAZMAT locations.

Pine Bluff Arsenal.

Methamphetamine laboratories.

Highway HAZMAT.

Railroad HAZMAT.

Pipeline HAZMAT.

Fixed Site HAZMAT Locations

Most fixed site HAZMAT locations are private businesses that employ these chemicals in their daily production processes. These locations are generally not close to state-owned and operated facilities and HAZMAT events tend to be localized in nature and affect only the immediate area. Therefore the HMP Sub-Committee does not consider this type of HAZMAT to impact state facilities in general.

There are state-owned and operated facilities that do store and use hazardous material at their locations. These facilities would obviously be vulnerable to releases of the materials at their locations. Again, most releases are accidental and relatively small in nature and quickly contained and cleaned up. Therefore there is generally no real danger to the facilities themselves and the staff members at these locations are trained to respond appropriately. The HMP Sub-Committee does not consider this vulnerability to be a high priority.

Pine Bluff Arsenal

The Pine Bluff Arsenal is a federal installation and therefore does not fall under the category of state facilities, However there are a number of state locations near this installation that are vulnerable and could be impacted by a major event at PBA.

The assessment of state-owned and operated facilities vulnerable to an event at PBA was performed using the best available data. The data, provided by the Arkansas Insurance Council, consisted of an Excel database of state-owned facilities.
Based on the best available data, there are an estimated 84 state-owned facilities within a 5-mile radius of Pine Bluff Arsenal. The total cost to rebuild these 84 structures is estimated at $63,986,505.

Table 4.4.11-1: State-Owned Facilities within 5 Miles of Pine Bluff Arsenal

			Average Per Building	
Number of State-Owned Facilities	**Cost to Replace**	**Value of Contents**	**To Replace**	**Contents**
84	$ 63,986,505.00	$ 11,203,770.00	$ 761,744.00	$ 133,378.00

There are an estimated 86 state-owned facilities within a 10-mile radius of Pine Bluff Arsenal. The total cost to rebuild these 86 structures is estimated at $66,300,052.

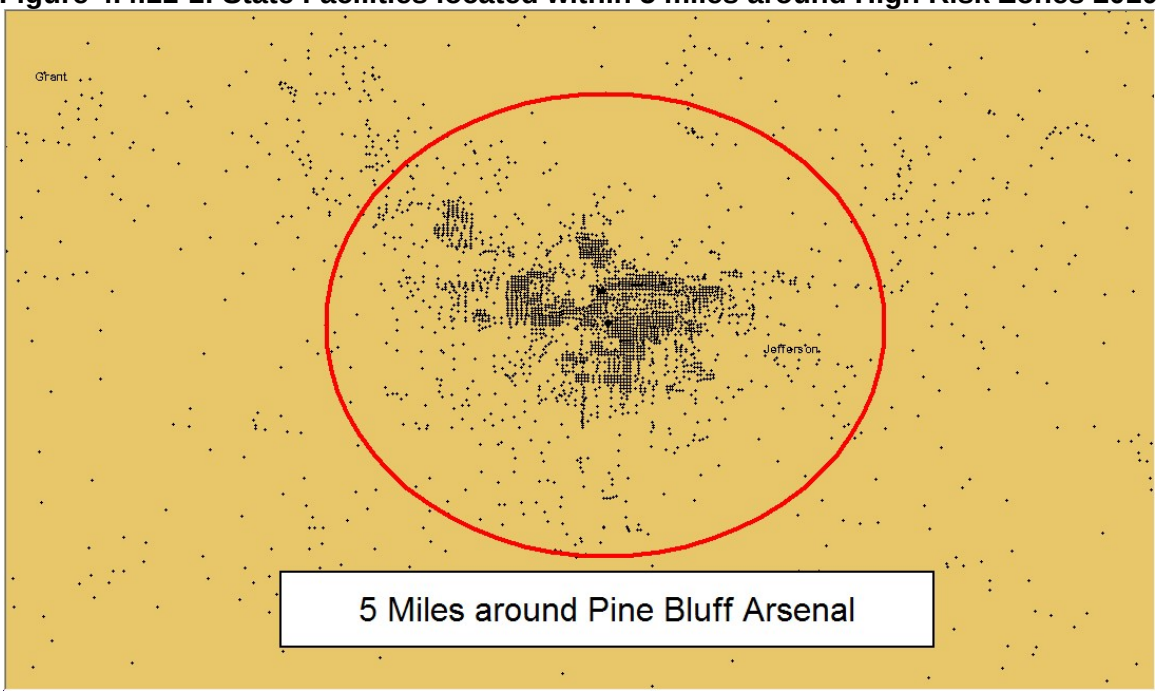
Table 4.4.11-2: State-Owned Facilities within 10 Miles of Pine Bluff Arsenal

			Average Per Building	
Number of State-Owned Facilities	**Cost to Replace**	**Value of Contents**	**To Replace**	**Contents**
86	$ 66,300,052.00	$ 11,203,770.00	$ 770,930.00	$ 130,276.00

2010 State Facility GIS Dataset

The following map shows the areas 5 miles around the Pine Buff Arsenal. The state facilities within the high risk zone are listed on the following page.

Figure 4.4.11-1: State Facilities located within 5 miles around High Risk Zones 2010



Source: GeoStor

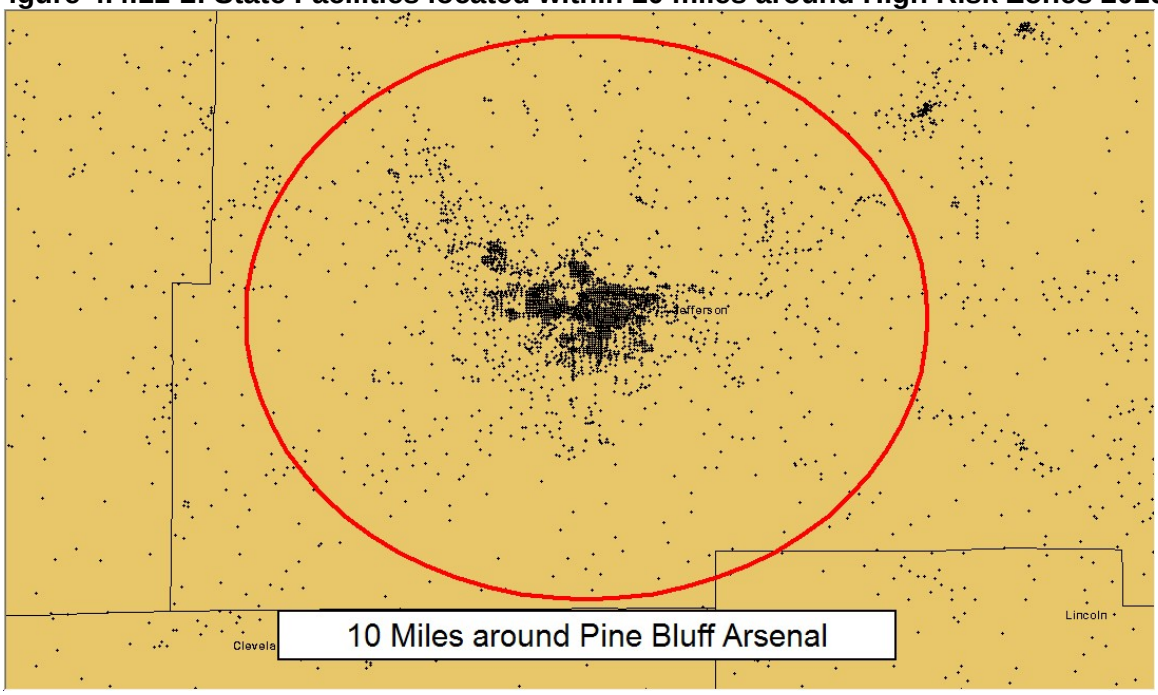
Table 4.4.11-3: ABA State-Owned Facilities and OIT Locations

State-Owned Locations (ABA)				
COUNTY NAME	NAME	ADDR	CITY	CONTACT NAME
Jefferson	Arkansas State Police Highway Patrol Troop E	6816 Princeton Pike	Pine Bluff	J. R. Howard
Jefferson	Southeast Arkansas College	1706 Hazel	Pine Bluff	Melionee Knight
Jefferson	Arkansas Employment Security Dept n/a n/a	1001 S. Tennessee Street	Pine Bluff	Damita B. Casey

OIT Locations			
LDRPS COUNTY	NAME	ADDR	LDRPS_CITY
Jefferson	ADC Compliance / Board of Corrections	7300 Dollarway Rd	Pine Bluff
Jefferson	ADC Jefferson County Jail Correctional Facility	7206 W 7th Ave	Pine Bluff
Jefferson	DHHS-DCO-Jefferson/Pine Bluff 35	1222 West 6th	Pine Bluff
Jefferson	DCC Pine Bluff Probation and Parole Office	2801 South Olive	Pine Bluff
Jefferson	ADC Admin Offices	2403 E. Harding Ave.	Pine Bluff
Jefferson	Jefferson County Office	101 W. Barraque	Pine Bluff
Jefferson	DHHS-DOH-Jefferson Co Health Unit	2306 Pike Drive	Pine Bluff

The map below shows the area 10 miles around the Pine Bluff Arsenal. Besides the facilities listed on the previous page for the 5-mile zone, there are an additional two state facilities that fall within this new 10-mile zone.

Figure 4.4.11-2: State Facilities located within 10 miles around High Risk Zones 2010



Source: GeoStor

Table 4.4.11-4: ABA State-Owned Facilities and OIT Locations

State-Owned Locations (ABA)				
COUNTY NAME	NAME	ADDR	CITY	CONTACT NAME
Jefferson	Arkansas State Military Department	707 Thomas Riggins Drive	Pine Bluff	David R. Jensen

OIT Locations			
LDRPS_COUNTY	NAME	ADDR	LDRPS_CITY
Jefferson	AHTD Resident Engineer #23	4900 Hwy. 65 South	Pine Bluff

Methamphetamine Laboratories

Based on the unpredictable nature of the locations of meth labs and the small scale of these operations, no state facilities are vulnerable to this type of hazardous material site. These laboratories are generally small, short-term clandestine operations based in poor or rural neighborhoods or in rental properties or hotels. Problems such as explosions and contaminations are localized in nature and only affect the immediate area.

Highway HAZMAT

There are a number of highway and interstate accidents annually involving hazardous material. These events are usually small in nature due to the size of the trucks and the loads. It is rare for a highway incident to affect any nearby facilities. Sometimes based on the chemical and the weather, a HAZMAT release will create a plume dispersion that will send toxic air-borne chemical over the area surrounding the incident. In these cases, people may be vulnerable to these chemicals from a health standpoint, however there is no danger of physical damage to buildings and facilities. The state is responsible for the roads and the related transportation infrastructure, so there is some vulnerability to the actual roads. Accidents can cause road damage that must be repaired and can also cause traffic congestion for short periods of time. Based on these assumptions, the HMP Sub-Committee does not feel that state facilities are vulnerable to highway HAZMAT incidents.

As a quantitative way to assess the potential vulnerability to this type of HAZMAT, an analysis was performed to determine the various state facilities near the highways and interstates. The assessment of state-owned and operated facilities vulnerable to a highway related hazardous materials event was performed using the best available data. The data, provided by the Arkansas Insurance Council, consisted of an Excel database of 4,010 state-owned facilities. Each facility within the database included the facility's address, zip code, building name, agency affiliation, square footage, replacement cost, value of contents, and date of construction. Using ESRI's Arcview Geographic Information System (GIS) technology, a GIS database was created so that the state-owned facility data could be displayed on a geo-referenced map. The locations of the 4,010 facilities were geo-coded to the nearest zip code centroid.

Based on the best available data, there are an estimated 1,639 state-owned facilities within a 1-mile buffer of major highways/interstates within Arkansas. The total cost to rebuild these 1,639 structures is estimated at $1,330,873,996.

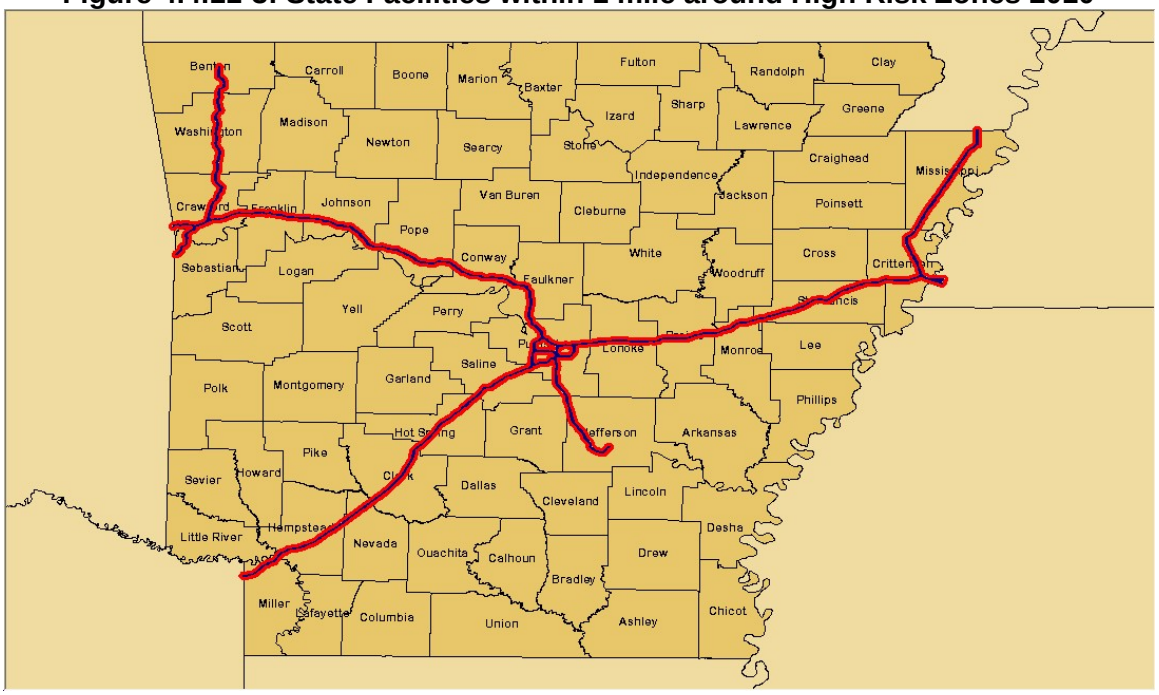
Table 4.4.11-5: State-Owned Structures within 1 Mile of a Major Highway/Interstate

			Average Per Building	
Number of State-Owned Facilities	**Cost to Replace**	**Value of Contents**	**To Replace**	**Contents**
1639	$ 1,330,873,996.00	$ 244,600,060.00	$ 812,003.00	$ 149,237.00

2010 State Facility GIS Dataset

The following map shows the areas 1 mile around the interstates. The state facilities within the high risk zone are listed in Table 4.4.11-6.

Figure 4.4.11-3: State Facilities within 1 mile around High Risk Zones 2010



Source: GeoStor

Table 4.4.11-6: ABA State-Owned Facilities and OIT Locations

State-Owned Locations (ABA)			
202 records			
COUNTY NAME	NAME	ADDR	CITY
Benton	Northwest Arkansas Community College Real Estate Services n/a	1201 SE Eagle Way	Bentonville
Benton	Arkansas State Police Highway Patrol Troop L	900 South 48th St	Springdale
Conway	University of Arkansas Community College Morrilton	1 Bruce Street	Morrilton
Crawford	Arkansas State Military Department	1820 Chestnut	Van Buren
Crittenden	Mid-South Community College Finance Office n/a	2001 West Broadway	West Memphis
Crittenden	Mid-South Community College Finance Office n/a	2003 West Broadway	West Memphis
Crittenden	Mid-South Community College Finance Office n/a	2002 West Broadway	West Memphis
Crittenden	Mid-South Community College Finance Office n/a	2000 West Broadway	West Memphis
Crittenden	Arkansas State Military Department	1700 North Avalon	West Memphis
FAULKNER	DHS DDS/CHDC	150 E. Siebenmorgan Rd	Conway
Faulkner	Arkansas State Military Department	300 Exchange Ave	Conway
Hempstead	Arkansas Employment Security Dept n/a n/a	205 Smith Road	Hope
Hempstead	Arkansas State Police Highway Patrol Troop G	2501 N Hazel	Hope
Jefferson	Arkansas State Police Highway Patrol Troop E	6816 Princeton Pike	Pine Bluff
Johnson	Arkansas State Police Highway Patrol Troop J	2402 W Main	Clarksville
Mississippi	Cotton Boll Technical Institute Department of Workforce Education n/a	822 West Plantation Road	Burdette
Mississippi	Mississippi County Community College	2501 South	Blytheville

		Division	
Pulasi	UAMS Campus Ops	509 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	208 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	206 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	204 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	200 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	318 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	324 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	400 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	406 S. Piine	Little Rock
Pulaski	UAMS Campus Ops	408 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	506 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	508 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	520 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	524 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	600 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	606 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	610 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	614 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	616 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	618 S. Pine	Little Rock
Pulaski	UAMS Campus Ops	201 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	205 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	209 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	301 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	311 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	313 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	315 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	321 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	323 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	401 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	407 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	411 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	415 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	421 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	501 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	521 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	519 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	517 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	515 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	513 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	505 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	605 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	609 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	611 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	615 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	619 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	620 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	618 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	614 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	610 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	606 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	600 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	520-22 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	510 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	508 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	506 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	424 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	422 S. Cedar	Little Rock

Pulaski	UAMS Campus Ops	420 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	406 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	404 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	400 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	324 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	320 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	312 S. Cedar	Litle Rock
Pulaski	UAMS Campus Ops	310 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	308 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	306 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	304 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	214 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	212 S. Cedar	Litle Rock
Pulaski	UAMS Campus Ops	208 S. Cedar	Little Rock
Pulaski	UAMS Campus Ops	3904 W. Capitol	Little Rock
Pulaski	UAMS Campus Ops	3906 W. Capitol	Little Rock
Pulaski	UAMS Campus Ops	3901 W. Capitol	Little Rock
Pulaski	UAMS Campus Ops	3903 W. Capitol	Little Rock
Pulaski	UAMS Campus Ops	3913 W. Capitol	Little Rock
Pulaski	UAMS Campus Ops	3915 W. Capitol	Little Rock
Pulaski	UAMS Campus Ops	3919 W. Capitol	Little Rock
Pulaski	UAMS Campus Ops	4101 Ambulance Drive	Little Rock
Pulaski	UAMS Campus Ops	4105 Ambulance Drive	Little Rock
Pulaski	UAMS Campus Ops	4108 Dwyer Drive	Little Rock
Pulaski	UAMS Campus Ops	4200 Dwyer Drive	Little Rock
Pulaski	UAMS Campus Ops	4219 Dwyer Drive	Little Rock
Pulaski	UAMS Campus Ops	4104 Outpatient Circle	Little Rock
Pulaski	UAMS Campus Ops	4105 Outpatient Circle	Little Rock
Pulaski	UAMS Campus Ops	4110 Outpatient Circle	Little Rock
Pulaski	UAMS Campus Ops	4120 W. Markham	Little Rock
Pulaski	UAMS Campus Ops	4301 W. Markham	Little Rock
Pulaski	UAMS Campus Ops	5800 West 10th	Little Rock
Pulaski	UAMS Campus Ops	800 Cottage Drive	Little Rock
Pulaski	UAMS Campus Ops	101 Hooper Drive	Little Rock
Pulaski	UAMS Campus Ops	200-227 Elm	Little Rock
Pulaski	UAMS Campus Ops	4014-4024 W. 6th	Little Rock
Pulaski	War Memorial Stadium Same n/a	1 Stadium Drive	Little Rock
Pulaski	Arkansas Building Authority Financial Management	4701 W. 20th	Little Rock
Pulaski	UA Cooperative Extension State Office n/a	2301 S. University Ave.	Little Rock
Pulaski	Arkansas Building Authority Financial Management	1421 W. 6th	Little Rock
Pulaski	Arkansas Building Authority Financial Management	1400 W. 7th	Little Rock
Pulaski	DF&A Revenue n/a	1800 W 7th	Little Rock
Pulaski	DF&A Revenue n/a	1900 W 7th	Little Rock
Pulaski	Department of Arkansas Heritage Mosaic Templars	501-513 W. 9th St	Little Rock
Pulaski	Arkansas Department of Health In-Home Services Freeway Medical Tower HPR	5800 West 12th	Little Rock
Pulaski	Arkansas Development Finance Authority Housing Compliance	1851 Cross	Little Rock
Pulaski	Arkansas Development Finance Authority Housing Compliance	1800 Cross Street	Little Rock
Pulaski	Arkansas Building Authority Financial Mgmt n/a	501 Main	Little Rock
Pulaski	Arkansas Contractors Licensing Board n/a n/a	621 E. Capitol Ave.	Little Rock
Pulaski	Pulaski Technical College	3000 West Scenic	North Little Rock

Sebastian	Arkansas Oil and Gas Commission	3309 Phoenix Avenue	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	4819 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	4823 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	4905 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5000 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5120 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5318 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5405 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5415 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5511 Kinkead Ave	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5523 Kinkead	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	4800 Grand Ave	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5021 Grand Avenue	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5101 Grand	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5111 Grand Avenue	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5211-5221 Grand Avenue	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5317 Grand Avenue	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5210 Grand Avenue	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5411 Grand Avenue	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	6205 Grand Ave	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	800 North 48th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	808 North 48th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	819 North 49th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	818 North 48th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	710 North 48th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	704 North 48th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	619 North 48th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	622 N 48th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	701 North 49th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	703 North 49th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	705 North 49th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	715 North 49th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	615 North 49th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	609 North 49th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	705 North 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	709 North 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	801-805 North 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	815 North 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	821-823 No. 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	905 North 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	901 North 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	545 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	544 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	444 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	500 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	510 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	532-534 N. 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	515 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	519 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	521 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	525 North 51st	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	535 North 51st	Fort Smith

Sebastian	University of Arkansas at Fort Smith n/a n/a	1108 North 52nd	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	1020 North 50th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	517 North 53rd	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	525 North 53rd	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	531 North 53rd	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	537 North 53rd	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	544 North 53rd	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	541 North 53rd	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	620 North Waldron	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	702 North Waldron	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	710 North Waldron	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	701 North 56th	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	500 College Drive	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	511 College Drive	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	520 College Drive	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	529 College Drive	Fort Smith
Sebastian	University of Arkansas at Fort Smith n/a n/a	5500 Ellsworth	Fort Smith
St. Francis	Arkansas State Police Highway Patrol Troop D	3205 N. Washington	Forrest City
St. Francis	East Arkansas Community College n/a n/a	1700 Newcastle Road	Forrest City
St. Francis	Crowley'Ridge Technical Institute	1620 Newcastle Rd.	Forrest City
Washington	University of Arkansas Kinzer Property	790 W. Cato Springs Rd.	Fayetteville
Washington	University of Arkansas Lazenby Property (near Baum Stadium)	15th & Beechwood	Fayetteville
Washington	University of Arkansas Parking	1232 W. 6 TH ST.	Fayetteville
Washington	University of Arkansas Parking-Old Kerr McGEE Lot	1370 W. 6TH ST.	Fayetteville
Washington	University of Arkansas Walton Arena Fair Park Addition	1402 W. 6TH ST.	Fayetteville
OIT Locations			
108 records			
LDRPS-COUNTY	**NAME**	**ADDR**	**LDRPS-CITY**
Conway	DHHS-DCO-Conway/Morrilton 15	2 Bruce Street	Morrilton
Conway	DHHS-DOH-Conway Co. Health Unit	100 Hospital Drive	Morrilton
Crawford	DHHS-DOH-Crawford Co. Health Unit	2040 Chestnut	Van Buren
Crawford	AHTD Resident Engineer #42	2495 So. 4th Street	Van Buren
Crittenden	DHHS-DOH-Crittenden Co Health Unit - West Memphis	901 North 7th	West Memphis
Crittenden	DCC West Memphis Probation and Parole Office	250 West Shopping Way	West Memphis
Crittenden	AHTD Resident Engineer #14	151 N. Frontage Rd	West Memphis
Faulkner	DWS Conway	1500 North Musuem Road	Conway
Faulkner	DCC Conway Probation and Parole Office	1014 Main	Conway
Hempstead	AHTD Resident Engineer #32	2911 Hwy. 29 North	Hope
Jefferson	AETN KETS - Redfield Transmitter	1811 365N	Redfield
Jefferson	ADC Compliance / Board of Corrections	7300 Dollarway Rd	Pine Bluff
Jefferson	ADC Jefferson County Jail Correctional Facility	7206 W 7th Ave	Pine Bluff
Jefferson	ADC Admin Offices	2403 E. Harding Ave.	Pine Bluff
Johnson	DHHS-DOH-Johnson Co. Health Unit	6 Professional Park Drive	Clarksville
Johnson	DHHS-DCO-Johnson/Clarksville 36	900 S. Rogers Ave.	Clarksville
Johnson	AHTD Resident Engineer #82	Hwy. 65 West & I-	Clarksville

		40	
Mississippi	AHTD Resident Engineer #05	Hwy. 119 North	Osceola
Monroe	DHHS-DOH-Monroe Co Health Unit	306 W King	Brinkley
Pope	DHHS-DOH-Pope Co. Health Unit	203 Weir Road	Russellville
Pope	AETN Lee Mountain Microwave Site	Lee Mountain Road	Lee Mountain
Pope	Emergency Administration and Management Department	105 West O Street, Arkansas Tech University Bryan Hall	Russellville
Pope	ATU Emergency Operations Center & Development	402 West O Street	Russellville
Pope	AHTD Resident Engineer #86	370 East Aspen Lane	Russellville
Pulaski	Department of Health and Human Services	618 Main Street	Little Rock
Pulaski	DFA ASC, OIT, APERS - Union Building	124 West Capitol	Little Rock
Pulaski	105 West Capitol, Two Union National Plaza Multi-agency	105 West Capitol	Little Rock
Pulaski	Arkansas Building Authority - Main Street Mall	101 East Capitol	Little Rock
Pulaski	Department of Higher Education	114 East Capitol Avenue	Little Rock
Pulaski	Historic Arkansas Museum	200 East Third Street	Little Rock
Pulaski	Arkansas Securities Department & Cemetery Board - Heritage West Building	201 E Markham	Little Rock
Pulaski	DCC Little Rock Probation Office	720 West 3rd	Little Rock
Pulaski	Ethics Commission	910 West 2nd Street	Little Rock
Pulaski	AID Liquidation Division	1023 W. Capitol	Little Rock
Pulaski	Insurance Department	1200 West Third Street	Little Rock
Pulaski	Senior Health Insurance Information Program AID	206 Cross	Little Rock
Pulaski	State Auditor, Teacher Retirement	1400 West Third Street	Little Rock
Pulaski	Assessment Coordination Department	1614 West 3rd Street	Little Rock
Pulaski	Department of Education	4 Capitol Mall	Little Rock
Pulaski	Multi-agency - Multiple Agency Complex	1 Capitol Mall	Little Rock
Pulaski	Department of Workforce Services & Transitional Employment	2 Capitol Mall	Little Rock
Pulaski	Workforce Education	3 Capitol Mall	Little Rock
Pulaski	Administrative Office of the Courts, Building Authority	625 Marshall	Little Rock
Pulaski	Arkansas Building Authority - 410 Battery Building	410 South Battery	Little Rock
Pulaski	Private Career Education Board & Real Estate	612 South Summit Street	Little Rock
Pulaski	Arkansas Building Authority - Shop Location	2201 West 6th Street	Little Rock
Pulaski	Social Work Licensing Board, Workforce Ed	2020 West 3rd Street	Little Rock
Pulaski	School for the Deaf	2400 West Markham	Little Rock
Pulaski	School for the Blind	2600 West Markham	Little Rock
Pulaski	DHHS-DMHS-Arkansas State Hospital	4313 West Markham	Little Rock
Pulaski	Department of Health and Human Services	4815 West Markham Street	Little Rock
Pulaski	DCC -Central Arkansas Center (CAC)	4823 West 7th	Little Rock
Pulaski	DHHS-DOH-Pulaski Co Health Unit-Central L. Rock	3915 West 8th	Little Rock
Pulaski	DHHS-DOH-Central Public Health Region	5800 West 10th	Little Rock
Pulaski	Board of Nursing	1123 South	Little Rock

		University Ave	
Pulaski	Little Rock Veterans Home	4701 W. Charles Bussey Avenue	Little Rock
Pulaski	Geological Commission - Warehouse	1911 Thayer Street	Little Rock
Pulaski	DWS Little Rock Midtown	1501 S. Main	Little Rock
Pulaski	Board of Barber Examiners	103 East Seventh	Little Rock
Pulaski	Multi-agency	423 Main Street	Little Rock
Pulaski	Arkansas Building Authority AWCC	4th and Spring	Little Rock
Pulaski	DFA Office of Child Support Enforcement	400 E Capitol	Little Rock
Pulaski	DCC Little Rock Parole Office	1421 East 9th	Little Rock
Pulaski	DHHS-DCO-Pulaski East 60-4	1424 E. Second	Little Rock
Pulaski	Department of Aeronautics	1 Airport Drive	Little Rock
Pulaski	DHHS-DOH-Pulaski Co Health Unit - College Station	4206 Frazier Pike	College Station
Pulaski	DHHS-DCO-Pulaski North 60-2	1900 E. Washington Ave.	North Little Rock
Pulaski	NLR Central Station	723 Maple Street	North Little Rock
Pulaski	DHHS-DOH-Pulaski Co Health Unit - N. Little Rock	2800 Willow Street	North Little Rock
Pulaski	Department of Veterans Affairs	2200 Fort Roots Drive	North Little Rock
Pulaski	Department of Labor Building 1	10421 West Markham	Little Rock
Pulaski	Department of Labor Building 2	10411 West Markham	Little Rock
Pulaski	Oil and Gas Commission	301 Natural Resources Drive	Little Rock
Pulaski	Arkansas Building Authority - Natural Resources Bl	1 Natural Resources Drive	Little Rock
Pulaski	Arkansas Building Authority - Crime Lab Building	3 Natural Resource Drive	Little Rock
Pulaski	Game and Fish Commission	2 Natural Resources Drive	Little Rock
Pulaski	State Bank	400 Hardin Road	Little Rock
Pulaski	Contractors Licensing Board	4100 Richards Road	North Little Rock
Pulaski	LP Gas Board	3800 Richards Road	North Little Rock
Pulaski	AHTD Resident Engineer #61	803 Eureka Gardens Rd.	North Little Rock
Pulaski	AHTD Resident Engineer #66	11221 Otter Creek E. Blvd.	Little Rock
Pulaski	Highway and Transportation	10324 Interstate 30	Little Rock
Pulaski	AHTD Resident Engineer #65	8900 Mabelvale Pike	Little Rock
Pulaski	DHHS-DCO-Pulaski Southwest 60-3	6801 Baseline Road	Little Rock
Pulaski	DHHS-DOH-Pulaski Co Health Unit - SW Little Rock	4918 Baseline	Little Rock
Pulaski	State Police & ADEQ Water	1 State Police Plaza Drive	Little Rock
Pulaski	Department of Environmental Quality	8001 National Drive	Little Rock
Pulaski	DFA Marketing and Redistribution	6620 Young Road	Little Rock
Pulaski	AHTD Resident Engineer #62	411 Shamberger Lane	Little Rock
Pulaski	DHHS-DCO-Pulaski South 60-1	1105 MLK, Jr.	Little Rock
Pulaski	Old State House Museum	300 West Markham	Little Rock

Pulaski	Pulaski County	201 S Broadway	Little Rock
Pulaski	Board of Review, Heritage, Prosecutor Coordinator	323 Center Street	Little Rock
Pulaski	Workers Compensation Commission	324 Spring St	Little Rock
Pulaski	Registration for Prof. Engineers & Land Surveyors	410 West 3rd Street	Little Rock
Pulaski	Department of Finance and Administration	1509 W. 7th Street	Little Rock
Pulaski	Arkansas Building Authority - 1515 Building	1515 W. 7th Street	Little Rock
Pulaski	Governor, Treasury, Sec. of State,	State Capitol Building	Little Rock
Pulaski	Multi-agency	501 Woodlane	Little Rock
Pulaski	Legislative Audit, Treasury	1401 West Capitol	Little Rock
Pulaski	Disability Determination	701 Pulaski Street	Little Rock
Pulaski	Mosaic Templars Cultural Center	904 Broadway	Little Rock
Pulaski	Arkansas Building Authority - Public Service Com	1000 Center Street	Little Rock
Pulaski	Department of Health and Human Services	700 Main Street	Little Rock
Pulaski	Department of Health and Human Services	621 Main Street	Little Rock
Sebastian	DHHS-DOH-Sebastian Co. Health Unit	3112 South 70th	Fort Smith
St. Francis	DHHS-DOH-SE P. Health Regional Off./Forrest City	1501 Dawson Road	Forrest City
Washington	AHTD Resident Engineer #43	3526 No. Hwy. 112	Fayetteville

Railroads and Hazardous Materials

There are a significant number of railroads operating throughout the State of Arkansas and they transport a large quantity of hazardous materials every year. These railroads are constantly monitored for safety and very few major incidents occur, however this is a concern to the HMP Sub-Committee. Railroad vulnerability is very similar to that of highway in that the incidents are usually localized and only affect the immediate area. In some cases, toxic plume dispersion may affect the surrounding area as well, but this is only in terms of human health and does not affect the vulnerability of state facilities. Railroads primarily travel through rural areas, but they do often go through populated areas and therefore pose a direct risk to the populations and the structures near the rail lines. The HMP Sub-Committee does not consider this to be a high priority hazard in terms of vulnerability to state facilities; however an analysis was completed to determine the facilities near the railroad infrastructure.

The assessment of state-owned and operated facilities vulnerable to a rail event was performed using the best available data. The data, provided by the Arkansas Insurance Council, consisted of an Excel database of 4,010 state-owned facilities. Each facility within the database included the facility's address, zip code, building name, agency affiliation, square footage, replacement cost, value of contents, and date of construction. Using ESRI's Arcview Geographic Information System (GIS) technology, a GIS database was created so that the state-owned facility data could be displayed on a geo-referenced map. The locations of the 4,010 facilities were geo-coded to the nearest zip code centroid.

Based on the best available data, there are an estimated 1464 state-owned facilities within a 1-mile buffer of railways found in Arkansas. The total cost to rebuild these 1464 structures is estimated at $1,157,507,012, an average of $790,646 per facility.

Table 4.4.11-7: State-Owned Facilities within 1 Mile of a Major Railroad in Arkansas

Number of State-Owned Facilities	Cost to Replace	Value of Contents	Average Per Building To Replace	Average Per Building Contents
1464	$ 1,157,507,012.00	$ 222,974,599.00	$ 790,646.00	$ 152,305.00

Pipelines and Hazardous Materials

Pipelines crisscross the State of Arkansas transporting a number of dangerous chemicals. In general these pipelines are meticulously maintained and safety issues are constantly addressed and improved. Incidents involving pipelines may involve explosions, but most likely they results in a release of the transported substance. These releases may have an effect on the human, animal or crop population immediately surrounding the pipeline, but there is very little risk to buildings or structures not directly next to the pipeline. Pipeline incidents are similar to highway or rail incidents in the very limited area impacted. The HMP Sub-Committee has completed the following analysis of state facilities within one mile of pipelines, however the committee does not feel that these locations are particularly vulnerable to this type of HAZMAT release.

The assessment of state-owned and operated facilities vulnerable to a pipeline event was performed using the best available data. The data, provided by the Arkansas Insurance Council, consisted of an Excel database of 4,010 state-owned facilities. Each facility within the database included the facility's address, zip code, building name, agency affiliation, square footage, replacement cost, value of contents, and date of construction. Using ESRI's Arcview Geographic Information System (GIS) technology, a GIS database was created so that the state-owned facility data could be displayed on a geo-referenced map. The locations of the 4,010 facilities were geo-coded to the nearest zip code centroid.

Based on the best available data, there are an estimated 230 state-owned facilities within a 1-mile buffer of pipelines found in Arkansas. The total cost to rebuild these 230 structures is estimated at $63,947,285, an average of $278,031 per facility.

Table 4.4.11-8: State-Owned Facilities within 1 Mile of a Major Pipeline in Arkansas

Number of State-Owned Facilities	Cost to Replace	Value of Contents	Average Per Building To Replace	Average Per Building Contents
230	$ 63,947,285.00	$ 15,743,000.00	$ 278,031.00	$ 68,491.00

4.4.12 Assessing Vulnerability of State Facilities to Nuclear Events

There are two primary nuclear sites within Arkansas that have been identified to assess vulnerability of state facilities:

Arkansas Nuclear One (ANO).

Southwest Experimental Fast Oxide Reactor (SEFOR).

Arkansas Nuclear One (ANO)

An event at Arkansas Nuclear One could affect some of the state facilities nearby. The most likely effects are related to the health and safety of people as radiation disperses in the area. There would be no danger to the physical buildings and facilities but rather the vulnerability is to the state employees and to the ability for these facilities to continue operations during the emergency response and subsequent recovery. The HMP Sub-Committee completed an analysis of the state facilities within the federally mandated Nuclear Emergency Planning Zones (EPZ).

The assessment of state-owned and operated facilities vulnerable to a nuclear event at ANO was performed using the best available data. The data, provided by the Arkansas Insurance Council, consisted of an Excel database of 4,010 state-owned facilities. Each facility within the database included the facility's address, zip code, building name, agency affiliation, square footage, replacement cost, value of contents, and date of construction. Using ESRI's Arcview Geographic Information System (GIS) technology, a GIS database was created so that the facility data could be displayed on a geo-referenced map. The locations of the 4,010 facilities were geocoded to the nearest zip code centroid.

Based on the best available data, there are 138 state-owned facilities within a 10-mile radius of Arkansas Nuclear One. The total cost to rebuild these 138 structures is estimated at $3,483,562,506.

Table 4.4.12-1: State-Owned Facilities within 10 Miles of ANO

Number of State-Owned Facilities	Cost to Replace	Value of Contents	Average Per Building: To Replace	Average Per Building: Contents
143	$147,039,845.00	$ 39,522,668.00	$ 1,028,250.00	$ 276,382.00

Based on the best available data, there are 774 state-owned facilities within a 50-mile radius of Arkansas Nuclear One. The total cost to rebuild these 774 structures is estimated at $549,467,943.

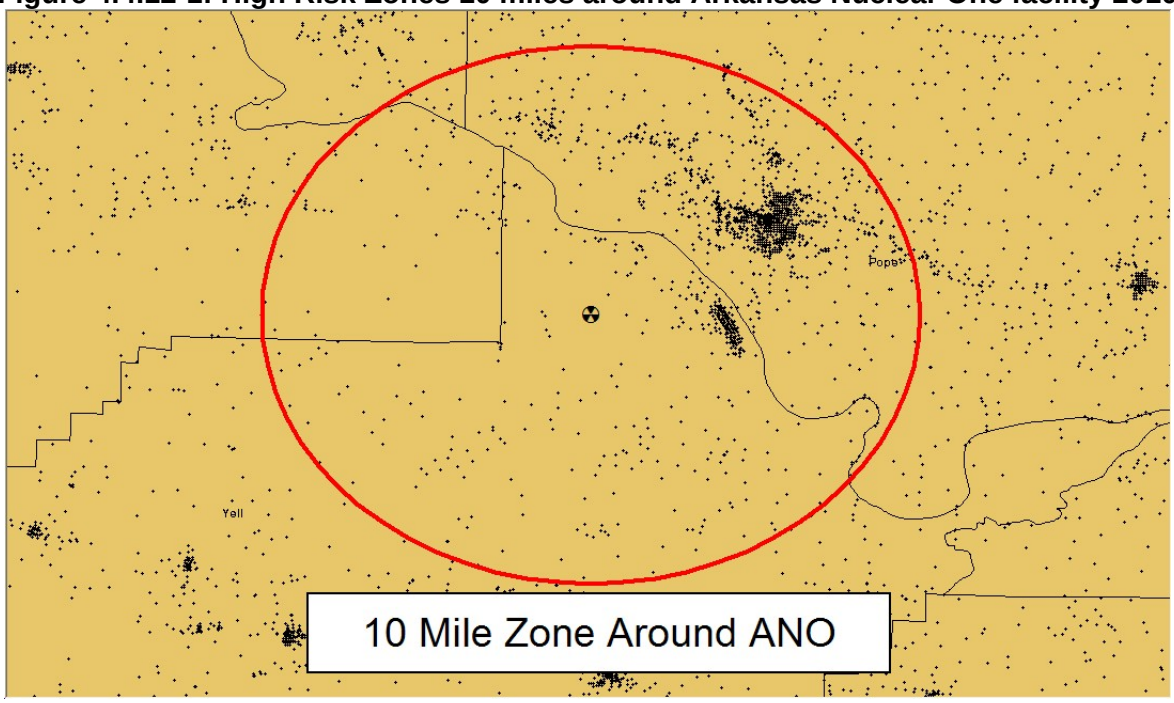
Table 4.4.12-2: State-Owned Facilities within 50 Miles of ANO

Number of State-Owned Facilities	Cost to Replace	Value of Contents	Average Per Building: To Replace	Average Per Building: Contents
774	$549,467,943.00	$ 113,290,738.00	$ 709,906.00	$ 146,370.00

2010 State Facility GIS Dataset

The following map shows the area 10 miles around the Arkansas Nuclear One facility. The state facilities within the high risk zone are listed below.

Figure 4.4.12-1: High Risk Zones 10 miles around Arkansas Nuclear One facility 2010



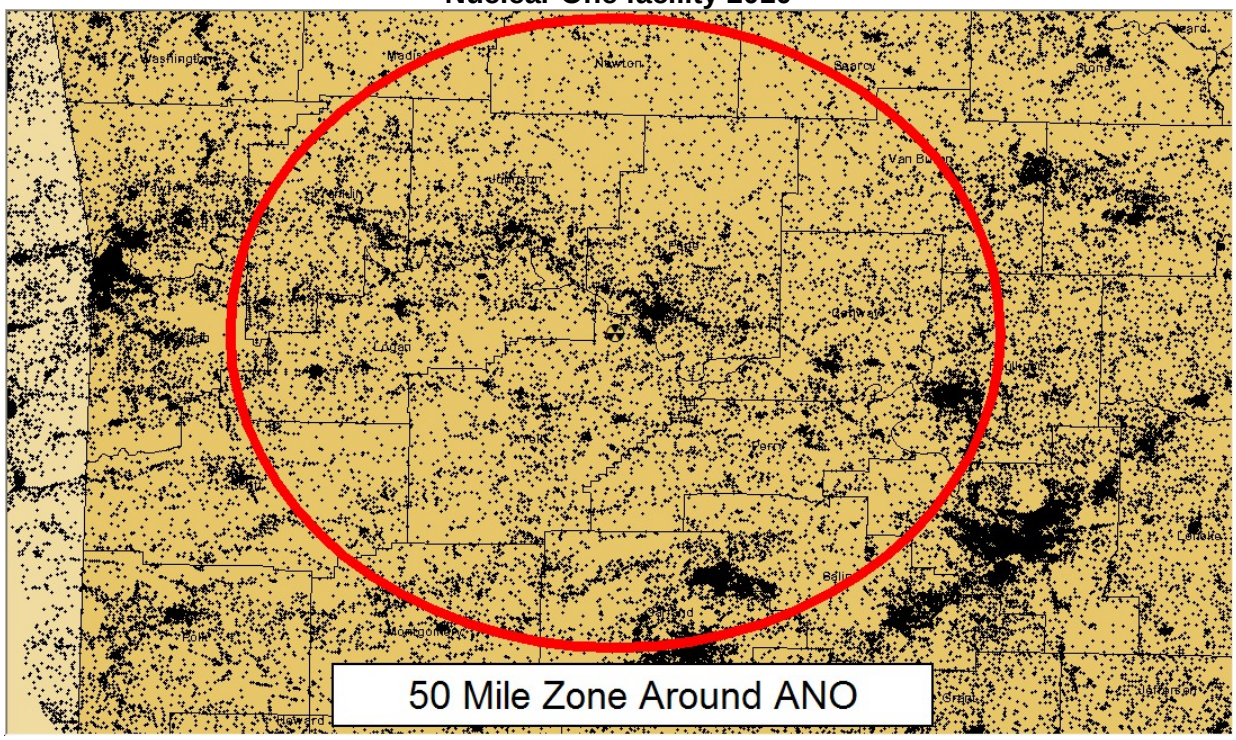
Source: GeoStor

Table 4.4.12-3: ABA State-Owned Facilities and OIT Locations

State-Owned Locations (ABA)			
COUNTY NAME	NAME	ADDR	CITY
Yell	Arkansas State Military Department	510 N 2d St	Dardanelle
OIT Locations			
LDRPS_COUNTY	NAME	ADDR	LDRPS_CITY
Pope	DHHS-DOH-Pope Co. Health Unit	203 Weir Road	Russellville
Pope	AETN Lee Mountain Microwave Site	Lee Mountain Road	Lee Mountain
Pope	DHHS-DCO-Pope/Russellville 58	701 N. Denver	Russellville
Pope	DHHS-DOH-NW Public Health Regional Off./Rsvl.	404 North El Paso	Russellville
Pope	Emergency Administration and Management Department	105 West O Street, Arkansas Tech University Bryan Hall	Russellville
Pope	ATU Emergency Operations Center & Development	402 West O Street	Russellville
Pope	AHTD Resident Engineer #86	370 East Aspen Lane	Russellville
Yell	DHHS-DOH-Yell Co. Health Unit-Dardanelle	719 North 5th	Dardenelle

The following map and list are for the high risk area within the 50-mile Emergency Planning Zone (EPZ) for the Arkansas Nuclear One facility.

Figure 4.4.12-2: High Risk Area within 50 mile Emergency Planning Zones for Arkansas Nuclear One facility 2010



Source: GeoStor

Table 4.4.12-4: ABA State-Owned Facilities and OIT Locations

State-Owned Locations (ABA)			
23 records			
COUNTY NAME	NAME	ADDR	CITY
Conway	University of Arkansas Community College Morrilton	1 Bruce Street	Morrilton
Conway	Arkansas State Military Department	411 E Branch St	Morrilton
Faulkner	University of Central Arkansas Administration Physical Plant	425 Donahey Ave.	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	2413 College Avenue	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	2401 College Avenue	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	2329 College	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	115 Farris Road	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	324 Western	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	453 Western Ave	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	377 Donaghey Ave.	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	405 Augusta	Conway

Faulkner	University of Central Arkansas Administration Physical Plant	424 Augusta	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	2400 Bruce Street	Conway
Faulkner	University of Central Arkansas Administration Physical Plant	1971 Robbins Street	Conway
FAULKNER	DHS DDS/CHDC	150 E. Siebenmorgan Rd	Conway
Faulkner	Arkansas State Military Department	300 Exchange Ave	Conway
Fualkner	University of Central Arkansas Administration Physical Plant	1965 Torreyson Ave.	Conway
Garland	Quapaw Technical Institute Technical Institute N/A	200 Mid-America Blvd	Hot Springs
Garland	Garland County Community College n/a n/a	101 College Drive	Hot Springs
Garland	Arkansas State Military Department	401 Mid-America	Hot Springs
Johnson	Arkansas State Police Highway Patrol Troop J	2402 W Main	Clarksville
Perry	Arkansas State Military Department	775 East Main Street	Piggot
Yell	Arkansas State Military Department	510 N 2d St	Dardanelle
OIT Locations			
29 records			
LDRPS_COUNTY	NAME	ADDR	LDRPS_CITY
Conway	AETN Center Ridge Microwave Site	Wolverton Mountain Road	Center Ridge
Conway	DHHS-DCO-Conway/Morrilton 15	2 Bruce Street	Morrilton
Conway	DHHS-DOH-Conway Co. Health Unit	100 Hospital Drive	Morrilton
Faulkner	AETN	350 South Donaghey	Conway
Faulkner	DWS Conway	1500 North Musuem Road	Conway
Faulkner	DCC Conway Probation and Parole Office	1014 Main	Conway
Faulkner	AETN Cadron Ridge Microwave Antenna	1399 Hickory Hill Road	Conway
Franklin	DHHS-DCO-Franklin/Ozark 24	800 W. Commercial	Ozark
Franklin	DHHS-DOH-Franklin Co. Health Unit	799 River Street	Ozark
Garland	ASP Troop K	101 Mid America Blvd	Hot Springs
Johnson	DHHS-DOH-Johnson Co. Health Unit	6 Professional Park Drive	Clarksville
Johnson	DHHS-DCO-Johnson/Clarksville 36	900 S. Rogers Ave.	Clarksville
Johnson	AHTD Resident Engineer #82	Hwy. 65 West & I-40	Clarksville
Logan	DHHS-DOH-Logan Co. Health Unit-Paris	150 South Lowder	Paris
Logan	DHHS-DCO-Logan/Paris 42-1	17 W. McKeen	Paris
Logan	DHHS-DOH-Logan Co. Health Unit-Booneville	721 West First	Booneville
Logan	DHHS-DCO-Logan/Booneville 42-2	398 East 2nd	Booneville
Logan	DHHS-DDS-Booneville Human Development Center	87 Reed Road	Booneville
Perry	DHHS-DCO-Perry/Perrryville 53	213 Houston Avenue	Perryville
Pope	DHHS-DOH-Pope Co. Health Unit	203 Weir Road	Russellville
Pope	AETN Lee Mountain Microwave Site	Lee Mountain Road	Lee Mountain
Pope	DHHS-DCO-Pope/Russellville 58	701 N. Denver	Russellville
Pope	DHHS-DOH-NW Public Health Regional Off./Rsvl.	404 North El Paso	Russellville
Pope	Emergency Administration and Management Department	105 West O Street, Arkansas Tech University Bryan Hall	Russellville
Pope	ATU Emergency Operations Center &	402 West O Street	Russellville

	Development		
Pope	AHTD Resident Engineer #86	370 East Aspen Lane	Russellville
Yell	DHHS-DOH-Yell Co. Health Unit-Danville	1309 Hwy 10E	Danville
Yell	DHHS-DCO-Yell/Danville 75	904 M St./Hwy. 10 E	Danville
Yell	DHHS-DOH-Yell Co. Health Unit-Dardanelle	719 North 5th	Dardenelle

Southwest Experimental Fast Oxide Reactor (SEFOR)

An event at Southwest Experimental Fast Oxide Reactor (SEFOR) could affect some of the state facilities nearby. The most likely effects are related to the health and safety of people as radiation disperses in the area. There would be no danger to the physical buildings and facilities but rather there would be vulnerability to the state employees and to the ability for these facilities to continue operations during the emergency response and subsequent recovery. The HMP Sub-Committee completed an analysis of the state facilities within a 10-mile radius of the SEFOR site.

The assessment of state-owned and operated facilities vulnerable to an event at SEFOR was performed using the best available data. The data, provided by the Arkansas Insurance Council, consisted of an Excel database of 4,010 state-owned facilities. Each facility within the database included the facility's address, zip code, building name, agency affiliation, square footage, replacement cost, value of contents, and date of construction. Using ESRI's Arcview Geographic Information System (GIS) technology, a GIS database was created so that the facility data could be displayed on a geo-referenced map. The locations of the 4,010 facilities were geocoded to the nearest zip code centroid.

Based on the best available data, there are 59 state-owned facilities within a 10-mile radius of SEFOR. The total cost to rebuild these 59 structures is estimated at $15,471,802.

Table 4.4.12-5: State-Owned Facilities within 10 Miles of SEFOR

Number of State-Owned Facilities	Cost to Replace	Value of Contents	Average Per Building: To Replace	Average Per Building: Contents
59	$ 15,471,802.00	$ 463,000.00	$ 262,233.00	$ 7,847.00

4.4.13 Assessing Vulnerability of State Facilities to Terrorism Events

The very nature of the national terrorism threat is aimed at inflicting damage to our government, economy and infrastructure. With this in mind, the HMP Sub-Committee feels that state facilities are highly vulnerable to potential terrorist attacks. The overarching belief is that there will be no future terrorist attacks in the State of Arkansas; however ADEM and the Department of Homeland Security have enacted a variety of programs to strengthen the levels of protection around key locations and high density population areas. Based on these assumptions, the HMP Sub-Committee feels that all state facilities are potentially vulnerable to terrorist attacks, however the Committee also feels that the largest, most populated and most visible locations are more attractive targets and therefore face a higher level of vulnerability than the overall list of 4,010 facilities.

These high risk targets are susceptible to physical building damage, contamination from bio-hazards and associated continuity of government issues during the response, and the subsequent investigation and recovery.

Please refer to the state's terrorism plans to get further detailed information about this vulnerability.

4.4.14 Assessing Vulnerability of State Facilities to Biological Events

Due to the nature of biological hazards, facilities are not in danger of actual physical damage. Any associated vulnerabilities are related to human health and safety issues, facility contamination issues, and recovery and continuity or operations issues. In the event of a pandemic outbreak, there will be widespread implications for the state government, economy and the populations, so various state agencies and facilities will be vulnerable to a variety of impacts. However, the majority of the facilities impacted will be private facilities such as hospitals, laboratories, poultry operations, etc.

State facilities that are considered vulnerable during severe biological outbreaks include:

Public or quasi-public hospitals and medical facilities.

Testing and monitoring laboratories.

Public health and animal health agencies involved in response and surveillance.

Research facilities at university locations.

The analysis above is considering state facilities from the viewpoint of responding to a naturally occurring human or animal disease outbreak. In the case of a bio-terror attack, any and all state facilities are considered vulnerable to contamination. As discussed above in the Terrorism Vulnerability Analysis, this level of vulnerability is difficult to predict and tends to be focused on high-profile locations. To determine the state facilities vulnerable to bioterrorism attacks, please refer to the State's Terrorism and Bioterrorism plans.

All Hazard Mitigation Plan
State of Arkansas

Chapter 4 – Loss Estimation

Updated September 2, 2010

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4.5 Estimating Potential Losses by Jurisdiction

Estimating Potential Losses by Jurisdiction	
IFR REQUIREMENT *201.4(c)(2)(iii):*	[The risk assessment shall include an] overview and analysis of potential losses to identified vulnerable structures, based on estimates provided in local risk assessments
Explanation:	This requires States to incorporate the findings of local jurisdiction loss estimates in the State plan. The plan **shall** describe the distribution of losses across the State and *should* include specific reference to quantifying losses to local critical facilities.
Update	The State **shall** incorporate any changes, clarifications, or refinements, obtained from State-wide or local loss estimates. Recognizing the differences in local risk assessments, information from local mitigation plans allows the State to better understand or describe its vulnerability in terms of the potential losses. However, the update should not attempt to include the details provided in every local mitigation plan. Comparable to the estimating vulnerability by jurisdiction, the state **must** consider changes in development that may affect the statewide loss estimates.

As part of the 2010 plan update process, the HMP Sub-Committee reviewed the existing loss estimations from the original State Hazard Mitigation Plan, and the 2007 updated plan. Using these original estimations as the starting point, the Sub-Committee developed a more detailed analysis for all the profiled hazards. This overall section provides specific details about the following items:

- The original 2004 estimation methodologies and results.
- The 2007 update process used to enhance the 2004 assessment.
- The 2010 update process used to enhance the 2007 assessment.
- The detailed study of the state's potential losses associated with each hazard event.

The HMP Sub-Committee has reviewed this entire section thoroughly again for the 2010 update process and has fully researched the state's potential for losses in terms of jurisdictions at risk. Through the public process, the HMP Sub-Committee researched all relevant data for use in the development of this analysis. The best available data for each category was used in this loss estimation.

2004 Methodology for Estimating Losses by Jurisdiction

In 2004, the HMP Sub-Committee provided the following explanation of the process used to estimate potential losses on a statewide basis to the profiled hazards.

At the time this Revision of the State of Arkansas Hazard Mitigation Plan was prepared, fourteen local jurisdiction hazard mitigation plans had been approved by ADEM and sent to the Federal Emergency Management Agency for review and approval. Therefore, assessment of vulnerability and potential losses by local jurisdictions is currently limited. It is expected that by the next edition of the plan, to be submitted to FEMA for approval

in 2007, 75% of the 77 Arkansas jurisdictions required to write a plan will have FEMA approved plans. At this point, the assessment of risk by jurisdiction is summarized below and is detailed in the Local Plan Integration for each hazard. For complete details please refer to the Risk Assessment Sections of the specific local mitigation plans. Details of the timeline of completion of local plans are provided in Section 5.7.

The Mitigation Branch of the Arkansas Department of Emergency Management and members of the Pre-Disaster Mitigation Advisory Committee will continue to review hazard profiles and risk assessments of local plans during the preparations of the next edition of the state plan. Information in local plans that supplements and improves the accuracy and depth of the state plan will be incorporated into the plan. Such information may include, but not be limited to: 1) detailed locations of hazard areas, 2) detailed information on populations, structures, and critical facilities located in or near hazard areas, and 3) information on projected growth in or near hazard areas. Local jurisdictions and hazard experts will review the revised risk assessment to ensure the accuracy following incorporation of local information.

Because of the limited availability of local risk assessment data, much of the estimation of potential losses by jurisdiction for each hazard in this section is based on historical hazard loss data where it is available.

2007 Methodology for Estimating Losses by Jurisdiction

In conducting the 2007 estimation of potential losses from hazard events, the HMP Sub-Committee reviewed the official guidance and information from the Federal Emergency Management Agency (FEMA) and the Emergency Management Accreditation Program (EMAP) regarding the specific elements for loss estimation.

The Sub-Committee conducted an extensive search for information and data about the overall potential losses to the state. The extensive effort comprised a number of individual initiatives:

- Interviews with state departments about best available financial data for their facilities and programs.
- Research of public records including newspapers, libraries, and the Internet.
- Communication with federal agencies regarding past events and financial impacts and other losses.
- Meetings with private businesses and subject-matter experts for various industries.

After this research phase, all the available data was collated and used to estimate losses for each identified hazard. The HMP Sub-Committee utilized three distinct data sources for primary information regarding potential losses for the overall state. Each of the data sources is independent from the other and the resulting estimations are therefore different. However the results of these three independent loss estimations provided an overall perspective for this plan revision. The following details the three data sources:

- HAZUS-MH2 Exposure Values – As part of the previous vulnerability analysis section, the overall exposure values for the high risk counties was calculated. For each hazard, this data was considered and used for loss estimation. The HMP-Sub-Committee recognized that this data could not be related directly to the impacts within a county for a specific hazard, but rather that these exposure

amounts were worst-case scenarios for each county. In order to attempt to estimate losses on a statewide basis and not for a particular county, the HMP Sub-Committee agreed on an averaging methodology by summing the high risk county exposure and dividing it by the number of high risk counties. This resulted in an average exposure value for all counties identified in the high risk zone.

- FEMA Approved Local Hazard Mitigation Plans – At the time of the 2007 plan revision, the State of Arkansas had nine local plans approved by FEMA. These nine plans were reviewed extensively for data to assist with the statewide loss estimation. This data is inconsistent from plan to plan and from hazard to hazard and is based on a number of varying sources. However at the time of the 2007 revision, this was some of the best financial data available. This information was used in this analysis as applicable for each individual hazard.
- National Climatic Data Center (NCDC) Storm Events Database – This database is maintained by NOAA and the NCDC and has historical records for local events. This database reports information about quantities, locations, deaths, injuries, property damage and crop damage. The property and crop damage statistic are used in this estimation along with quantities to find historical loss averages.

The HMP Sub-Committee considered the issues related to estimating losses on a statewide basis and realized that any scenario-based modeling would provide statistics and estimations only for the geographic area impacted by the scenario. Therefore the Sub-Committee elected not to attempt this type of loss estimation. Instead the Sub-Committee focused on the overall financial exposure for the high risk areas and the average damage amounts from past events as the primary tools for estimating potential losses in the future on a statewide basis.

2010 Methodology for Estimating Losses by Jurisdiction

For the 2010 update the Sub-Committee chose not to use HAZUS-MH for assessing estimated losses by jurisdiction. The committee instead chose to use past hazard event data from the NCDC to update the data from the previous update of this plan, with the exception of earthquakes. For estimating losses from earthquakes the committee chose to review data from the Mid-America Earthquake Center, which provides damages for a 7.7 magnitude earthquake scenario event in the New Madrid Seismic Zone (NMSZ). The following is a summary of the resources used throughout the loss estimation:

- FEMA Approved Local Hazard Mitigation Plans – At the time of the 2010 plan revision, the State of Arkansas had sixty-two local plans approved by FEMA. These sixty-two plans were reviewed extensively for data to assist with the statewide loss estimation. This data is inconsistent from plan to plan and from hazard to hazard. The inconsistency is based on local plans using varying methodologies and sources. However at the time of the 2010 revision, this was some of the best monetary data available. This information was used in this analysis as applicable for each individual hazard.

- National Climatic Data Center (NCDC) Storm Events Database – This database is maintained by NOAA and the NCDC and has historical records for local events. This database reports information about quantities, locations, deaths, injuries, property damage and crop damage from actual events. The property and

crop damage statistic are used in this estimation along with quantities to find historical loss averages.

- Development Pressure – (See Chapter 3 Development in Hazard Prone Areas). For flooding, wildfire, earthquake, and hazardous materials please refer to the Development in Hazard Prone Areas located in their individual vulnerability assessments.

4.5.1 Estimating Potential Losses by Jurisdiction to Tornadoes

The HMP Sub-Committee conducted a loss estimation for tornadoes in the original plan development process. During the previous plan update and revision process, this estimation was enhanced and expanded with the best available data when possible. For 2010, the Sub-Committee removed the loss estimates from previous versions of this plan and updated the loss estimation in 2010 with more current data, and integrated data from the local mitigation plans.

2010 NCDC Tornado Loss Estimation

The data from the National Climatic Data Center provided details about the historical tornadoes in the state. The following chart shows a breakdown of the magnitudes of the tornadoes that have occurred in Arkansas from January 1996 to March 2010.

Table 4.5.1-1: 2010 Tornadoes by F-Scale Rating

Magnitude of Tornadoes	NCDC Total Events (1996- 2010)	Average per Year	Percent of Total
F4	11	0.8	1.3%
F3	61	4.4	7.3%
F2	142	10.1	17.1%
F1	338	24.1	40.6%
F0	288	20.6	33.7%
Total	**840**	**60**	**100%**

From the reported NCDC data, the following losses have resulted from the 840 tornadoes in the state from January 1996 – March 2010.

Table 4.5.1-2: Summary of Tornado Losses

	Deaths	Injuries	Property Damage	Crop Damage	Total Damages
Total (1996-2010)	81	1280	$1,237,000,000	$1,457,000	$1,238,457,000
Annual Average	5.7	91.4	$88,357,142	$ 104,071	$88,461,214
Average Per Event	0.07	1.1	$1,472,619	$1,642	$1,474,353

Based on this historical data, the average estimated losses per tornado is approximately $1,474,353. The following statistics were noted by the HMP Sub-Committee to qualify this estimated loss based on historical events in the state.

- A number of NCDC events are for the same tornado but are reported by different jurisdictions. Therefore the number of events listed is actually higher than the actual number of events that occurred.
- There were eight listed tornadoes with damages greater than $45 million. These events had a total cumulative reported damage of $770 million which is 62.2% of the total $1,238,457,000.
- There were two events reported for 4/21/1996 in Fort Smith and one in Van Buren. Each of these individually reported the highest damages with $150 million each.

The HMP Sub-Committee determined that worse case loss estimates for tornadoes can easily reach into the hundreds of millions of dollars; however as part of the loss estimation, the Sub-Committee discarded the 452 events with no damage and the eight "high-dollar" events (over $45 million) and calculated a more typical loss. Based on this revised estimation, a more typical loss for a tornado event is approximately $1,199,631.

Table 4.5.1-3: Tornado Statistics 1996 - 2010

	Number of events	Total Damages	Average per Event
NCDC Total	840	$1,238,457,000	$1,474,353
Removed	452	$770,000,000	$1,703,540
New Total	388	$465,457,000	$1,199,631

Local Loss Estimation Averages

The following table was developed from data from the FEMA approved local plans for the tornado hazard. The HMP Sub-Committee determined that this is the best available local data related to historical losses.

Table 4.5.1-4: Local Plan Summary for Tornadoes by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	High	29	$ 6,938,000	0	21	N/A	N/A	N/A
Ashley County	High	24	$ 518,129,152	3	3,700	N/A	N/A	N/A
Benton County	High	17	$ 19,293,000	0	12	N/A	2	$332,638
Bradley County	High	17	$ 30,400,000	7	53	6	6	$608,584
Calhoun County	N/A	12	N/A	N/A	1	N/A	N/A	N/A
Chicot County	N/A	23	$ 5,620,000	1	41	7	1	$116,983
City of Foreman	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A

Clark County	Medium-High	29	$ 130,235,500	N/A	N/A	N/A	8	N/A
Clay County	Medium-High	15	$ 16,450,000	1	1	4	2	$ 237,550
Cleburne County	N/A	25	$ 63,353,000	3	32	12	N/A	$ 1,195,339
Cleveland County	N/A	8	$ 53,000.	0	2	N/A	N/A	$ 1,040
Columbia County	N/A	24	$ 7,083,000	3	18	1	N/A	$ 138,882
Conway County	High	24	$ 7,403,100	3	N/A	N/A	14	$ 139,681
Craighead County	N/A	27	$ 36,100,000	37	616	21	2	$ 707,650
Crawford County	Orange (MH)	14	$ 150,790,000	0	75	0	1	$ 3,500,000
Crittenden County	N/A	14	$ 356,476	6	122	3	1	$ 44,559
Cross County	N/A	18	$ 9,860,000	5	24	N/A	N/A	$ 176,143
Dallas County	N/A	20	$ 1,130,000	1	6	N/A	5	N/A
Desha County	N/A	18	$ 1,130,000	0	5	N/A	N/A	$ 20,545
Drew County	N/A	9	$ 3,600,000	1	4	5	0	$ 19,400
Faulkner County	High	47	N/A	10	N/A	8	2	N/A
Franklin County	N/A	17	$ 3,491,000	0	8	N/A	2	$ 74,276
Fulton County	N/A	19	$ 808,000	4	28	N/A	N/A	$ 17,191
Grant County	N/A	16	$ 4,400,000	0	2	5	1	$ 81,481
Hempstead County	High	21	$ 17,200,000	5	11	12	3	$ 373,461
Hot Spring County	High	29	$ 32,755,000	N/A	N/A	N/A	13	$ 606,574
Howard County	High	25	$ 6,233,000	10	42	1	3	$ 115,425
Independence County	N/A	37	$ 60,386,000	8	52	N/A	N/A	$ 1,078,321
Jackson County	N/A	46	$ 72,900,000	5	105	15	2	$ 1,376,079
Jefferson County	Orange (MH)	23	$ 10,900,000	1	11	12	1	$ 218,840
Johnson County	High	30	$ 8,478,000	2	135	N/A	1	N/A
Lafayette County	N/A	8	$ 1,475,000	0	0	N/A	9	$ 36,875
Lawrence County	N/A	22	$ 2,491,000	1	15	N/A	N/A	$ 49,820
Lincoln County	N/A	14	$ 3,500,000	5	23	7	0	$ 19,000
Little Rock/ L.R. North	Red (H)	27	$ 125,148,000	13	371	0	6	$ 2,317,600
Logan County	Red (H)	19	$ 1,836,000	1	12	0	1	$ 34,641
Lonoke County	Highest	59	N/A	N/A	N/A	N/A	3	N/A
Marmaduke ISD	N/A	25	$ 31,554,000	2	62	N/A	N/A	$ 563,464.29
City of Mena	High	27	$ 53,500,000	1	30	N/A	N/A	$ 1,138,297
Miller County	Medium-High	21	$ 11,253,200	0	6	6	1	$ 239,429

Mississippi County	High	39	$ 29,600,000	5	148	4	1	$ 548,941
Monroe County	Highest	14	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium-High	6	$ 55,000	N/A	N/A	N/A	N/A	N/A
City of Mountain View	Medium-High	18	$ 6,333,000	5	11	N/A	N/A	N/A
Ouachita County	Medium-High	16	$ 5,553,000	0	24	N/A	N/A	N/A
Perry County	Medium	14	$ 4,400,000	0	0	0	2	N/A
Phillips County	Medium	15	$ 3,935,000	0	7	N/A	N/A	N/A
Pike County	Medium-High	15	$ 280,000	0	2	N/A	3	N/A
Poinsett County	Medium	30	$ 60,000,000	8	98	19	2	N/A
Pope County	Medium-High	N/A	N/A	N/A	N/A	N/A	7	N/A
Prairie County	Medium-High	22	$ 38,780,000	0	0	N/A	N/A	$ 1,760,000
Pulaski County	High	62	$ 125,148,000	13	371	N/A	6	$ 2,317,600
Saline County	Medium-High	32	N/A	N/A	N/A	N/A	1	N/A
Scott County	High	6	$ 55,000	0	2	N/A	1	N/A
Sebastian County	Medium-High	25	$ 159,344,000	16	334	0	1	$ 3,400,000
Sevier County	Medium-High	15	$ 3,505,000	0	8	N/A	1	N/A
Sharp County	High	17	N/A	N/A	N/A	N/A	N/A	N/A
St. Francis County	Medium	17	$ 26,377,000	5	136	N/A	N/A	N/A
Union County	High	29	$ 34,035,000	3	30	N/A	N/A	N/A
Washington County	Medium-High	27	$ 4,460,500	N/A	N/A	N/A	N/A	N/A
White County	High	58	$ 14,770,000	59	427	N/A	N/A	N/A
Woodruff County	Medium-High	30	$ 7,228,000	32	219	N/A	19	N/A
Totals		**1377**	**$ 1,973,152,928**	**285**	**7,442**	**148**	**134**	**$23,606,315**

Using the local plan summary for tornadoes by county data (Table 4.5.1-4), the following analysis was conducted and the average losses were calculated. Based on this methodology, the average losses for a tornado are $1,432,936 per event. The HMP Sub-Committee determined that this was a better estimation of future losses based on the local plan data.

Table 4.5.1-5: Local Plan Averages, Statewide Summary

	Deaths	Injuries	Total Damages
Totals	285	7,442	$1,973,152,928
Average per Jurisdiction	4.60	120.03	$31,825,047
Average Per Event	4.83	5.40	$1,432,936

4.5.2 Estimating Potential Losses by Jurisdiction to Severe Winter Weather

The HMP Sub-Committee conducted loss estimations for winter weather during the original plan development process. During the 2010 plan update revision process, this estimation was enhanced and expanded with the best available data when possible.

2010 NCDC Winter Weather Loss Estimation

The data from the National Climatic Data Center provided details about the historical winter events in the state. The following chart shows a breakdown of the types of winter events that have occurred in Arkansas from January 1996 through March 2010.

Table 4.5.2-1: Winter Storm Event Summary 1996-2010

Winter Weather	NCDC Total Events (1996 - 2010)	Average per Year	Percent of Total
Heavy Snow	31	1.6	12.8%
Ice Storms	37	2.1	15.4%
Winter Storms	60	3.6	24.9%
Winter Weather/Mix	182	7.5	46.9%
Total	**310**	**17.2**	**100%**

From the reported NCDC data, the following losses have resulted from the 310 winter weather events in the state.

Table 4.5.2-2: Winter Storm Damage Summary 1996 - 2010

	Deaths	Injuries	Property Damage	Crop Damage	Total Damages
Total (1996-2010)	6	3	$681,519,000	$0	$681,519,000
Annual Average	0.4	0.2	$48,679,928	$0	$48,679,928
Average Per Event	0.02	0.01	$2,827,879	$0	$2,827,879

Based on this historical data, the average estimated losses per winter event is approximately $2,827,879. The following statistics were noted by the HMP Sub-Committee to qualify this estimated loss based on this historical evidence.

- A number of NCDC events are for the same winter event but are reported by different jurisdictions. Therefore the number of events listed is actually higher than the actual number of events that occurred.
- 272 of the 310 listed events reported zero dollars ($0) for damages.
- There were two events listed that were considered “high dollar” (over $100 million)

Local Loss Estimation Averages

The following table was developed from data from the FEMA approved local plans for the winter weather hazard. The HMP Sub-Committee determined that this is the best available local data related to historical losses.

Table 4.5.2-3: Local Plan Summary for Winter Storms by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	Medium-High	9	$ 5,000,000	2	0	N/A	N/A	N/A
Ashley County	N/A	6	$ 2,315,000	0	0	N/A	N/A	$ 42,090
Benton County	Medium-High	34	$ 67,970,000	0	0	N/A	2	$ 2,955,217
Bradley County	Medium-High	8	$ 4,920,000	2	0	22	2	$ 59,204
Calhoun County	Medium	9	$ 500,000	2	0	1	2	$ 8,620
Chicot County	Medium	5	$ 4,550,000	0	0	14	0	$ 325,000
City of Foreman	N/A	9	$ 525,950,000	0	0	N/A	N/A	N/A
Clark County	Medium-High	12	N/A	2	0	N/A	N/A	N/A
Clay County	N/A	11	$ 22,900,000	1	0	2	1	$ 2,291,000
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	High	11	$ 23,900,000	1	0	5	1	$ 2,394,800
Crawford County	N/A	19	$ 1,354,000	N/A	N/A	N/A	1	N/A
Crittenden County	High	8	$ 17,000,000	0	0	3	2	N/A
Cross County	High	13	$ 12,667,000	0	0	N/A	3	$ 904,785
Dallas County	Medium-High	11	$ 500,000	2	0	N/A	2	N/A
Desha County	N/A	8	N/A	2	0	N/A	N/A	N/A
Drew County	Medium-High	8	$ 4,900,000	2	0	21	2	$ 58,838
Faulkner County	Medium	14	N/A	N/A	N/A	2	2	N/A
Franklin County	High	13	$ 10,500,000	N/A	N/A	N/A	2	N/A
Fulton County		20	$ 10,000,000	3	0	N/A	N/A	N/A
Grant County	High	13	$ 7,600,000	2	0	7	1	$ 762,500
Hempstead County	High	9	$ 528,000,000	0	0	7	2	N/A
Hot Spring County	Medium-High	12	$ 5,000,000	2	0	N/A	N/A	N/A
Howard County	Medium-High	10	$ 525,950,000	0	0	N/A	N/A	N/A
Independence County	High	16	$ 13,680,000	3	0	N/A	N/A	N/A
Jackson County	High	16	$ 17,400,000	3	0	12	3	$ 1,741,500
Jefferson County	High	13	$ 7,600,000	3	0	8	2	$ 762,500

Johnson County	Medium-High	14	$ 10,000,000	3	0	N/A	N/A	N/A
Lafayette County	Medium-High	6	$ 525,450,000	0	0	N/A	N/A	N/A
Lawrence County	N/A	13	$ 22,212,000	1	0	N/A	N/A	$ 1,708,615
Lincoln County	Medium-High	7	$ 5,000,000	2	0	21	2	$ 58,838
Little Rock/ L.R. North	N/A	32	N/A	N/A	N/A	0	1	N/A
Logan County	Medium	15	$ 10,000,000	1	0	0	1	N/A
Lonoke County	Medium-High	14	$ 10,000,000	3	N/A	N/A	N/A	N/A
Marmaduke ISD	Medium-High	16	$ 22,229,000	1	0	N/A	N/A	N/A
City of Mena	High	24	$ 10,500,000	2	0	0	1	N/A
Miller County	High	7	$ 528,000,000	0	0	8	2	N/A
Mississippi County	Medium-High	12	$ 27,400,000	1	0	3	2	N/A
Monroe County	High	12	$ 10,000,000	2	0	0	1	N/A
Montgomery County	Medium-High	14	$ 10,000,000	2	0	N/A	N/A	N/A
City of Mountain View	High	19	$ 19,180,000	2	0	N/A	N/A	$ 1,475,384
Ouachita County	Medium-High	9	$ 500,000	2	0	N/A	N/A	N/A
Perry County	High	20	$ 10,500,000	3	0	N/A	N/A	N/A
Phillips County	Medium	8	$ 7,160,000	0	0	N/A	N/A	$ 550,769
Pike County	Medium-High	12	N/A	2	0	N/A	N/A	N/A
Poinsett County	High	13	$ 27,000,000	1	0	19	2	N/A
Pope County	Medium-High	14	N/A	N/A	N/A	N/A	1	N/A
Prairie County	Medium-High	14	N/A	N/A	N/A	N/A	1	N/A
Pulaski County		30	N/A	N/A	N/A	N/A	1	N/A
Saline County	Medium-High	15	$ 10,000,000	2	0	N/A	2	N/A
Scott County	High	15	N/A	2	N/A	N/A	1	N/A
Sebastian County	Medium	11	N/A	0	N/A	N/A	1	N/A
Sevier County	Medium-High	10	$ 525,950,000	0	0	N/A	N/A	N/A
Sharp County	High	29	$ 19,180,000	N/A	N/A	N/A	6	$ 342,500
St. Francis County	Medium-High	13	$ 12,667,000	0	0	N/A	N/A	N/A
Union County	n/a	n/a	$ 525,450,000	N/A	N/A	N/A	N/A	$ 58,300,000
Washington County	Medium	6	$ 12,325,000	N/A	N/A	N/A	1	N/A
White County	High	15	$ 13,680,000	3	0	N/A	N/A	$ 1,234,636
Woodruff County	High	16	$ 14,180,000	2	0	N/A	N/A	$ 1,090,769
Totals		**763**	**$4,203,719,000**	**67**	**0**	**155**	**56**	**$77,067,566**

Using the local plan summary for winter storms by county data (Table 4.5.2-3), the following analysis was conducted and the average losses were calculated. Based on this methodology, the average losses for a winter storm event were $5,509,461 per event (Table 4.5.2-4). The HMP Sub-Committee determined that this was a good estimation of future losses based on the data in these local plans.

Table 4.5.2-4: Local Plan Averages for Winter Storms, Statewide Summary

	Deaths	Injuries	Total Damages
Totals	67	0	$4,203,719,000
Average per Jurisdiction	1.08	0	$ 67,801,919
Average Per Event	0.09	0	$ 5,509,461

4.5.3 Estimating Potential Losses by Jurisdiction to Flooding

The HMP Sub-Committee conducted loss estimations for flooding during the original plan development process. During the 2010 plan update revision process; this estimation was enhanced with the best available data when possible.

2010 NCDC Flood Loss Estimation

The data from the National Climatic Data Center provided details about the historical flooding events in the state. The following chart shows a breakdown of the types of reported flood events that have occurred in Arkansas from January 1996 through March 2010.

Table 4.5.3-1: Flooding Events by Type 1996-2010

Type of Flood	NCDC Total Events	Average per Year	Percentage
Flash Floods	1,584	113.1	76.7%
Riverine / Steam Floods	480	34.3	23.3%
Total	**2,064**	**147.4**	**100%**

From the reported NCDC data, the following losses have resulted from the 2,064 flooding events in the state.

Table 4.5.3-2: Flooding Events Averages 1996-2010

	Deaths	Injuries	Property Damage	Crop Damage	Total Damages
Total (1996-2010)	35	35	$ 419,015,000	$ 30,890,000	$ 449,905,000
Annual Average	1.4	1.4	$ 29,929,642	$ 2,206,428	$ 32,136,071
Average Per Event	0.01	0.01	$ 203,011	$ 15,744	$ 218,755

Based on this historical data, the average estimated losses per flooding event is approximately $218,755. The following statistics were noted by the HMP Sub-Committee to qualify this estimated loss based on this historical evidence:

- A number of NCDC events are for the same flooding event but are reported by different jurisdictions. Therefore the number of events listed is actually higher than the actual number of events that occurred.
- 1,353 of the 2,064 listed events reported zero dollars ($0) for damages.
- There were seven listed events with damages greater than $10 million. These events had a total cumulative reported damage of $203,775,000 million which is 48.2% of the total $422,754,000.
- The event with the most damage in the past 14 years occurred on 10/11/2001 in the City of Magnolia in Columbia County. The reported damage from this event was $120 million.

The HMP Sub-Committee determined that worst case loss estimates for flooding events can easily reach into the hundreds of millions of dollars; however as part of the loss estimation, the Sub-Committee discarded the 1,353 events with no damage and the seven "high-dollar" events (over $10 million) and calculated a more typical loss. Based on this revised estimation, a more typical loss from a flooding event is approximately $311,050.

Table 4.5.3-3: Summary of Flooding Events (Recalculated)

	Number of events	Total Damages	Average per Event
NCDC Total	2064	$422,754,000	$204,823
Removed	1360	$203,775,000	$149,835
New Total	704	$218,979,000	$311,050

Local Loss Estimation Averages

The following table was developed from data from the FEMA approved local plans for the flooding hazard. The HMP Sub-Committee determined that this is the best available local data related to historical losses.

Table 4.5.3-4: Local Plan Summary for Flooding by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	High	15	$ 10,000	0	0	N/A	N/A	N/A
Ashley County	High	12	$ 144,000	0	0	N/A	N/A	N/A
Benton County	N/A	41	$ 2,715,000	0	0	N/A	4	N/A
Bradley County	Medium	13	$ 1,370,000	0	0	6	2	$ 52,692
Calhoun County	Medium	14	$ 64,000	0	0	N/A	2	$ 4,000
Chicot County	High	12	$ 1,400,000	0	0	6	1	$ 175,000
City of Foreman	N/A	3	$ 55,000	0	0	N/A	N/A	$ 948
Clark County	Medium-High	16	$ 50,000	N/A	N/A	12	1	N/A
Clay County	N/A	11	$ 7,900,000	N/A	N/A	7	3	$ 1,128,571
Cleburne County	Medium	20	$ 3,000,000	0	0	N/A	15	N/A

Cleveland County	High	10	N/A	0	0	N/A	N/A	N/A
Columbia County	N/A	15	$ 131,245,000	0	0	N/A	9	N/A
Conway County	N/A	9	N/A	N/A	N/A	N/A	14	N/A
Craighead County	N/A	13	$ 8,700,000	N/A	N/A	26	4	N/A
Crawford County	N/A	40	$ 1,473,000	0	0	N/A	1	$ 67,000
Crittenden County	High	9	$ 6,500,000	0	0	6	3	$ 169,844
Cross County	Medium-High	5	$ 218,000	0	0	N/A	N/A	N/A
Dallas County	N/A	13	$ 50,000	0	0	N/A	5	N/A
Desha County	N/A	14	$ 5,000,000	0	0	N/A	N/A	N/A
Drew County	Medium	17	$ 1,370,000	0	0	5	1	N/A
Faulkner County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	Medium-High	39	$ 670,000	0	0	N/A	6	N/A
Fulton County	N/A	9	N/A	N/A	N/A	N/A	1	N/A
Grant County	High	7	$ 800,000	0	0	2	1	$ 100,000
Hempstead County	High	16	$ 3,000,000	0	0	12	5	$ 253,917
Hot Spring County	Medium-High	11	N/A	N/A	N/A	N/A	14	N/A
Howard County	Medium-High	13	$ 1,365,000	0	0	0	6	N/A
Independence County	Medium	20	N/A	0	0	N/A	N/A	N/A
Jackson County	High	15	$ 5,800,000	N/A	N/A	17	4	N/A
Jefferson County	High	18	$ 3,242,000	0	0	9	1	N/A
Johnson County	Medium-High	29	$ 21,000	1	0	N/A	N/A	N/A
Lafayette County	Medium-High	9	$ 30,000	0	0	N/A	N/A	N/A
Lawrence County	N/A	10	$ 1,187,000	0	0	N/A	N/A	N/A
Lincoln County	High	10	$ 4,500,000	0	0	12	2	$ 295,800
Little Rock/ L.R. North	Medium-High	17	$ 60,000	N/A	N/A	N/A	N/A	$ 6,000
Logan County	Medium-High	12	$ 55,000	0	0	0	1	N/A
Lonoke County	High	9	$ 52,000	0	0	N/A	5	N/A
Marmaduke ISD	High	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	N/A	10	$ 3,500	0	0	0	1	N/A
Miller County	High	14	$ 2,500,000	0	0	10	2	$ 180,643
Mississippi County	High	12	$ 4,500,000	?	?	4	1	N/A
Monroe County	High	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium-High	11	N/A	N/A	N/A	0	2	N/A

City of Mountain View	Medium-High	15	N/A	0	0	N/A	N/A	N/A
Ouachita County	Medium-High	16	$ 762,000	0	0	0	8	N/A
Perry County	High	20	$ 1,247,000	0	0	0	3	N/A
Phillips County	n/a	6	N/A	N/A	N/A	N/A	N/A	N/A
Pike County	Medium-High	10	N/A	N/A	N/A	N/A	2	N/A
Poinsett County	Medium-High	8	$ 7,630,000	0	0	19	3	N/A
Pope County	Medium-High	13	$ 50,000	N/A	N/A	N/A	9	N/A
Prairie County	High	6	N/A	0	0	N/A	N/A	N/A
Pulaski County	High	18	$ 60,000	N/A	N/A	N/A	5	$ 6,000
Saline County	High	15	N/A	0	0	N/A	N/A	N/A
Scott County	High	21	$ 465,000	N/A	N/A	N/A	N/A	N/A
Sebastian County	Medium-High	33	$ 710,000	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	11	$ 115,000	0	0	N/A	N/A	N/A
Sharp County	Medium	33	$ 17,975,000	2	3	N/A	9	$ 27,000
St. Francis County	High	7	$ 209,000	0	0	N/A	N/A	N/A
Union County	High	14	$ 275,000	0	0	N/A	N/A	N/A
Washington County	Medium-High	8	$ 8,105,000	N/A	N/A	N/A	N/A	N/A
White County	High	23	$ 10,000	0	0	N/A	N/A	N/A
Woodruff County	Medium-High	7	$ 32,000	0	0	N/A	N/A	N/A
Totals		**862**	**$236,684,500**	**3**	**3**	**153**	**156**	**$2,467,415**

Using the data in Table 4.5.3-4, the following analysis was conducted and the average losses were calculated. Based on this methodology, the average losses for a flooding event are $274,575 per event. The HMP Sub-Committee determined that this was a good estimation of future losses based on local plan data.

Table 4.5.3-5: Local Plan Averages for Flooding, Statewide Summary

	Deaths	Injuries	Total Damages
Totals	3	3	$ 236,684,500
Average per Jurisdiction	0.04	0.04	$ 3,817,491
Average Per Event	0.0035	0.0035	$ 274,575

4.5.4 Estimating Potential Losses by Jurisdiction to Earthquakes

The HMP Sub-Committee conducted loss estimations for earthquakes in 2004 during the original plan development process. The Sub-Committee determined that the original estimation remained valid except when new information was supplied that specifically updated the existing data. During the previous plan update and revision process, this estimation was enhanced and expanded with the best available data when possible. Due to the high priority for earthquake planning in the state, a separate Earthquake Vulnerability Analysis was also developed as part of this previous revision. For the 2010 update the previous plans loss estimation was removed and replaced with a loss estimate that was conducted using a report from the Mid-America Earthquake Center. This new estimate was used due to the level of detail provided in the report.

2010 Earthquake Loss Estimation

For the 2010 loss estimation update the Sub-Committee utilized data from Mid-America Earthquake Center. This data is a comprehensive overview of the eight state regions that would incur more significant losses in the event of a 7.7 magnitude earthquake on the New Madrid Fault. Arkansas is considered to be one of the top three states affected in this scenario in terms of damages. Using this data, a more detailed loss estimation can be utilized for the State of Arkansas with special focus on the top “at risk” counties: Arkansas, Clay, Craighead, Crittenden, Cross, Greene, Independence, Jackson, Lawrence, Lee, Mississippi, Monroe, Phillips, Poinsett, Prairie, Randolph, St. Francis, White, and Woodruff Counties. According to the data the state can expect significant damages, well into the billions of dollars, with a large portion of this damage occurring in the previously mentioned “at-risk” counties. Below is a table to illustrate the expected economic losses to the state. Note that the highest amount of damage would be to the utilities state wide.

Direct Economic Loss for Arkansas ($ millions)

Buildings	Transportation	Utilities	Total
$18,167	$2,347	$18,515	$39,029

This scenario data also includes an estimated number of injuries and fatalities expected. Although, over 15 thousand casualties are predicted, nearly 75% of the injuries would be minor and require no hospitalization. Practically 650 fatalities would be expected with almost all being in the top “at-risk” counties. Mentioned previously, of these counties Crittenden, Mississippi, and Craighead Counties are the most significantly impacted with an estimated two to three thousand casualties in each of the three counties.

Based on this data the state of Arkansas could experience catastrophic losses in the event of a 7.7 magnitude earthquake, especially to the northeastern counties which are located in the New Madrid Seismic Zone (NMSZ).

4.5.5 Estimating Potential Losses by Jurisdiction to Wildfires

The HMP Sub-Committee conducted a loss estimation on wildfires during the original plan development process. During the previous plan update and revision process, this estimation was enhanced and expanded with best available data when possible. The Sub-Committee determined that the original estimation remained valid except when new information was supplied that specifically updated the existing data. For the 2010 update process, the planning team removed the previous loss estimation and replaced it with a new updated estimation to bring a more current feel to the estimation.

2010 Wildfire Loss Estimation – Historic Events

The data from the National Climatic Data Center for historical wildfire events in the state is minimal and incomplete. The HMP Sub-Committee coordinated with the Arkansas Forestry Commission and received the complete database of fire events for the period from 2004 through 2009. This data was analyzed instead of the incomplete NCDC data for this section. During the five year period, there were 10,407 reported fire events across the state with a total of 143,476 acres burned. Statistics for 2010 were not included in the annual averages because it is only part of the year and would not reflect accurate annual data.

- 2004 – There were 1,654 reported fires with a total of 22,612 acres burned.
- 2005 – There were 2,674 reported fires with a total of 34,907 acres burned.
- 2006 – There were 2,964 reported fires with a total of 42,042 acres burned.
- 2007 – There were 1,222 reported fires with a total of 17,123 acres burned.
- 2008 – There were 846 reported fires with a total of 10,636 acres burned.
- 2009 - There were 1,047 reported fires with a total of 16,156 acres burned.
- 2010 - There were 794 reported fires with a total of 11,737 acres burned from January to June of 2010.

From the reported data, the following losses have resulted from the 10,407 fire events in the state.

Table 4.5.5-1: Wildfire Averages 2004-2009

	Acres Burned
Total (2004-2009)	143,476
Annual Average	28,695
Average Per Event	13.8

Table 4.5.5-2: Local Plan Summary for Wildfires by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A
Ashley County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Benton County	High	76	N/A	N/A	N/A	N/A	0	N/A
Bradley County	Medium-High	270	N/A	0	0	0	0	N/A
Calhoun County	Medium	8	N/A	N/A	N/A	N/A	N/A	N/A
Chicot County	Medium-Low	21	N/A	0	0	0	0	N/A
City of Foreman	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A
Clark County	Medium-High	867	N/A	N/A	N/A	N/A	N/A	N/A
Clay County	N/A	19	N/A	0	0	0	0	N/A
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	Medium-Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	263	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	N/A	31	N/A	0	0	0	0	N/A
Crawford County	N/A	2251	N/A	N/A	N/A	N/A	N/A	N/A
Crittenden County	N/A	6	N/A	0	0	0	0	N/A
Cross County	Medium-High	68	N/A	0	0	N/A	N/A	N/A
Dallas County	N/A	8	N/A	N/A	N/A	N/A	N/A	N/A
Desha County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A
Drew County	Medium-High	420	N/A	0	0	0	0	N/A
Faulkner County	High	833	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	421	N/A	N/A	N/A	N/A	N/A	N/A
Grant County	High	435	N/A	0	0	0	0	N/A
Hempstead County	High	366	N/A	0	0	0	0	N/A
Hot Spring County	N/A	12	$ 5,000,000	2	0	N/A	N/A	N/A
Howard County	Medium High	8	N/A	N/A	N/A	N/A	N/A	N/A

Independence County	High	464	N/A	0	0	N/A	N/A	N/A
Jackson County	High	80	N/A	0	0	0	0	N/A
Jefferson County	High	252	N/A	0	0	0	0	N/A
Johnson County	Medium-High	22	N/A	N/A	N/A	N/A	N/A	N/A
Lafayette County	High	56	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	N/A	96	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	Medium	156	N/A	N/A	N/A	0	0	N/A
Little Rock/ L.R. North	N/A	169	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	Medium-High	45	N/A	N/A	N/A	N/A	N/A	N/A
Marmaduke ISD	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	High	419	N/A	0	0	0	0	N/A
Mississippi County	Medium-High	5	N/A	0	0	0	0	N/A
Monroe County	Medium-High	58	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium-High	197	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	High	144	N/A	N/A	N/A	N/A	N/A	N/A
Ouachita County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A
Perry County	N/A	103	N/A	N/A	N/A	N/A	N/A	N/A
Phillips County	Medium	25	N/A	N/A	N/A	N/A	N/A	N/A
Pike County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	Medium	20	N/A	N/A	N/A	0	0	N/A
Pope County	Medium	197	N/A	N/A	N/A	N/A	N/A	N/A
Prairie County	N/A	24	N/A	N/A	N/A	N/A	N/A	N/A
Pulaski County	High	169	N/A	N/A	N/A	N/A	N/A	N/A
Saline County	High	833	N/A	N/A	N/A	N/A	N/A	N/A
Scott County	Medium-High	13	N/A	N/A	N/A	N/A	N/A	N/A
Sebastian County	Medium	203	N/A	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	334	N/A	N/A	N/A	N/A	N/A	N/A
Sharp County	Medium-High	306	N/A	N/A	N/A	N/A	N/A	N/A
St. Francis County	High	56	N/A	N/A	N/A	N/A	N/A	N/A
Union County	High	481	N/A	N/A	N/A	N/A	N/A	N/A
Washington County	Medium	178	N/A	N/A	N/A	N/A	N/A	N/A

White County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A
Woodruff County	High	11	N/A	N/A	N/A	N/A	N/A	N/A
Totals		**11515**	**$ 5,000,000**	**2**	**0**	**0**	**0**	N/A

4.5.6 Estimating Potential Losses by Jurisdiction to Landslides

The HMP Sub-Committee conducted a loss estimation on landslides during the original plan development process. During the previous plan update and revision process, this estimation was enhanced and expanded with the best available data when possible. The Sub-Committee determined that the original estimation remained valid except when new information was supplied that specifically updated the existing data.

HAZUS-MH2 Exposure

In the vulnerability analysis section for landslides the following data was calculated for the exposure in the counties with the highest risk.

Table 4.5.6-1: HAZUS MH2 Exposure for Landslides

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Pulaski	361,474	147,942	$44,808,179	$2,996,821	$2,116,005	$49,921,005
Washington	157,715	60,151	$15,034,068	$1,975,733	$321,456	$17,331,257
Sebastian	115,071	45,300	$12,255,589	$764,711	$707,380	$13,727,680
Garland	88,068	37,813	$9,121,235	$784,577	$531,135	$10,436,947
Faulkner	86,014	31,882	$8,577,304	$970,081	$551,832	$10,099,217
Craighead	82,148	32,301	$8,156,237	$913,854	$734,106	$9,804,197
Saline	83,529	31,778	$7,405,179	$787,327	$791,265	$8,983,771
White	67,165	25,148	$5,923,805	$1,247,296	$786,445	$7,957,546
Mississippi	51,979	19,349	$4,226,460	$2,171,344	$1,214,781	$7,612,585
Pope	54,469	20,701	$5,179,873	$968,461	$555,713	$6,704,047
Lonoke	52,828	19,262	$4,751,962	$1,365,092	$551,832	$6,668,886
Crittenden	50,886	18,471	$4,358,456	$1,648,511	$521,913	$6,528,880
Crawford	53,247	19,702	$4,161,626	$1,162,819	$265,315	$5,589,760
Independence	34,233	13,467	$3,097,289	$878,415	$452,748	$4,428,452
Greene	37,331	14,750	$3,391,720	$690,119	$327,729	$4,409,568
Hot Spring	30,353	12,004	$2,626,246	$1,096,848	$530,848	$4,253,942
St. Francis	29,329	10,043	$2,138,818	$950,083	$750,723	$3,839,624
Poinsett	25,614	10,026	$2,336,491	$968,738	$521,739	$3,826,968
Cleburne	24,046	10,190	$2,841,804	$603,242	$145,116	$3,590,162
Clark	23,546	8,912	$1,946,410	$967,477	$406,977	$3,320,864
Hempstead	23,587	8,959	$1,689,613	$1,149,661	$414,642	$3,253,916
Jackson	18,418	6,971	$1,580,775	$912,604	$619,336	$3,112,715
Phillips	26,445	9,711	$1,830,095	$631,642	$502,764	$2,964,501
Clay	17,609	7,417	$1,574,149	$721,963	$581,665	$2,877,777
Conway	20,336	7,967	$1,867,754	$753,888	$203,919	$2,825,561
Johnson	22,781	8,738	$1,765,691	$827,011	$209,696	$2,802,398

Logan	22,486	8,693	$1,832,764	$568,467	$394,032	$2,795,263
Yell	21,139	7,922	$1,645,708	$812,038	$319,890	$2,777,636
Van Buren	16,192	6,825	$1,565,684	$793,475	$347,826	$2,706,985
Cross	19,526	7,391	$1,483,817	$830,815	$290,058	$2,604,690
Polk	20,229	8,047	$1,455,330	$872,440	$233,064	$2,560,834
Franklin	17,771	6,882	$1,452,041	$585,923	$290,563	$2,328,527
Desha	15,341	5,922	$1,308,846	$582,976	$347,826	$2,239,648
Prairie	9,539	3,894	$920,317	$1,009,934	$289,797	$2,220,048
Madison	14,243	5,463	$1,088,498	$984,759	$59,064	$2,132,321
Chicot	14,117	5,205	$968,683	$926,061	$203,058	$2,097,802
Scott	10,996	4,323	$789,013	$953,781	$117,006	$1,859,800
Montgomery	9,245	3,785	$804,599	$782,797	$231,768	$1,819,164
Nevada	9,955	3,893	$704,325	$926,367	$89,932	$1,720,624
Newton	8,608	3,500	$854,540	$515,993	$144,942	$1,515,475
Stone	11,499	4,768	$970,125	$445,230	$87,174	$1,502,529
Searcy	8,261	3,523	$644,909	$651,931	$174,000	$1,470,840
Lee	12,580	4,182	$660,998	$501,439	$231,942	$1,394,379
Perry	10,209	3,989	$867,114	$436,122	$57,942	$1,361,178
Totals	**1,890,157**	**737,162**	**182,664,139**	**42,088,866**	**19,226,964**	**243,979,969**

Based on the totals for the 44 counties, the average exposure amounts per county are listed below. From a loss estimation perspective, the HMP Sub-Committee viewed these amounts as worst case scenario estimates.

Table 4.5.6-2: HAZUS MH2 Average Exposure

County	Population (2000)	Households (2000)	Building Stock (x1000)	Transportation System (x1000)	Utility System (x1000)	Total Exposure (x1000)
Totals	**1,890,157**	**737,162**	**182,664,139**	**42,088,866**	**19,226,964**	**243,979,969**
Averages	**42,958**	**16,754**	**4,151,458**	**956,565**	**436,976**	**5,544,999**

2010 NCDC Landslide Loss Estimation

The data from the National Climatic Data Center did not provide details about the historical landslide events in the state.

Local Loss Estimation Averages

The following table was developed from data from the FEMA approved local plans for the landslide hazard. The HMP Sub-Committee determined that there was not enough local data available to conduct a viable analysis; therefore, all previous information from the previous update is considered the most current for the 2010 plan update. A mitigation “Action Item” will be evaluated in this mitigation plan that includes gathering additional local landslide loss estimates as funding becomes available.

Table 4.5.6-3: Local Plan Summary for Landslides by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ashley County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benton County	Low	0	N/A	0	0	N/A	N/A	N/A
Bradley County	Low	N/A	N/A	0	0	0	0	N/A
Calhoun County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chicot County	Medium-Low	N/A	N/A	0	0	0	0	N/A
City of Foreman	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Clark County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Clay County	N/A	4	N/A	0	0	0	0	N/A
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	N/A	3	N/A	0	0	0	0	N/A
Crawford County	Low	1	N/A	N/A	N/A	N/A	N/A	N/A
Crittenden County	Low	N/A	N/A	0	0	0	0	N/A
Cross County	Medium	6	N/A	0	0	N/A	N/A	N/A
Dallas County	Medium-Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Desha County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drew County	Low	0	N/A	0	0	0	0	N/A
Faulkner County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grant County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hempstead County	Low	N/A	N/A	0	0	0	0	N/A
Hot Spring County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Howard County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Independence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackson County	Medium	N/A	N/A	0	0	0	0	N/A
Jefferson County	Low	N/A	N/A	0	0	0	0	N/A
Johnson County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Lafayette County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	Low	N/A	N/A	0	0	0	0	N/A
Little Rock/ L.R. North	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marmaduke ISD	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	Low	N/A	N/A	0	0	0	0	N/A
Mississippi County	Medium	N/A	N/A	0	0	0	0	N/A
Monroe County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A
Ouachita County	Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perry County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phillips County	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A
Pike County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	Medium	2	N/A	N/A	N/A	0	0	N/A
Pope County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A
Prairie County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pulaski County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Saline County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scott County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sebastian County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A
Sharp County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
St. Francis County	Medium-High	2	N/A	N/A	N/A	N/A	N/A	N/A
Union County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Washington County	Medium	0	N/A	N/A	N/A	N/A	N/A	N/A
White County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Woodruff County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals		**18**	**$ -**	**0**	**0**	**0**	**0**	**$ -**

4.5.7 Estimating Potential Losses by Jurisdiction to Expansive Soils

The HMP Sub-Committee conducted a high level loss estimation on landslides in 2004 during the original plan development process. During the previous plan update and revision process, this estimation was reviewed and new data was researched. Very little data is available regarding this hazard and the subsequent losses. The Sub-Committee determined that the original estimation remained valid. For 2010, the Sub-Committee utilized the original plan loss estimation that was used in the previous version.

2004 Expansive Soils Loss Estimation

The following estimation was performed as part of the original plan development process.

No state or county loss statistics for expansive soils are available to allow estimation of potential loss to expansive soils by jurisdiction. As discussed previously, various studies estimate that expansive soils result in somewhere between $2 and $11 billion in annual losses in the United States. Other studies have suggested that approximately 10% of the new homes constructed annually in the United States are subjected to significant damage during their useful lives by expansive soils, and an additional 60% of homes sustain minor damage. This damage, if widespread in Arkansas, has yet to be quantified. It is expected that local jurisdiction plans, when they become available, will allow the potential losses by jurisdiction to be quantified. A mitigation “Action Item” will be evaluated in this mitigation plan that includes gathering additional local expansive soil loss estimates as funding becomes available.

2010 Update

The HMP Sub-Committee again researched this hazard and the impact on the State of Arkansas. No significant studies have been conducted on this hazard since the previously updated plan development process. As new information is developed about land subsidence and expansive soils, it will be incorporated into this plan with future revisions; therefore, all data from the previous version is considered current for the 2010 plan update.

4.5.8 Estimating Potential Losses by Jurisdiction to Straight-line Winds

The HMP Sub-Committee conducted a loss estimation on Straight-line winds in the original plan development process. During the previous plan update and revision process, this estimation was enhanced and expanded with best available data when possible. The Sub-Committee determined that the original estimation remained valid except when new information was supplied that specifically updated the existing data. For 2010, the loss estimations used in the previous plan was removed and replaced with more current loss estimations. The new loss estimation was used to bring more local plan information into the 2010 plan update.

2010 NCDC Straight-line Winds Loss Estimation

The data from the National Climatic Data Center provided details about the historical wind events with winds over 60 knots from January 1996 through March 2010. The NCDC listed a total of 754 Thunderstorm/Wind.

From the reported NCDC data, the following losses have resulted from the 754 Straight-line wind events in the state.

Table 4.5.8-1: Straight-line Wind Event Averages 1996-2010

	Deaths	Injuries	Property Damage	Total Damages
Total (1996-2010)	3	79	$ 57,344,000	$ 57,344,000
Annual Average	.21	5.6	$ 4,096,000	$ 4,096,000
Average Per Event	0.003	0.1	$ 76,053	$ 76,053

Based on this historical data, the average estimated losses per Straight-line wind event is approximately $76,053. The following statistics were noted by the HMP Sub-Committee to qualify this estimated loss based on this historical evidence.

- A number of NCDC events are for the same Straight-line wind event but are reported by different jurisdictions. Therefore the number of events listed is actually higher than the actual number of events that occurred.
- 434 of the 751 listed events reported zero dollars ($0) for damages.
- There were twelve listed events with damages greater than $1 million. These events had a total cumulative reported damage of $18.6 million which is 32.4% of the total $57,344,000
- The most damaging event in this three year period occurred on June 1, 2008 in Paris in Logan County with $2.7 million in property damages.

The HMP Sub-Committee determined that a worse case loss estimate for high wind events can easily reach into the millions of dollars; however as part of the loss estimation, the Sub-Committee discarded the 446 events with no damage and the twelve “high-dollar” events (over $1 million) and calculated a more typical loss. Based on this revised estimation, a more typical loss from Straight-line winds is approximately $120,742.

Table 4.5.8-2: Summary of Straight-line Wind (Recalculated)

	Number of events	Total Damages	Average per Event
NCDC Total	751	$57,344,000	$76,356
Removed	446	$18,600,000	$41,704
New Total	305	$38,744,000	$120,742

Local Loss Estimation Averages

The following table was developed from data from the FEMA approved local plans for the Straight-line wind hazard. The HMP Sub-Committee determined that this is the best available local data related to historical losses.

Table 4.5.8-3: Local Plan Summary for Straight-line Wind Events by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	High	122	$ 173,000	1	5	N/A	N/A	N/A
Ashley County	Medium	91	$ 497,000	0	4	N/A	N/A	$ 9,036
Benton County	N/A	240	$ 9,025,000	1	9	N/A	0	$ 392,391
Bradley County	Medium-Low	65	$ 180,000	0	2	0	0	$ 1,449
Calhoun County	High	52	$ 55,000	0	2	0	0	$ 1,078
Chicot County	N/A	62	$ 820,000	0	2	0	0	$ 14,909
City of Foreman	Medium-High	20	$ 140,000	0	0	N/A	N/A	N/A
Clark County	High	147	$ 181,000	1	2	N/A	N/A	N/A
Clay County	N/A	75	$ 3,960,000	0	0	1	1	$ 84,255
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	High	143	$ 3,780,000	0	2	10	0	N/A
Crawford County	Medium	16	$ 530,000	N/A	N/A	N/A	N/A	N/A
Crittenden County	High	98	$ 1,400,000	0	5	1	0	N/A
Cross County	Medium-High	59	$ 1,155,000	1	10	N/A	N/A	N/A
Dallas County	High	114	$ 101,000	0	3	N/A	N/A	N/A
Desha County	Medium-High	77	$ 206,000	0	1	N/A	N/A	N/A
Drew County	High	71	$ 206,000	0	1	0	0	$ 4,204
Faulkner County	Medium-High	198	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	Medium-Low	65	$ 280,000	0	0	N/A	N/A	N/A
Fulton County	N/A	81	$ 130,000	0	4	N/A	N/A	N/A
Grant County	High	115	$ 107,000	0	3	0	1	N/A
Hempstead County	High	145	$ 4,300,000	1	9	8	1	N/A
Hot Spring County	Medium-High	149	N/A	N/A	N/A	N/A	N/A	N/A
Howard County	High	151	$ 2,945,000	0	0	N/A	N/A	N/A
Independence County	High	81	$ 611,000	0	0	N/A	N/A	N/A
Jackson County	High	133	$ 3,000,000	0	5	8	1	$ 63,061

Jefferson County	High	207	$ 2,580,000	2	10	7	1	N/A
Johnson County	High	154	$ 163,000	0	0	N/A	N/A	N/A
Lafayette County	N/A	105	$ 675,000	0	3	N/A	N/A	N/A
Lawrence County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	High	59	$ 2,800,000	0	2	7	0	$ 58,787
Little Rock/ L.R. North	N/A	233	$ 406,000	N/A	N/A	N/A	N/A	$ 21,368
Logan County	Medium	61	$ 8,000	0	0	N/A	N/A	N/A
Lonoke County	High	195	$ 697,000	0	12	N/A	N/A	N/A
Marmaduke ISD	N/A	70	$ 659,000	0	0	N/A	N/A	N/A
City of Mena	High	18	$ 10,000	0	0	N/A	N/A	N/A
Miller County	High	158	$ 1,950,000	1	3	2	1	$ 43,311
Mississippi County	High	130	$ 2,260,000	0	2	1	0	N/A
Monroe County	High	73	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium	94	$ 10,000	0	4	N/A	N/A	N/A
City of Mountain View	High	74	$ 721,000	0	0	N/A	N/A	N/A
Ouachita County	Medium-High	123	$ 131,000	N/A	N/A	N/A	N/A	N/A
Perry County	Medium-High	100	$ 662,000	1	0	N/A	N/A	N/A
Phillips County	Medium-High	51	$ 1,477,000	1	4	N/A	N/A	N/A
Pike County	Medium-High	117	$ 236,000	0	1	N/A	N/A	N/A
Poinsett County	Medium-High	92	$ 3,350,000	0	5	7	1	$ 64,423
Pope County	Medium-High	100	N/A	N/A	N/A	N/A	N/A	N/A
Prairie County	Medium	102	$ 266,000	0	4	N/A	N/A	N/A
Pulaski County	N/A	328	$ 406,000	N/A	N/A	N/A	N/A	N/A
Saline County	Medium	183	$ 251,000	1	4	N/A	N/A	N/A
Scott County	Medium-High	86	$ 6,000	0	0	N/A	N/A	N/A
Sebastian County	Medium	50	$ 250,000	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	116	$ 2,412,000	0	1	N/A	N/A	N/A
Sharp County	High	81	$ 1,631,000	1	1	N/A	N/A	N/A
St. Francis County	High	73	$ 655,000	0	6	N/A	N/A	N/A
Union County	High	99	$ 1,249,000	0	5	N/A	N/A	N/A
Washington County	Medium	55	$ 2,413,300	0	0	N/A	N/A	N/A
White County	Medium-High	15	$ 13,680,000	3	0	N/A	N/A	N/A
Woodruff County	High	71	$ 112,000	0	3	N/A	N/A	$ 4,307
Totals		**5921**	**$ 75,735,300**	**14**	**134**	**52**	**7**	**$ 762,580**

Using the local plan summary for Straight-line wind events by county data (Table 4.5.8-3), the following analysis was conducted and the average losses were calculated. Based on this methodology, the average losses for a Straight-line wind event are $12,790 per event. The HMP Sub-Committee determined that this was a good estimation of future losses based on the data in these local plans.

Table 4.5.8-4: Local Plan Averages for Straight-line Wind Events, Statewide Summary

	Deaths	Injuries	Total Damages
Totals	14	134	$ 75,735,300
Average per County	0.22	2.16	$ 12,215,370
Average Per Event	0.002	0.02	$ 12,790

4.5.9 Estimating Potential Losses by Jurisdiction to Drought

The HMP Sub-Committee conducted a loss estimation on drought in the original plan development process. During the previous plan update and revision process, this estimation was enhanced and expanded with best available data when possible. The Sub-Committee determined that the original estimations remained valid except when new information was supplied that specifically updated the existing data. For 2010, based on the limited reported data, the HMP Sub-Committee could not conduct a more detailed analysis. A mitigation “Action Item” will be evaluated in this mitigation plan that includes gathering additional local drought loss estimates as funding becomes available. However, to enhance the local plan integration the data from all local plans was included to further enhance the previous loss estimations.

2010 NCDC Drought Loss Estimation

The data from the National Climatic Data Center provided very few details about the historical droughts in the state. There were a total of 15 drought events listed in the NCDC with only one showing any damage amounts. This single event occurred on October 1, 2006 in Ashley and Chicot Counties and listed $4 million in crop damages. Based on the limited reported data, the HMP Sub-Committee could not conduct a more detailed analysis. A mitigation “Action Item” will be evaluated in this mitigation plan that includes gathering additional local drought loss estimates as funding becomes available.

Local Loss Estimation Averages

The following table was developed from data from the FEMA approved local plans for the drought hazard. The HMP Sub-Committee determined that this is the best available local data related to historical losses.

Table 4.5.9-1: Local Plan Summary for Drought by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	Medium	1	N/A	0	0	N/A	N/A	N/A
Ashley County	Low	0	N/A	N/A	N/A	N/A	N/A	N/A
Benton County	Low	7	N/A	0	0	N/A	0	N/A
Bradley County	Medium-Low	38	$ 350,000	N/A	N/A	0	0	N/A
Calhoun County	Medium-Low	1	N/A	0	0	0	0	N/A
Chicot County	Medium-Low	37	N/A	?	?	0	0	N/A
City of Foreman	Medium	3	N/A	0	0	N/A	N/A	N/A
Clark County	Medium-High	1	N/A	0	0	N/A	N/A	N/A
Clay County	Medium-High	35	$ 8,700,000	1	N/A	0	0	$ 873,333
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	Medium-High	36	N/A	N/A	N/A	0	0	N/A
Crawford County	N/A	8	$ 2,000,000	N/A	N/A	N/A	N/A	N/A
Crittenden County	Medium	38	N/A	0	?	0	0	N/A
Cross County	Medium-High	39	N/A	0	?	N/A	N/A	N/A
Dallas County	Medium-Low	1	N/A	N/A	N/A	N/A	N/A	N/A
Desha County	Medium-Low	1	N/A	0	0	N/A	N/A	N/A
Drew County	Low	1	N/A	N/A	N/A	0	0	N/A
Faulkner County	Medium-Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	1	N/A	0	0	N/A	N/A	N/A
Grant County	Medium-High	41	N/A	N/A	N/A	0	0	N/A
Hempstead County	Medium	40	N/A	N/A	N/A	0	0	N/A
Hot Spring County	Medium-High	1	N/A	0	0	N/A	N/A	N/A
Howard County	Medium-High	3	N/A	0	0	N/A	N/A	N/A

Independence County	Medium-High	1	N/A	N/A	N/A	N/A	N/A	N/A
Jackson County	Medium-High	35	N/A	N/A	N/A	0	0	N/A
Jefferson County	Medium-High	41	N/A	N/A	N/A	0	0	N/A
Johnson County	Medium-High	2	N/A	N/A	N/A	N/A	N/A	N/A
Lafayette County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lawrence County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln County	Medium	37	N/A	N/A	N/A	0	0	N/A
Little Rock/ L.R. North	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A
Lonoke County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marmaduke ISD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mena	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A
Miller County	Medium-High	40	N/A	N/A	N/A	0	0	N/A
Mississippi County	Medium-High	38	$ 280,000	0	N/A	0	0	N/A
Monroe County	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	High	144	N/A	0	0	N/A	N/A	N/A
Ouachita County	Medium-High	1	N/A	0	0	0	0	N/A
Perry County	Medium-High	1	N/A	0	0	N/A	N/A	N/A
Phillips County	Medium-High	42	N/A	N/A	N/A	N/A	N/A	N/A
Pike County	Medium-High	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poinsett County	Medium-High	38	N/A	N/A	0	0	N/A	N/A
Pope County	Medium	1	N/A	N/A	N/A	1	0	N/A
Prairie County	Medium	4	$ 10,066,000	N/A	N/A	N/A	N/A	$218,000
Pulaski County	Medium	4	N/A	4	N/A	1	N/A	N/A
Saline County	Medium-High	2	N/A	N/A	N/A	N/A	N/A	N/A
Scott County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A
Sebastian County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	3	N/A	0	0	N/A	N/A	N/A
Sharp County	N/A	6	N/A	0	0	N/A	N/A	N/A
St. Francis County	Medium-High	3	N/A	0	0	N/A	N/A	N/A

Union County	Medium-High	1	N/A	0	0	N/A	N/A	N/A
Washington County	Medium-High	8	N/A	N/A	N/A	N/A	N/A	N/A
White County	Low	1	N/A	0	0	N/A	N/A	N/A
Woodruff County	Medium-High	1	N/A	0	0	N/A	N/A	N/A
Totals		**810**	**$ 21,396,000**	**5**	**0**	**2**	**0**	**$1,091,333**

Using the local plan summary for drought by county data (Table 4.5.9-1), the following analysis was conducted and the average losses were calculated. Based on this methodology, the average losses for a drought event are $26,414 per event. The HMP Sub-Committee determined that this was a good estimation of future losses based on the data in these local plans.

Table 4.5.9-2: Local Plan Averages for Drought, Statewide Summary

	Deaths	Injuries	Total Damages
Totals	5	0	$ 21,396,000
Average per County	0.06	0	$ 345,096
Average Per Event	0.006	0	$ 26,414

4.5.10 Estimating Potential Losses by Jurisdiction to Thunderstorms, Hail and Lightning

The HMP Sub-Committee identified this additional hazard as part of the previous update process. These events are usually part of large storm cells that also produce tornadoes, Straight-line winds, and flooding. Therefore, it is often difficult to distinguish the losses and damages from the various hazards. The HMP Sub-Committee conducted this analysis for this hazard separately; however it should be considered in conjunction with the other related hazards within this risk assessment. For the 2010 update, the Sub-Committee removed the loss estimation from the previous version of this plan and included updated data and local plan data to enhance the loss estimations for this hazard.

2010 NCDC Hail Loss Estimation

The data from the National Climatic Data Center provided details about the historical hail events in the state. Due to the extremely high amount of hail events and the fact that many of the reported events list no damages for these events, the Sub-Committee used a different time period (January 2007 – March 2010) and limited the data to hail events over one inch in diameter for this loss estimation. This three year period and size limitation is to show a more accurate estimate of damages by narrowing the amount of events with no reported damage. If the timeframe used for the loss estimation for tornadoes was used the amounts would be skewed by the high number of events that list no damages (over 5,400 events with over 5,200 of these events reporting no damages). The following chart shows a breakdown of the magnitude of reported hail events over one inch that have occurred in Arkansas from January 2007 through March 2010.

Table 4.5.10-1: Hail Events by Type 2007-2010

Size of Hail (Diameter)	NCDC Total Events	Average per Year	Percentage
1-2 Inches	524	174	94.4%
2-3 Inches	24	8	4.3%
3-4 Inches	2	.67	0.4%
4+ Inches	5	1.67	0.9%
Total	**555**	**185**	**100%**

From the reported NCDC data, the following losses have resulted from the 555 inch or greater hail events in the state.

Table 4.5.10-2: Hail Event Averages 2007-2010

	Deaths	Injuries	Property Damage	Crop Damage	Total Damages
Total (2007-2010)	0	0	$ 154,135,000	$ 8,200,000	$ 162,335,000
Annual Average	0	0	$ 51,378,333	$ 2,733,333	$ 54,111,667
Average Per Event	0	0	$ 277,720	$ 14,774	$ 292,495

Based on this historical data, the average estimated losses per hail event is approximately $292,495. The following statistics were noted by the HMP Sub-Committee to qualify this estimated loss based on this historical evidence.

- A number of NCDC events are for the same hail event but are reported by different jurisdictions. Therefore the number of events listed is actually higher than the actual number of events that occurred.
- 464 of the 555 listed events reported zero dollars ($0) for damages.
- There were four listed events with damages greater than $1 million. These events had a total cumulative reported damage of $159 million which is 97% of the total $162,335,000.
- The most damaging event was reported on March 31, 2008 by the Texarkana Airport in Miller County with over $85 million in property damages.

The HMP Sub-Committee determined that a worse case loss estimate for hail events can easily reach into the tens of millions of dollars; however as part of the loss estimation, the Sub-Committee discarded the 464 events with no damage and the four “high-dollar” events (over $1 million) and calculated a more typical loss. Based on this revised estimation, a more typical loss from hail is approximately $38,333.

Table 4.5.10-3: Hail Event Averages (Recalculated)

	Number of events	Total Damages	Average per Event
NCDC Total	555	$162,335,000	$292,495
Removed	468	$159,000,000	$339,743
New Total	87	$3,335,000	$38,333

2010 NCDC Lightning Loss Estimation

The data from the National Climatic Data Center provided details about the historical lightning events in the state from January 1996 through March 2010. From the reported NCDC data, the following losses have resulted from the 230 lightning events in the state during that period.

Table 4.5.10-4: Lightning Event Averages 1996-2010

	Deaths	Injuries	Total Property Damage
Total (1996-2010)	12	55	$15,824,000
Annual Average	0.9	3.9	$1,130,285
Average Per Event	0.05	0.23	$68,800

Based on this historical data, the average estimated losses per lightning event is approximately $68,800. The following statistics were noted by the HMP Sub-Committee to qualify this estimated loss based on this historical evidence.

- 130 of the 230 listed events reported zero dollars ($0) for damages.
- There were five listed events with damages greater than $1 million. These events had a total cumulative reported damage of $9.8 million which is 61.9% of the total $15,824,000.
- The most damaging event occurred on July 20, 2007 in Levy in Pulaski County with over $3 million in property damages when lightning struck a church and caught it on fire.

The HMP Sub-Committee determined that worst case loss estimates for lightning events can easily reach into the millions of dollars; however as part of the loss estimation, the Sub-Committee discarded the 130 events with no damage and the five “high-dollar” events (over $1 million) and calculated a more typical loss. Based on this revised estimation, a more typical loss from lightning is approximately $60,240.

Table 4.5.10-5: Lightning Event Averages (Recalculated)

	Number of events	Total Damages	Average per Event
NCDC Total	230	$15,824,000	$68,800
Removed	130	$9,800,000	$75,384
New Total	100	$6,024,000	$60,240

Local Loss Hail Estimation Averages

The following table was developed from data from the FEMA approved local plans for the hail hazard. The HMP Sub-Committee determined that this is the best available local data related to historical losses.

Table 4.5.10-6: Local Plan Summary for Hail by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	High	84	N/A	0	0	N/A	N/A	N/A
Ashley County	High	57	$ 500,000	0	0	N/A	N/A	$ 9,090
Benton County	Medium-Low	202	$ 2,796,000	0	0	N/A	N/A	$ 121,565
Bradley County	Medium-High	61	$ 3,430,000	0	0	9	2	$ 95,338
Calhoun County	Medium	56	N/A	0	0	0	0	N/A
Chicot County	Medium-High	60	$ 3,620,000	0	0	9	1	$ 73,918
City of Foreman	N/A	22	N/A	0	0	N/A	N/A	N/A
Clark County	Medium	126	$ 1,000	0	0	N/A	N/A	N/A
Clay County	Medium	35	$ 6,650,000	0	0	6	3	$ 141,489
Cleburne County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead County	Medium-High	87	$ 122,000	0	0	18	4	N/A
Crawford County	N/A	127	$ 850,000	0	0	N/A	N/A	N/A
Crittenden County	High	52	$ 6,046,100	0	0	10	3	$ 151,150
Cross County	Medium-High	35	$ 20,000	0	0	N/A	N/A	N/A
Dallas County	Medium	51	N/A	0	0	N/A	N/A	N/A
Desha County	N/A	33	N/A	0	0	N/A	N/A	N/A
DrewCounty	High	43	$ 1,500,000	0	0	9	0	N/A
Faulkner County	High	102	N/A	N/A	N/A	N/A	N/A	N/A
Franklin County	High	149	$ 1,056,000	N/A	N/A	N/A	N/A	N/A
Fulton County	N/A	51	$ 50,000	N/A	N/A	N/A	1	N/A
Grant County	High	63	N/A	0	0	N/A	N/A	N/A
Hempstead County	High	136	N/A	N/A	N/A	N/A	N/A	N/A
Hot Spring County	Medium	107	N/A	0	0	N/A	N/A	N/A
Howard County	Medium-High	167	N/A	0	0	N/A	N/A	N/A
Independence County	High	116	N/A	0	1	N/A	N/A	N/A
Jackson County	High	78	$ 6,475,200	N/A	N/A	N/A	N/A	N/A
Jefferson County	High	125	N/A	N/A	N/A	N/A	N/A	N/A
Johnson County	High	134	N/A	0	0	N/A	N/A	N/A

Lafayette County	Medium-High	112	$ 70,000	0	0	N/A	N/A	N/A
Lawrence County	N/A	56	$ 167,000	0	0	N/A	N/A	N/A
Lincoln County	High	41	N/A	0	0	N/A	N/A	N/A
Little Rock/ L.R. North	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logan County	Medium	76	N/A	0	0	N/A	N/A	N/A
Lonoke County	High	144	$ 8,000	0	0	N/A	N/A	N/A
Marmaduke ISD	N/A	52	$ 27,000	0	0	N/A	N/A	$ 13,449
City of Mena	High	125	N/A	0	0	N/A	N/A	N/A
Miller County	High	152	N/A	0	1	N/A	N/A	N/A
Mississippi County	High	25	$ 1,800,000	N/A	N/A	N/A	N/A	N/A
Monroe County	High	43	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery County	Medium	79	N/A	N/A	N/A	N/A	N/A	N/A
City of Mountain View	High	60	N/A	0	0	N/A	N/A	N/A
Ouachita County	Medium-High	95	$ 1,495,000	N/A	N/A	N/A	N/A	N/A
Perry County	Medium-High	66	$ 100,000	0	0	N/A	N/A	N/A
Phillips County	Medium	18	$ 19,000	0	0	N/A	N/A	N/A
Pike County	Medium	139	N/A	0	0	N/A	N/A	N/A
Poinsett County	Medium-High	64	$ 3,030,000	N/A	N/A	N/A	N/A	N/A
Pope County	Medium-High	120	N/A	0	0	N/A	N/A	N/A
Prairie County	High	61	N/A	N/A	N/A	N/A	N/A	N/A
Pulaski County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Saline County	High	140	$ 5,000	0	0	N/A	N/A	N/A
Scott County	High	82	$ 1,000	N/A	N/A	N/A	N/A	N/A
Sebastian County	High	211	$ 116,000	0	0	N/A	N/A	N/A
Sevier County	Medium-High	135	$ 50,000	0	0	N/A	N/A	N/A
Sharp County	Medium-High	75	N/A	0	0	N/A	N/A	N/A
St. Francis County	High	57	$ 43,000	0	0	N/A	N/A	N/A
Union County	High	84	$ 5,000	0	0	N/A	N/A	N/A
Washington County	Medium	5	$ 59,010,000	0	0	N/A	N/A	N/A
White County	High	166	$ 100,000	0	0	N/A	N/A	N/A
Woodruff County	High	40	$ 53,000	0	0	N/A	N/A	N/A
Totals		**4798**	**$ 99,215,300**	**0**	**2**	**61**	**14**	**$ 606,000**

Using the local plan summary for hail by county data (Table 4.5.10-6), the following analysis was conducted and the average losses were calculated. Based on this methodology, the average losses for a hail event are $20,678 per event. The HMP Sub-Committee determined that this was a good estimation of future losses based on the data in these local plans.

Table 4.5.10-7: Local Plan Averages for Hail, Statewide Summary

	Deaths	Injuries	Total Damages
Totals	0	2	$ 99,215,300
Annual per County	0	0.03	$ 1,600,246
Average Per Event	0	0.00	$ 20,678

Local Loss Thunderstorm Estimation Averages

The following table was developed from data from the FEMA approved local plans for the thunderstorm hazard. The HMP Sub-Committee determined that this is the best available local data related to historical losses.

Table 4.5.10-8: Local Plan Summary for Thunderstorms by County

County or Jurisdiction	Hazard Score	Event Count	Total $ Losses	Fatalities	Injuries	State Declar-ations	Federal Declar-ations	AVG Annual Fiscal Loss (Property and Crop)
Arkansas County	High	122	$ 173,000	1	5	N/A	N/A	N/A
Ashley County	N/A	91	$ 497,000	0	4	N/A	N/A	N/A
Benton County	High	240	$ 9,025,000	1	N/A	N/A	1	$ 392,391
Bradley County	Medium-High	61	$ 3,430,000	0	0	9	2	$ 95,338
Calhoun County	Medium	52	$ 55,000	0	2	0	2	$ 948
Chicot	Medium-High	60	$ 3,620,000	0	0	9	1	$ 73,918
City of Foreman	Medium-High	123	$ 140,000	0	0	N/A	N/A	N/A
Clark County	High	147	$ 181,000	1	2	N/A	N/A	N/A
Clay County	Medium	35	$ 6,650,000	0	0	6	3	$ 141,489
Cleburne	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cleveland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Columbia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conway	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Craighead	High	92	$ 5,700,000	0	2	18	4	N/A
Crawford County	N/A	27	N/A	N/A	N/A	N/A	N/A	N/A
Crittenden	High	54	$ 6,000,000	0	0	10	3	N/A
Cross	Medium-High	46	$ 41,000	0	0	N/A	N/A	N/A
Dallas	High	115	$ 106,000	0	3	N/A	5	N/A
Desha County	N/A	77	$ 206,000	0	1	N/A	N/A	N/A
Drew	High	45	$ 4,800,000	0	0	9	1	$ 97,963
Faulkner County	High	201	$ 178,000	0	11	N/A	N/A	$ 1,000
Franklin	High	144	$ 280,000	0	0	N/A	N/A	$ 6,086
Fulton	N/A	51	$ 52,000	N/A	N/A	N/A	1	N/A
Grant	High	65	$ 2,750,000	1	0	3	1	N/A
Hempstead County	High	137	$ 3,300,000	0	0	7	5	N/A
Hot Spring County	Medium-High	173	$ 642,000	0	0	N/A	N/A	N/A

Howard	High	151	$ 2,945,000	N/A	N/A	N/A	N/A	N/A
Independence County	High	81	$ 611,000	0	0	N/A	N/A	N/A
Jackson County	High	133	$ 653,000	0	3	N/A	N/A	N/A
Jefferson County	High	130	$ 4,400,000	1	2	7	1	$ 90,673
Johnson County	Medium-High	N/A	$ 181,000	N/A	N/A	N/A	N/A	N/A
Lafayette	Medium-High	105	$ 675,000	0	3	N/A	N/A	N/A
Lawrence	N/A	79	$ 1,986,000	0	2	N/A	N/A	N/A
Lincoln	High	41	$ 2,000,000	0	0	5	2	N/A
Little Rock/ L.R. North	N/A	328	N/A	N/A	N/A	0	8	N/A
Logan County	Medium-High	100s	$ 1,000,000	N/A	N/A	N/A	N/A	N/A
Lonoke County	High	207	$ 1,247,000	N/A	N/A	N/A	N/A	N/A
Marmaduke	High	70	$ 659,000	0	0	N/A	N/A	N/A
Mena	High	105	$ 250,000	0	0	0	1	N/A
Miller County	High	153	$ 5,100,000	0	1	16	3	N/A
Mississippi County	High	67	$ 2,750,000	1	0	3	1	N/A
Monroe County	High	73	$ 726,000	N/A	N/A	N/A	N/A	$ 55,000
Montgomery	Medium-High	87	N/A	N/A	N/A	N/A	N/A	N/A
Mountain View	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
Ouachita County	Medium-High	123	$ 241,000	0	2	N/A	N/A	N/A
Perry	N/A	100+	$ 100,000	N/A	N/A	N/A	N/A	N/A
Phillips	High	51	$ 1,477,000	1	4	N/A	N/A	N/A
Pike	Medium-High	117	$ 236,000	0	1	N/A	N/A	N/A
Poinsett	Medium-High	66	$ 10,300,000	0	0	19	3	$ 205,229
Pope	Medium-High	N/A	$ 10,000	N/A	N/A	N/A	N/A	N/A
Prairie County	Medium	102	$ 266,000	0	4	N/A	N/A	N/A
Pulaski County	N/A	328	$ 406,000	N/A	N/A	N/A	N/A	N/A
Saline County	High	183	$ 251,000	1	4	N/A	2	N/A
Scott County	High	86	$ 6,000	0	0	N/A	N/A	N/A
Sebastian County	Medium-High	0	N/A	N/A	N/A	N/A	N/A	N/A
Sevier County	Medium-High	116	$ 2,412,000	0	1	N/A	N/A	N/A
Sharp County	High	81	$ 1,631,000	1	1	N/A	N/A	N/A
St. Frances	High	73	$ 655,000	0	6	N/A	N/A	N/A
Union	High	99	$ 1,249,000	0	5	N/A	N/A	N/A
Washington County	Medium	55	$ 2,413,300	0	0	N/A	N/A	N/A
White County	High	197	$ 253,000	0	1	N/A	N/A	N/A
Woodruff	High	1	N/A	0	0	N/A	N/A	N/A
Totals		**5525**	**$94,742,300**	**8**	**65**	**121**	**50**	**$1,160,035**

Using the local plan summary for thunderstorms by county data (Table 4.5.10-8), the following analysis was conducted and the average losses were calculated. Based on this methodology, the average losses for a thunderstorm event are $171,479 per event. The HMP Sub-Committee determined that this was a good estimation of future losses based on the data in these local plans.

Table 4.5.10-9: Local Plan Averages for Thunderstorms, Statewide Summary

	Deaths	Injuries	Total Damages
Totals	8	65	$ 94,742,300
Average Per County	0.13	1.05	$ 1,528,101
Average Per Event	0.001	0.01	$ 171,479

4.5.11 Estimating Potential Losses by Jurisdiction to Hazardous Material Events

The top six potential HAZMAT event categories have been identified, profiled, and analyzed in detail relating to the ability to estimate potential losses by jurisdiction.

- Fixed site HAZMAT locations.
- Pine Bluff Arsenal.
- Methamphetamine laboratories.
- Highway HAZMAT.
- Railroad HAZMAT.
- Pipeline HAZMAT.

The HMP Sub-Committee does not have sufficient data at this time to make estimates of potential losses by jurisdiction for HAZMAT events. However the following assumptions have been made that begin the process of estimating these actual losses:

- Most HAZMAT events are localized and affect only the immediate area.
- Most events are small in nature and are quickly contained and cleaned.
- Fixed sites can be identified through the federal reporting requirements and some historical event data is available by jurisdiction.
- Maps for highways, railroads and pipelines are available thereby designating the jurisdictions at risk to these specific hazards.
- Most HAZMAT events involve an immediate response and an expedited cleanup with relatively fixed costs. Depending on the size and location of a release, the associated costs can range from a few thousand dollars to hundreds of thousands of dollars.
- The Pine Bluff Arsenal is the single highest risk facility and the nearby jurisdictions could be directly or indirectly impacted by an event at that facility.
- Losses could include limited loss of life, injuries and sickness for the general population and for the first responders.
- Losses could include the financial costs for response and cleanup.
- There could be significant loss of reputation or confidence in associated organizations.
- There could be short-term impacts to the local economy due to a major event.
-

4.5.12 Estimating Potential Losses by Jurisdiction to Nuclear Events

It is extremely difficult to estimate the potential losses related to a nuclear event at Arkansas Nuclear One. This location has never had a major accident or radioactive release. The only historical cases for comparison are the events at Three Mile Island and at Chernobyl in Russia.

- Three Mile Island – There were no immediate deaths or injuries and there was little evidence that there were any long term health issues for people in the surrounding area. There was however a VERY high economic impact during the response, the recovery and the on-going investigations, tests, reports and studies.
- Chernobyl – There were more than 30 people killed immediately and there were long term health risks for many of the 100,000+ people evacuated. It is estimated that there was a $12.8 billon disruption to the Soviet economy due to this event.

The following four counties are the ones within the immediate 10-mile EPZ for ANO. These are the jurisdictions that would obviously have the highest estimated losses – both human and economic.

Table 4.5.12-1: County Populations Found Within the 10-Mile EPZ Zone

		Population Estimates					Estimates Base	Census 2000
Rank	**Geographic area**	**July 1, 2004**	**July 1, 2003**	**July 1, 2002**	**July 1, 2001**	**July 1, 2000**	**April 1, 2000**	**April 1, 2000**
	Arkansas	2,752,629	2,727,774	2,707,509	2,692,134	2,678,501	2,673,398	2,673,400
	COUNTY							
13	Pope County	55,933	55,285	55,224	54,864	54,489	54,469	54,469
30	Johnson County	23,713	23,462	23,211	22,913	22,785	22,781	22,781
34	Logan County	22,899	22,820	22,542	22,459	22,512	22,486	22,486
35	Yell County	21,318	21,469	21,364	21,261	21,179	21,139	21,139

Based on the lack of historical information there is no way to estimate the potential losses associated with a nuclear event in the state. There is no doubt that the effects would be dramatic and the costs to the state, the federal government, the local jurisdictions and a large number of associated private enterprises would be extremely high, potentially reaching into the billions of dollars.

2010 Update

For the 2010 update, it was determined that there is still not an accurate way to estimate the potential losses associated with a nuclear event in Arkansas. There is no doubt that a nuclear event would be devastating on the citizens, economy, and government (state and federal). The damages from such an event would easily cause billions of dollars in damages in the state.

4.5.13 Estimating Potential Losses by Jurisdiction to Terrorism Events

It is extremely difficult to estimate potential losses related to a potential terrorism event. A number of factors add to this difficulty:

- Location of the attack.
- Populations in the attacked area.
- Available resources for response and recovery.
- Time of day and year.
- Level of success of the attack.
- Residual effects of the attack.

The HMP Sub-Committee has considered ways to estimate potential losses by jurisdiction and has agreed that there is not enough historical information or enough current data about potential threats to make a valid estimation at this time. Please refer to the State's Terrorism Plan for further information about potential losses and at-risk jurisdictions.

2010 Update

For 2010, the Sub-Committee agreed that there is still no accurate way to make a valid loss estimation for terrorism events in Arkansas. However it was also determined that a terrorist attack could easily cause billions of dollars in damages, and the loss of hundreds, if not thousands, of lives in the state.

4.5.14 Estimating Potential Losses by Jurisdiction to Biological Events

The HMP Sub-Committee has agreed that it is very difficult to estimate losses by jurisdiction related to biological outbreak events. There are a wide variety of diseases that can affect the human and animal populations throughout the state and each one would result in slightly different losses for different jurisdictions. Also, there is not enough historical data to support a detailed analysis on this subject. The Vulnerability and Impact Analysis details the potential damages and impacts to the state and to various regions and special populations. Please refer to this as the best available data for making future estimations.

Potential losses are subject to a variety of factors:

- Type of disease outbreak – human versus animal, contagious versus exposure, etc.
- Speed of identification and containment.
- Contamination issues at responding medical facilities.
- Location of outbreak – surrounding population and level of responding resources.
- Management of the flow of public information and the resulting level of panic in the general population.

Losses are expected to be heaviest in the jurisdictions immediately affected by the outbreak as they would be hardest hit and have the least time to respond and enact containment measures. Nearby jurisdictions would then be impacted as well but to a lesser degree.

Financial losses could be extreme as local jurisdictions respond and recover. The anthrax attacks in 2001 cost the federal government millions and millions of dollars and the mad cow and FMD outbreaks in Great Britain resulted in losses of billions of dollars. Due to the many factors and the wide range of potential losses, the HMP Sub-Committee is not currently prepared to make specific estimations.

2010 Update

For 2010, the Sub-Committee agreed that there is still no accurate way to make valid loss estimations for biological events in Arkansas. However, it was also determined that a biological event could easily cause the loss of hundreds, if not thousands, of lives in the state.

4.6 Estimating Potential Losses of State Facilities

Estimating Potential Losses of State Facilities	
IFR REQUIREMENT *201.4(c)(2)(iii):*	[The State risk assessment shall include an overview and analysis of potential losses to identified vulnerable structures, based on estimates provided in] the State risk assessment. The State shall estimate the potential dollar losses to State-owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas. .
Explanation:	This requires States to estimate losses to State-owned or operated facilities and infrastructure. The plan **shall** describe the distribution of losses across the State, with specific reference to quantifying losses to critical facilities. States *should* also describe their approach for determining losses for State-owned infrastructure and buildings.
Update	If there are changes to the hazard profile and/or to the State facilities and infrastructure as described under Assessing Vulnerability of State Facilities, this section **must** be updated to reflect potential losses to identified vulnerable structures and infrastructure. If the approach for determining these losses has changed since the first approval, the plan *should* describe the new methodology.

As part of the 2010 plan update process, this section of the plan has been revisited, reviewed, and modified to reflect new information from the period of 2007 through 2010. In reviewing the hazard profiles and the vulnerability analysis, the Hazard Mitigation Planning Sub-Committee estimated losses for each hazard based on the best available data. Specific scenario modeling was not conducted for the hazards. The Sub-Committee recognized that any geographic-based modeling would result in estimation of losses for that particular area only and would therefore not be consistent with a statewide approach. For the 2010 update, when necessary and applicable, updated information has been added to enhance the existing analysis and to make the analysis more current.

Based on the results of the 2004 analysis, the HMP Sub-Committee recognized the necessity to collect spatial data for the state-owned and operated facilities in order to enhance the statewide risk assessment. Spatial coordinates were collected for 784 state-owned and operated facilities and the framework was established to continue the process of improving and maintaining this GIS database.

2004 Baseline Analysis

The following information describes the methodology followed in 2004 for the original loss estimation.

Risk assessment data for estimating the potential losses of state facilities is limited for most natural hazards in Arkansas. Much of the estimation of potential losses to state facilities for each hazard is based on historical hazard loss data. The Arkansas Insurance Department maintains a State Master Property Policy Loss History database. State property loss data are available from July 1, 1994 through October 1, 2004. Loss classifications available in this database relevant to this planning effort include fire,

freezing, ice, tornado, water, and wind/hail. No insured losses to state structures were incurred for earthquakes, landslides, expansive soils, or drought since 1994. Risk assessment and loss estimates are hindered by the lack of latitude and longitude data for state structures that would allow them to be accurately located with respect to hazard areas. Acquiring latitude-longitude data for all state structures is listed as a high priority mitigation action in Section 5.4 of this plan.

2007 Loss Estimation Methodology

A major part of this 2007 revision was the new initiative to collect latitude-longitude coordinates for state facilities. This data was used extensively in the vulnerability analysis; however it was not relevant to the loss estimation. The HMP Sub-Committee considered how to use this spatial data in the loss estimation analysis but any modeling of high risk areas would only estimate losses for the specific area of impact. The HMP Sub-Committee determined that the loss estimation methodology needed to be on a statewide basis and not based on an arbitrary selection of a high risk geographic location.

The HMP Sub-Committee determined that the best methodology for estimating future losses was the same one utilized during the original 2004 planning process. In order to update the existing loss estimation for state facilities, the HMP Sub-Committee acquired the most recent update to the Arkansas Insurance Department's State Master Property Policy Loss History database. This file provided a complete listing of all facility damages through July 2007 and includes the following data:

- State agency impacted by facility damage.
- Location by city.
- Cause of damage including natural hazards and human-caused events.
- Date of loss and appropriate fiscal year.
- Claim number and status.
- Amounts paid by the state through the Trust Fund.
- Amounts paid by the insurance policies.

The updated information from 2004 through 2007 is added to the original loss estimate to enhance the results.

During the 2007 update, the HMP Sub-Committee also received data from the AID loss reports for schools and school districts that are now insured by the state. Not all schools fall under this program, however the loss data due to natural hazards was considered very valuable to enhance the loss estimation process. This school loss data was therefore included with the state facility losses to provide better estimations based on a larger quantity of events.

2010 Loss Estimation Methodology

The following information describes the methodology followed in 2010 plan update. The 2010 update reflects the methodology for the original loss estimation in 2004 and utilizing the previous plan update critical facility data.

Risk assessment data for estimating the potential losses of state facilities is limited for most natural hazards in Arkansas. Much of the estimation of potential losses to state facilities for each hazard is based on historical hazard loss data. The HMP Sub-Committee found the previous data for the state property to be the most accurate facility information to date and with the low economic status and reduction of construction over the last three years; little has been added to the facility directory to merit changes in the 2010 plan update. Below lists the information for critical facilities:

- State agency impacted by facility damage.
- Location by city.
- Cause of damage including natural hazards and human-caused events.
- Date of loss and appropriate fiscal year.
- Claim number and status.
- Amounts paid by the state through the Trust Fund.
- Amounts paid by the insurance policies.

No insured losses to state structures were incurred for earthquakes, landslides, expansive soils, or drought since the original risk assessment and loss estimations.

4.6.1 Estimating Potential Losses of State Facilities to Tornadoes

Potential losses to state facilities resulting from tornadoes were estimated using recent historical data from the Arkansas Insurance Department. Between 1994 and 2004, three tornado events damaged 17 state structures resulting in losses of $794,421 (Table 4.6.1-1). Averaged over a 10-year period, the losses to state structures from tornado damage would be $79,442 annually (Table 4.6.1-1).

Table 4.6.1-1: Insured losses resulting from Tornado events to state-owned and operated structures from July 1, 1994 through October 1, 2004.

Hazard	Date of Loss	Description	Total Incurred Loss	Avg. Annual Loss
Tornado	4/14/96	Arkansas Department of Education	$1,677	$168
Tornado	4/14/96	Ozark Technical College	$16,967	$1,697
Tornado	3/1/97	Arkansas Department of Health	$2,998	$300
Tornado	3/1/97	Arkansas Department of Health	$583	$58
Tornado	3/1/97	Arkansas Department of Health	$15,000	$1,500
Tornado	3/1/97	Arkansas Employment Security Department	$11,273	$1,127
Tornado	3/1/97	Arkansas Department of Parks and Tourism	$6,013	$601
Tornado	3/1/97	Arkansas Department of Parks and Tourism	$2,592	$259
Tornado	3/1/97	Arkansas Department of Parks and Tourism	$2,028	$203
Tornado	3/1/97	Arkansas Department of Parks and Tourism	$247,549	$24,755
Tornado	3/11/97	Arkansas Educational Television Comm.	$60,080	$6,008
Tornado	1/21/99	Arkansas State University-Beebe	$197,460	$19,746
Tornado	1/21/99	Arkansas State University-Newport	$19,334	$1,933

Tornado	1/21/99	Arkansas State University-Newport	$3,228	$323
Tornado	1/21/99	Governors Mansion Commission	$156,853	$15,685
Tornado	1/21/99	Arkansas Forestry Commission	$26,361	$2,636
Tornado	1/21/99	Arkansas Department of Parks and Tourism	$24,425	$2,443
Total			**$794,421**	**$79,442**

2007 Update

The AID databases listed the following two damage reports from a single storm system on March 12, 2006. The Marmaduke Tornado outbreak from April of 2006 is also included.

Table 4.6.1-2: 2007 Tornado Damages to State Facilities

Event Type	Date of Loss	Agency	Location	Total Damages
Tornado	03/12/2006	Arkansas Game and Fish Commission	Centerton	$ 24,217
Tornado	03/12/2006	Northwest Arkansas Community College	Bentonville	$ 20,841
Tornado	04/02/2006	Marmaduke School District	Marmaduke	$ 550,000est.

With the addition of these three reports, the following statistics were calculated.

- The total incurred losses for state-owned facilities equal $1,339,480.
- There were 19 damaged facilities. The average loss per facility equals $44,183.
- There were five tornado events. The average loss per total tornado event equals $167,896.
- This data covers the 13-year period from 1994 through 2007. The average annual loss equals $64,575.

The HMP Sub-Committee determined that this historical evidence is the best available data for estimating losses in the future related to tornadoes.

The Marmaduke School District was the hardest hit area was in the town of Marmaduke. Forty-seven injuries occurred in Marmaduke with two people being airlifted to a local hospital. One hundred and thirty houses were destroyed in Marmaduke with twenty-five mobile homes also being destroyed. A pharmacy was also destroyed in Marmaduke. Outside of Marmaduke, in the rest of the county, nineteen homes and 11 mobile homes were destroyed. In addition, seven houses and two mobile homes had major damage in the county. In all, approximately five hundred homes were affected.

2010 Update

The AID database does not list any structures being damaged by tornados from 2007 to 2010. The information used the previous hazard data and added three years and recalculated the totals for the information.

- The total incurred losses for state-owned facilities equal $1,389,479.
- There were 20 damaged facilities. The average loss per facility equals $69,474.
- There were five tornado events. The average loss per total tornado event equals $277,896.
- This data covers the 16-year period from 1994 through 2010. The average annual loss equals $86,842.

4.6.2 Estimating Potential Losses of State Facilities to Severe Winter Weather

Potential losses to state facilities resulting from severe winter weather were estimated using historical data from the Arkansas Insurance Department. Between 1994 and 2004, nine ice or winter storm events damaged 15 state structures resulting in losses of $559,912 (Table 4.6.2-1). Averaged over a 10-year period, the losses to state structures from severe winter weather damage would be $55,991 annually (Table 4.6.2-1).

Table 4.6.2-1: Insured losses resulting from severe winter weather events to state-owned and operated structures from July 1, 1994 through October 1, 2004.

Hazard	Date of Loss	Description	Total Incurred Loss	Avg. Annual Loss
Freezing	12/13/00	Arkansas Educational Television Commission	$18,830	$1,883
Freezing	12/13/00	Arkansas Department of Health	$35,173	$3,517
Freezing	12/26/00	Henderson State University	$44,454	$4,445
Freezing	12/26/00	Arkansas Department of Veterans Affairs	$850	$85
Freezing	12/26/00	Cossatot Technical College	$21,895	$2,190
Freezing	12/26/00	Ozark Technical College	$6,663	$666
Freezing	12/26/00	Southeast Arkansas College	$8,225	$823
Freezing	2/1/01	Black River Technical College	$26,719	$2,672
Freezing	1/20/03	Arkansas State Police Commission	$76,970	$7,697
Freezing	2/8/03	Arkansas Rehabilitation Services	$86,658	$8,666
Ice	1/5/95	Arkansas Educational Television Commission	$24,199	$2,420
Ice	11/25/96	Arkansas Educational Television Commission	$30,094	$3,009
Ice	1/27/00	Southern Arkansas University	$142,064	$14,206
Ice	1/28/00	Arkansas Employment Security Department	$2,118	$212
Ice	12/4/02	Arkansas Educational Television Commission	$35,000	$3,500
Total			**$559,912**	**$55,991**

2007 Update

The AID databases listed the following two damage reports from a single winter storm on December 26, 2004. However these freezing events did not list any damage amounts or insurance claims pending. There was no new ice events recorded since the 2004 data. There was no school loss data related to severe winter weather that could be used to supplement this estimation.

Table 4.6.2-2: 2007 Update State Facilities Losses for Winter Storms

Event Type	Date of Loss	Agency	Location	Total Damages
Freezing	12/26/2004	National Park Community College	Hot Springs	$ -
Freezing	12/26/2004	DFA-Office of Child Support Enforcement	Benton	$ -

With the addition of these two reports, the following statistics were calculated.

- The total incurred losses for state-owned facilities remained $559,912.
- There were 17 damaged facilities. The average loss per facility equals $32,936.
- There were 10 ice and freezing events. The average loss per event equals $55,991.
- This data covers the 13-year period from 1994 through 2007. The average annual loss equals $43,070.

The HMP Sub-Committee determined that this historical evidence is the best available data for estimating losses in the future related to winter weather events.

2010 Update

The AID database does not list any structures being damaged by winter storms from 2007 to 2010. The information used the previous hazard data and added three years and recalculated the totals for the information.

Table 4.6.2-3: 2010 Update State Facility Losses for Winter Storms

Description	Date of Loss	Agency Code	Agency	Location	Total Incurred
Freezing	02/11/2010	960A	Arkansas State Police Commission	Little Rock	-
Ice	01/27/2009	128	Arkansas State University - Mountain Home	Mountain Home	3,395.88
Ice	01/27/2009	516	Arkansas Educational Telecommunications Network	Little Rock	23,677.34
Ice	01/27/2009	480	Arkansas Department of Correction	Calico Rock	24,304.38
Ice	01/27/2009	185	North Arkansas College	Harrison	467.00
Ice	01/27/2009	080	Arkansas Game and Fish Commission	Mammoth Springs	75,250.16
Ice	01/27/2009	960B	Arkansas State Police Communications	Statewide	386,545.12
Ice	01/27/2009	125C	Arkansas State University - Other Locations	Piggott	11,070.46
Ice	01/27/2009	198	Northwest Arkansas Community College	Bentonville	-
				Total Losses	524,710.34

Based on this data, the total losses to state facilities from 2007-2010 was $523,710. The average loss to state facilities was $174,570

4.6.3 Estimating Potential Losses of State Facilities to Flooding

Potential losses to state facilities resulting from flooding were estimated using recent historical data from the Arkansas Insurance Department. Between 1994 and 2004, two flood events damaged two state structures resulting in losses of $520,080 (Table 4.6.3-1). Averaged over a 10-year period, the losses to state structures from flood damage would be $55,991 annually (Table 4.6.3-1).

Table 4.6.3-1: Insured losses resulting from flood events to state-owned and operated structures from July 1, 1994 through October 1, 2004.

Hazard	Date of Loss	Description	Total Incurred Loss	Avg. Annual Loss
Water (Flood)	1/20/99	Arkansas State University- Other Locations	$66,725	$6,673
Water (Flood)	6/15/99	Southern Arkansas University	$453,355	$43,535
Total			**$520,080**	**$50,208**

An alternative method to estimate losses due to flooding is to use flood loss estimation tables. There are 396 state-owned and operated structures in the 100-year floodplain in the state with a building and contents value of $290,058,419. Assuming these buildings are flooded once every 100 years to a depth of 2 feet (=22% building damage based on FEMA Flood Building Loss Estimation table), the annual flood losses to state buildings may be roughly estimated.

$290,058,419 x 22% / 100 years = $638,129 per year

2007 Update

The AID database lists a number of loss events that are categorized as caused by "water." The HMP Sub-Committee recognized that these events are not necessarily related directly to riverine flooding, flash flooding or dam failure. However the Sub-Committee considered the data regarding the magnitude and severity of the water damage to be the best available data for estimating future losses. The following lists all the "water events" and the associated losses.

Table 4.6.3-2: 2007 Updated State Facility Losses for Water-Related Events

Description	Date of Loss	Agency	Location	Total Loss
Water	07/09/2007	North Little Rock School District	North Little Rock	$ -
Water	07/05/2007	North Little Rock School District	North Little Rock	$ -
Water	07/02/2007	Cedarville School District	Cedarville	$ -
Water	05/24/2007	Arkansas Department of Parks and Tourism	DeGray	$ -
Water	05/13/2007	Western Arkansas Education Cooperative	Western Arkansas Co-op	$ 4,224
Water	04/14/2007	Mansfield School District	Mansfield	$ 14,574
Water	01/13/2007	University of Central Arkansas	Conway	$ -
Water	01/13/2007	Mid South Community College	West Memphis	$ 7,500
Water	11/15/2006	North Little Rock School District	North Little Rock	$ -
Water	09/18/2006	North Little Rock School District	North Little Rock	$ -

Water	08/21/2006	Arkansas Tech University	Russellville	$ -
Water	08/17/2006	North Little Rock School District	North Little Rock	$ 4,133
Water	08/11/2006	North Little Rock School District	North Little Rock	$ 2,785
Water	05/30/2006	Harrison School District	Harrison, Arkansas	$ -
Water	05/29/2006	Monticello School District	Monticello, Arkansas	$ 14,684
Water	04/21/2006	North Little Rock School District	North Little Rock	$ -
Water	02/21/2006	Arkansas River Cooperative	Pine Bluff, Arkansas	$ -
Water	02/20/2006	DeWitt School District	Dewitt, Arkansas	$ 6,615
Water	12/06/2005	North Little Rock School District	North Little Rock	$ 7,984
Water	12/26/2004	North Little Rock School District	North Little Rock	$ 45,333
Water	12/25/2004	Lake Hamilton School District	Pearcy, Arkansas	$ 8,479
Water	11/02/2004	Wilbur D. Mills Education Service Cooperative	Beebe, Arkansas	$ -
Water	11/01/2004	North Little Rock School District	North Little Rock	$ -
Water	11/01/2004	North Little Rock School District	North Little Rock	$ 3,425
Water	11/01/2004	North Little Rock School District	North Little Rock	$ -
Water	10/30/2004	Harrison School District	Harrison, Arkansas	$ -
Water	09/06/2004	North Little Rock School District	North Little Rock	$ 2,115
Water	08/02/2004	North Little Rock School District	North Little Rock	$ 130
Water	07/27/2004	North Little Rock School District	North Little Rock	$ 13,389
Water	07/27/2004	North Little Rock School District	North Little Rock	$ -
Water	07/15/2004	Shirley School District	Shirley, Arkansas	$ 570
Water	07/02/2004	Cedarville School District	Cedarville, Arkansas	$ -
Water	11/26/2003	Arkansas State Police Commission	Little Rock	$ -
Water	11/18/2003	Ozarka Technical College	Melbourne	$ -
Water	01/28/2000	Southeast Arkansas College		$ 4,091
Water	06/15/1999	Southern Arkansas University		$ 453,355
Water	01/20/1999	Arkansas State University - Other Locations		$ 66,725
Water	01/08/1999	University of Central Arkansas		$ 10,882
Water	12/28/1998	Arkansas State University - Newport		$ 1,448
Water	05/31/1998	Arkansas State University - Other Locations		$ 20,754
Water	04/17/1998	Arkansas State University - Technical Center		$ 742
Water	03/10/1998	Arkansas Educational Television Commission		$ 3,559
Water	11/16/1997	Arkansas Department of Parks and Tourism		$ 4,415
Water	10/04/1997	Great Rivers Vo - Tech School		$ 34,112
Water	08/25/1996	Governors Mansion Commission		$ 2,231
Water	06/27/1996	Governors Mansion Commission		$ 2,130
Water	01/19/1996	Rice Belt Vo - Tech (Not Currently Insured)		$ 9,873
Water	01/18/1996	South Arkansas Community College		$ 8,564
Water	01/07/1996	Northwest Arkansas Community College		$ 15,744
Water	12/16/1995	University of Central Arkansas		$ 7,087
TOTAL				**$ 781,651**

Based on these reported losses, the following statistics were calculated.

- The total incurred losses for state-owned facilities equal $781,651.
- There were 50 damaged facilities. The average loss per facility equals $15,633.
- There were 45 water events. The average loss per event equals $17,370.
- This data covers the 13-year period from 1994 through 2007. The average annual loss equals $60,127.

The HMP Sub-Committee determined that this historical evidence is the best available data for estimating losses in the future related to flooding events.

The HMP Sub-Committee also recalculated the alternative method to estimate losses due to flooding using the flood loss estimation tables. The state-owned and operated structures in the 100-year floodplain in the state had a cumulative building and contents value of $418,709,386 as detailed in the vulnerability analysis section of this plan. Assuming these buildings are flooded once every 100 years to a depth of 2 feet (=22% building damage based on FEMA Flood Building Loss Estimation table), the annual flood losses to state buildings may be roughly estimated.

$418,709,386 x 22% / 100 years = $921,160 per year

2010 Update

The AID database lists these structures being damaged by flooding from 2007 to 2010, but does not include the dollar amounts. Therefore, the previous loss estimation remains valid.

Table 4.6.3-3: 2010 Updated State Facility Losses for Flooding

Description	Date of Loss	Agency Code	Agency	Location	Total Incurred
Flood	05/06/2009	440	Arkansas Oil and Gas Commission	Ft. Smith	-
Flood	10/29/2009	350	Arkansas Building Authority	Little Rock	-

The HMP Sub-Committee also used the 2007 alternative method to estimate losses due to flooding using the flood loss estimation tables. The state-owned and operated structures in the 100-year floodplain in the state had a cumulative building and contents value of $418,709,386 as detailed in the vulnerability analysis section of this plan. Assuming these buildings are flooded once every 100 years to a depth of 2 feet (=22% building damage based on FEMA Flood Building Loss Estimation table), the annual flood losses to state buildings may be roughly estimated.

$418,709,386 x 22% / 100 years = $921,160 per year

4.6.4 Estimating Potential Losses of State Facilities to Earthquakes

There have been no historical losses to state buildings resulting from an earthquake event. Losses to state buildings resulting from a large earthquake event can be estimated using Peak Ground Acceleration (PGA) data (Figure 4.2.4-3) and corresponding Building Damage Ratios developed for HAZUS. Building losses are estimated based on Building Damage Ratios that were approximated for each county based on the PGA with 10% probability of exceedance in 50 years. Average annual losses were determined assuming a 500-year return interval for the maximum PGA earthquake event (Table 4.6.4-1). Earthquake losses were also estimated for state-owned and operated critical facilities (Table 4.6.4-2).

Table 4.6.4-1: Potential losses resulting from a major earthquake event to state-owned and operated structures. Only counties in which damage would occur are listed.

County	Maximum PGA (%)	Building Damage ratio (HAZUS Loss Est. Tables)	Number of State Structures	Value of State Structures (x1000)	Building Loss Estimate (x1000)	Average Annual Loss (Loss Estimate / 500 years)
Mississippi	45	0.172	64	$54,882	$9,440	$18,879
Craighead	43	0.114	55	$472,183	$53,829	$107,658
Poinsett	43	0.114	33	$9,719	$1,108	$2,216
Crittenden	40	0.114	29	$27,655	$3,153	$6,305
Green	32	0.072	58	$11,884	$856	$1,711
Clay	30	0.072	31	$2,667	$192	$384
St. Francis	24	0.047	68	$27,414	$1,288	$2,577
Jackson	22	0.029	56	$90,338	$2,620	$5,240
Lawrence	22	0.029	50	$9,957	$289	$578
Woodruff	21	0.029	8	$643	$19	$37
Randolph	19	0.029	38	$27,059	$785	$1,569
Lee	17	0.018	35	$75,173	$1,353	$2,706
Independence	16	0.018	41	$19,191	$345	$691
White	14	0.018	66	$58,387	$1,051	$2,102
Monroe	13	0.018	10	$967,307	$17,412	$34,823
Sharp	13	0.018	9	$650	$12	$23
Prairie	12	0.006	15	$1,709	$10	$21
Cleburne	11	0.006	7	$431	$3	$5
Fulton	11	0.006	27	$10,605	$64	$127
Phillips	11	0.006	26	$63,566	$381	$763
Izard	10	0.006	29	$49,235	$295	$591
Lonoke	10	0.006	37	$52,626	$316	$632
Stone	10	0.006	50	$17,764	$107	$213
Arkansas	9	0.005	34	$19,529	$98	$195
Faulkner	9	0.005	286	$376,099	$1,880	$3,761
Pulaski	9	0.005	431	$1,963,075	$9,815	$19,631
Van Buren	9	0.005	10	$977	$5	$10
Totals			**1,603**	**$4,410,725**	**$106,724**	**$213,448**

Table 4.6.4-2: Potential losses resulting from a major earthquake event to state-owned and operated critical facilities.

County	Maximum PGA (%)	Building Damage Ratio (HAZUS Loss Est. Tables)	Number of State Critical Facilities	Value of State Critical Facilities (x1000)	Critical Facility Loss Estimate (x1000)	Average Annual Loss (Loss Estimate / 500 years)
Mississippi	45	0.172	21	$46,000	$7,912	$15,824
Craighead	43	0.114	48	$372,710	$42,489	$84,978
Poinsett	43	0.114	6	$463,902	$52,885	$105,770
Crittenden	40	0.114	9	$23,248	$2,650	$5,301
Green	32	0.072	7	$4,157	$299	$599
Clay	30	0.072	8	$1,224	$88	$176
St. Francis	24	0.047	14	$15,469	$727	$1,454
Jackson	22	0.029	16	$43,775	$1,269	$2,539
Lawrence	22	0.029	5	$604	$18	$35
Woodruff	21	0.029	3	$441	$13	$26
Randolph	19	0.029	13	$22,427	$650	$1,301
Lee	17	0.018	12	$68,881	$1,240	$2,480
Independence	16	0.018	17	$11,299	$203	$407
White	14	0.018	18	$35,834	$645	$1,290
Monroe	13	0.018	2	$131	$2	$5
Sharp	13	0.018	6	$338	$6	$12
Prairie	12	0.006	5	$660	$4	$8
Cleburne	11	0.006	5	$1,167	$7	$14
Fulton	11	0.006	5	$437	$3	$5
Phillips	11	0.006	5	$23,470	$141	$282
Izard	10	0.006	15	$45,309	$272	$544
Lonoke	10	0.006	5	$23,805	$143	$286
Stone	10	0.006	8	$5,338	$32	$64
Arkansas	9	0.005	7	$11,829	$59	$118
Faulkner	9	0.005	78	$285,060	$1,425	$2,851
Pulaski	9	0.005	173	$1,240,387	$6,202	$12,404
Van Buren	9	0.005	5	$689	$3	$7
Totals			**516**	**$2,748,591**	**$119,388**	**$238,777**

2007 Update

As of July 2007, there had been no reported damages or losses in the state due to earthquakes. Therefore the HMP Sub-Committee re-calculated the loss estimates based on the 2004 methodology. The table below contains updates for the number of state structures and the value of state structures from the most recent release of the AID data. Based on these new amounts, the losses and average annual losses were recalculated for each county.

Table 4.6.4-3: 2007 Updated HAZUS Loss Estimates to State Facilities for Earthquakes

County	Maximum PGA (%)	Building Damage ratio (HAZUS Loss Est. Tables)	Number of State Structures	Value of State Structures	Building Loss Estimate	Average Annual Loss (Loss Estimate / 500 years)
Mississippi	45	0.172	69	$ 65,908,029	$11,336,181	$22,672
Craighead	43	0.114	82	$ 37,375,460	$4,260,802	$8,522
Poinsett	43	0.114	38	$ 12,565,410	$1,432,457	$2,865
Crittenden	40	0.114	42	$ 44,737,999	$5,100,132	$10,200
Green	32	0.072	76	$ 16,507,007	$1,188,504	$2,377
Clay	30	0.072	32	$ 5,059,234	$364,265	$729
St. Francis	24	0.047	76	$ 35,892,200	$1,686,933	$3,374
Jackson	22	0.029	70	$ 137,150,178	$3,977,355	$7,955
Lawrence	22	0.029	58	$ 13,217,490	$383,307	$767
Woodruff	21	0.029	9	$ 855,193	$24,801	$50
Randolph	19	0.029	44	$ 36,954,170	$1,071,671	$2,143
Lee	17	0.018	35	$ 93,340,447	$1,680,128	$3,360
Independence	16	0.018	41	$ 7,548,763	$135,878	$272
White	14	0.018	85	$ 74,149,330	$1,334,688	$2,669
Monroe	13	0.018	13	$ 1,458,284	$26,249	$52
Sharp	13	0.018	12	$ 1,338,148	$24,087	$48
Prairie	12	0.006	18	$ 2,320,175	$13,921	$28
Cleburne	11	0.006	10	$ 4,544,565	$27,267	$55
Fulton	11	0.006	32	$ 6,612,238	$39,673	$79
Phillips	11	0.006	30	$ 13,508,703	$81,052	$162
Izard	10	0.006	38	$ 62,502,689	$375,016	$750
Lonoke	10	0.006	43	$ 8,914,836	$53,489	$107
Stone	10	0.006	56	$ 26,856,835	$161,141	$322
Arkansas	9	0.005	38	$ 3,625,075	$18,125	$36
Faulkner	9	0.005	334	$ 610,721,406	$3,053,607	$6,107
Pulaski	9	0.005	555	$ 1,446,287,066	$7,231,435	$14,463
Van Buren	9	0.005	13	$ 1,295,798	$6,479	$13
Totals			**1,949**	**$ 2,771,246,727**	**$45,088,645**	**$90,177**

The HMP Sub-Committee placed a significant focus on the earthquake hazard for the state. A separate Earthquake Vulnerability Analysis was prepared that used the latest version of HAZUS-MH2 along with updated data to run various models and to calculate vulnerabilities and potential losses. This Earthquake Vulnerability Annex contains information that compliments this loss estimation and supports this section.

2010 Update

Using the same data that was used in Section 4.5.4 of this plan the following damages are expected to the state and critical facilities in the event of a magnitude 7.7 earthquake. Note that most of these damages are expected in the "at risk" counties listed in Section 4.5.4.

In the scenario critical infrastructure is severely damaged and operational capabilities are substantially reduced in northeastern Arkansas. Well over 200 schools, 100 police stations, nearly 180 fire stations and 25 hospitals are damaged by the scenario event and a large portion of that damage is complete, rendering many facilities useless after the event. The table below details damage estimates for essential facilities in Arkansas. The impacted counties are catastrophically impacted, particularly Clay, Craighead, Crittenden, Cross, Greene, Jackson, Lee, Mississippi, Monroe, Phillips, Poinsett, Prairie, Saint Francis, and Woodruff Counties where most essential facilities, medical services, law enforcement and fire fighting services are nearly non-existent immediately after the event.

Table 4.6.4-4: 2010 Update Loss Estimates for State Facilities for Earthquakes

Essential Facility	Total Facilities	Moderate Damage	Complete Damage
Schools	1,328	219	56
Fire Stations	1,330	179	65
Police Stations	515	107	48
Hospitals	125	24	18
EOCs	113	25	8

Significant damage to transportation lifelines is expected also, but generally confined to the impacted counties. Craighead, Crittenden, Mississippi, and Poinsett Counties incur the largest numbers of damaged bridges. Furthermore, several major river bridges are damaged effectively separating major sections of Arkansas from neighboring states. The Harahan, Frisco, and Memphis/Arkansas bridges are damaged and impassible after the event. Nearly 40 airports and 15 railway facilities are damaged in the state, as shown in the table below. Most damage to rail, air and water transport facilities is located in Clay, Crittenden, Craighead, Cross, Greene, Mississippi, and Poinsett Counties.

Table 4.6.4-5: 2010 Loss Estimates for Critical Infrastructure for Earthquakes

Transportation Lifelines	Total Facilities	Moderate Damage	Complete Damage
Highway Bridges	14,060	1,083	336
Railway Bridges	68	11	0
Railway Facilities	69	14	0
Bus Facilities	18	1	0
Port Facilities	103	17	0
Airport Facilities	335	37	0

Impacts on utility infrastructure are most prominent in the impacted counties, though pipeline repairs are required throughout the entire state. The table below details expected utility facility damage for Arkansas, and shows that hundreds of waste water and communication facilities are damaged. Clay, Crittenden, Craighead, Cross, Greene, Independence, Jackson, Lawrence, Lee, Mississippi, Phillips, Poinsett, Randolph, St. Francis, White, and Woodruff Counties incur the majority of damage to waste water, communication, and other utility facilities.

Table 4.6.4-6: 2010 Loss Estimates to Utilities for Earthquakes

Utility Facilities	Total Facilities	Moderate Damage	Complete Damage
Potable Water Facilities	69	6	0
Waste Water Facilities	2,107	349	0
Natural Gas Facilities	422	47	0
Oil Facilities	96	14	0
Electric Facilities	800	147	0
Communication Facilities	4,626	633	0

Utility pipelines carry much-needed commodities to other parts of the country as well as individual homes in Arkansas. Both local distribution and major interstate pipeline repairs are quantified in the table below. Local distribution networks for potable water, waste water, and natural gas require a combined 124,000 repairs. Restoring the networks to their pre-event status will take weeks or months depending on the availability of spare parts and accessibility of damaged pipelines. In addition, over 1,700 repairs are needed on interstate pipelines which transport vital commodities to the upper Midwest and east coast. Without timely restoration these portions of the country that are not directly impacted by the earthquake will experience significant indirect affects as natural gas and oil are unavailable, or in scarce supply. Damage to utility infrastructure also leaves hundreds of thousands without power or water immediately after the event. Approximately 330,000 households are without power and 190,000 households without water after the event. Over 80% of all households in Craighead, Poinsett, Mississippi, Cross, and Crittenden Counties are without power immediately after.

Table 4.6.4-7: 2010 Loss Estimates for Highest Risk Jurisdictions for Earthquakes

Pipeline System	Total Miles	Leaks	Breaks	Total Repairs
Potable Water Local	118,700	19,532	27,649	47,181
Waste Water Local	71,200	15,448	21,868	37,316
Natural Gas Local	47,500	16,513	23,376	39,889
Natural Gas Interstate	9,700	340	1,092	1,432
Oil Interstate	2,200	62	214	276

There are over 3,000 other critical facilities in Arkansas and over 100 are damaged by the scenario earthquake. The table below shows that nearly 60 dams are damaged, all of which are located in Poinsett County. The 20 damaged levees are located in Craighead, Greene, Mississippi, and Poinsett Counties. Very intense ground shaking is required to damage hazardous materials facilities and such levels of shaking occur in small portions of northeast Arkansas. All damaged hazardous materials facilities are located in Mississippi County.

Facility Type	Total Facilities	Damaged
Dams	1,228	55
Levees	124	20
Hazardous Materials	1,834	69

SWEAT Analysis

SWEAT is an abbreviation for: **S**ecurity, **W**ater, **E**nergy, **A**ccessibility, and **T**elecommunications. The aim of a SWEAT analysis is to estimate potential impacts of a hazardous event on the aforementioned services, commodities, and infrastructure. To further detail the analysis, security is analyzed in terms of damage to emergency operation centers (EOC) including 911 call centers, police facilities, fire facilities, and hospitals. Water is decomposed into impacts to potable water, and waste water facilities. Energy includes electricity and natural gas facilities. Accessibility includes major river crossings, highway bridges, and schools. Telephone includes the telecom infrastructure. The impact of the earthquake on the capacity of each of those resources has been estimated for each impacted county on a standardized scale. This color-coded scale uses the following three levels/colors to describe available capacity:

Red: No Capacity/Capability (0%-39% of typical operating capacity)

Yellow: Reduced Capacity/Capability (40%-79% of typical operating capacity)

Green: Full capacity/Capability (80%-100% of typical operating capacity)

Table 4.6.4-8: SWEAT Analysis for Highest Risk Counties for Earthquakes

Impacted Counties (IC) Day 1	S				W		E		A			T
	EOC	Police	Fire	Hosp	Potable Water	Waste Facilities	Elect	NG Facilities	Major River Crossing	Hwy Bridges	Schools	Telecom
Arkansas	G	Y	G	R	R	G	Y	G	G	G	G	G
Clay	R	R	R	R	R	R	R	R	G	G	R	R
Craighead	R	R	R	R	R	R	R	R	G	Y	R	R
Crittenden	R	R	R	R	R	R	R	R	R	R	R	R
Cross	R	R	R	R	R	R	R	G	G	Y	R	R
Greene	R	R	R	R	R	R	R	R	G	Y	R	R
Independence	G	G	G	G	G	R	R	G	G	G	G	Y
Jackson	R	R	R	R	R	R	R	R	G	G	R	R
Lawrence	R	R	Y	R	R	R	R	R	G	Y	Y	R
Lee	R	R	R	G	R	R	R	G	G	G	R	R
Mississippi	R	R	R	R	R	R	R	R	G	R	R	R
Monroe	R	R	R	G	R	G	Y	G	G	G	R	G
Phillips	R	R	R	R	G	Y	Y	G	G	G	R	G
Poinsett	R	R	R	G	R	R	R	G	G	Y	R	R
Prairie	R	R	R	G	R	G	Y	G	G	G	R	G
Randolph	R	R	Y	G	R	R	R	R	G	G	Y	R
Saint Francis	R	R	R	R	R	R	R	G	G	Y	R	R
White	G	G	G	G	Y	Y	Y	Y	G	G	G	Y
Woodruff	R	R	R	G	R	R	R	G	G	G	R	R

4.6.5 Estimating Potential Losses of State Facilities to Wildfire

Although 37 fire events resulting in $1,780,838 in insured losses have affected state structures since 1994, none of these fires appears to have had a wildfire origin. Thus, no wildfires have affected state facilities in the past 10 years. Estimating potential losses to state structures by other means is not presently possible as locations of state structures and their proximity to wildfire susceptible areas is not accurately known.

2007 Update

The AID database lists a number of loss events that are categorized as caused by "fire." The HMP Sub-Committee recognized that these events are not necessarily related directly to wildfires. However the Sub-Committee considered the data regarding the magnitude and severity of the fire damage to be the best available data for estimating future losses. The following lists all the "fire events" and the associate losses.

Table 4.6.5-1: 2007 State Facility Losses for Fire Events

Description	Date of Loss	Agency	Location	Total Loss
Fire	06/02/2007	University of Central Arkansas	Conway	$ -
Fire	05/18/2007	North Little Rock School District	North Little Rock	$ 3,000
Fire	04/14/2007	Bradley School District	Bradley	$ 6,185
Fire	03/06/2007	Lake Hamilton School District	Pearcy	$ 4,811
Fire	02/11/2007	West Memphis School District	West Memphis	$ 109,909
Fire	11/16/2006	Office of Secretary of State	Little Rock	$ -
Fire	11/03/2006	North Little Rock School District	North Little Rock	$ -
Fire	10/27/2006	Arkansas State University - Newport	Newport	$ -
Fire	08/14/2006	Arkansas Department of Environmental Quality	Springdale	$ 10,938
Fire	04/28/2006	Huntsville School District	Huntsville, Arkansas	$ 8,361
Fire	02/27/2006	Palestine-Wheatley School District	Wheatley, Arkansas	$ 2,145,371
Fire	02/06/2006	Gravette School District	Gravette, Arkansas	$ 361,994
Fire	12/31/2005	Arkansas Department of Parks and Tourism	Morrilton	$ 66,517
Fire	12/13/2005	Greenland School District	Greenland, Arkansas	$ 4,225
Fire	12/05/2005	Lakeside School District (Insured With Other Program)	Lake Village, Arkansas	$ 3,912
Fire	06/27/2005	Pine Bluff School District	Pine Bluff, Arkansas	$ 77,623
Fire	06/04/2005	Arkansas School for the Blind		$ -
Fire	05/08/2005	Arkansas Department of Parks and Tourism	Lake Village	$ 29,554
Fire	04/30/2005	Helena - West Helena School District	Helena, Arkansas	$ 6,246
Fire	04/25/2005	Arkansas Department of Correction	Luxora	$ 5,259
Fire	02/14/2005	Walnut Ridge School District (Insured With Other Program)	Walnut Ridge, Arkansas	$ 4,574
Fire	01/07/2005	Rose Bud School District	Rosebud, Arkansas	$ 388,990
Fire	01/06/2005	Dermott School District	Dermott, Arkansas	$ 81,996
Fire	12/10/2004	North Little Rock School District	North Little Rock	$ 1,497
Fire	09/26/2004	Lee County School District	Marianna, Arkansas	$ 84,031
Fire	09/21/2004	Lakeside School District	Hot Springs, Arkansas	$ -
Fire	08/21/2004	University of Central Arkansas	Conway	$ 15,070
Fire	05/26/2004	Arkansas Department of Parks and Tourism		$ -
Fire	03/04/2004	Crowley's Ridge Technical Institute	Forrest City	$ 34,620
Fire	12/15/2003	Arkansas Department of		$ -

		Community Correction			
Fire	11/30/2003	Southern Arkansas University	Magnolia	$	98,536
Fire	09/29/2003	Arkansas Department of Parks and Tourism	Arkadelphia	$	120,544
Fire	08/10/2002	Arkansas Department of Parks and Tourism		$	67,654
Fire	12/23/2001	Arkansas Commission on Law Enforcement Standards and Training		$	73,311
Fire	04/12/2001	Arkansas Educational Television Commission		$	50,291
Fire	12/23/2000	Arkansas Department of Parks and Tourism		$	155,170
Fire	04/10/2000	DFA-Revenue Division		$	27,243
Fire	03/30/2000	Office of Secretary of State		$	23,315
Fire	02/24/2000	Arkansas Rehabilitation Services		$	156,465
Fire	02/24/2000	Arkansas Rehabilitation Services		$	67,882
Fire	10/28/1999	Department of Health and Human Services		$	10,000
Fire	09/30/1999	Arkansas Commission on Law Enforcement Standards and Training		$	16,872
Fire	02/28/1999	Arkansas Agriculture Department - Forestry Commission		$	79,948
Fire	02/09/1999	Department of Health and Human Services		$	103,337
Fire	12/20/1998	Arkansas Department of Environmental Quality		$	1,513
Fire	11/20/1998	Arkansas State University - Searcy		$	2,130
Fire	04/28/1998	Arkansas Department of Parks and Tourism		$	10,609
Fire	03/25/1996	Petit Jean College		$	9,436
Fire	02/12/1996	Southern Arkansas University		$	1,062
Fire	01/21/1996	Arkansas Educational Television Commission		$	8,165
Fire	12/07/1995	Department of Health and Human Services		$	36,000
Fire	08/28/1995	Southern Arkansas University		$	73,237
Fire	08/28/1995	Southern Arkansas University		$	921
Fire	10/06/1994	Arkansas Agriculture Department - Livestock and Poultry Commission		$	682
Fire	10/01/1994	Arkansas Northeastern College		$	486,612
TOTAL				**$**	**5,135,619**

Based on the reports on the previous page, the following statistics were calculated.

- The total incurred losses for state-owned facilities equal $5,135,619.
- There were 55 damaged facilities. The average loss per facility equals $93,374.
- There were 53 fire events. The average loss per event equals $96,898.
- This data covers the 13-year period from 1994 through 2007. The average annual loss equals $395,047.

The HMP Sub-Committee determined that this historical evidence is the best available data for estimating losses in the future related to fire events. The HMP Sub-Committee recognized that this calculation is only based on the average damage to a facility due to fire and not specifically related to wildfires. Most state facilities are in urban areas that automatically implies low risk to wildfire damages. The HMP Sub-Committee estimated these losses based on the data for fire and determined that damage from man-made or from naturally occurring wildfires would result in similar damage/loss patterns in affected state facilities. Probability and geographic areas at risk are addressed in the hazard profile and the vulnerability analysis.

2010 Update

The AID database does not list any structures being damaged by wildfires from 2007 to 2010. The information below used the previous hazard data and added three years and recalculated the totals for the information.

Table 4.6.5-2: 2010 Updates Losses for State Facilities for Fire Events

Description	Date of Loss	Agency Code	Agency	Location	Total Incurred
Fire	07/25/2007	105A	Southern Arkansas University	Magnolia	4,100.00
Fire	07/31/2007	485	Arkansas Department of Community Correction	Ashdown	-
Fire	08/28/2007	900	Arkansas Department of Parks and Tourism	Old Washington	25,457.27
Fire	01/10/2008	165	University of Central Arkansas	Conway	-
Fire	05/25/2008	080	Arkansas Game and Fish Commission	Lakeway	3,403.77
Fire	08/06/2008	710	Department of Human Services	Benton	-
Fire	10/31/2008	480	Arkansas Department of Correction	Grady	36,433.68

4.6.6 Estimating Potential Losses of State Facilities to Landslides

Based on Arkansas Insurance Department data, no landslides have affected insured state facilities in the past 10 years. No historical landslide losses to state facilities are known suggesting annualized loss estimates are very low. Estimating potential losses to state structures, other than historical data, is not presently possible as locations of state structures and their proximity to landslide susceptible areas is not accurately known.

2007 Update

The HMP Sub-Committee researched the landslide hazard and found no new data to enhance this loss estimation. The estimated losses related to this hazard are considered very low.

2010 Update

The HMP Sub-Committee again researched the landslide hazard as part of the 2010 update and found no new data that could enhance the loss estimation. The Sub-Committee continued to agree that state facilities were not at risk from the landslides hazard and therefore the estimated losses remain at or near $0 for all potential events.

4.6.7 Estimating Potential Losses of State Facilities to Expansive Soils

Based on Arkansas Insurance Department data, expansive soils have not affected insured state facilities in the past 10 years. No historical expansive soil losses to state facilities are known suggesting annualized loss estimates are very low. Estimating potential losses to state structures, other than historical data, is not presently possible as locations of state structures and their proximity to areas of highly expansive soils is not accurately known.

2007 Update

The HMP Sub-Committee researched the expansive soils hazard and found no new data to enhance this loss estimation. The estimated losses related to this hazard are considered very low.

2010 Update

The HMP Sub-Committee again researched the expansive soils hazard as part of the 2010 update and found no new data that could enhance the loss estimation. The Sub-Committee continued to agree that state facilities were not at a substantial risk from the expansive soils hazard and therefore the estimated losses remain at or near $0 for all potential events.

4.6.8 Estimating Potential Losses of State Facilities to Straight-line Winds

Potential losses to state facilities resulting from high winds were estimated using recent historical data from the Arkansas Insurance Department. This data combines losses from high Straight-line winds and hail thus the loss estimates alone may slightly overestimate wind-only damage. Between 1994 and 2004, approximately 30 wind/hail events damaged 15 state structures resulting in losses of $934,058 (Table 4.6.8-1). Averaged over a 10-year period, the losses to state structures from Straight-line winds damage would be $93,407 annually (Table 4.6.8-1).

Table 4.6.8-1: Insured Losses resulting from high Straight-line Wind Events to State-owned and Operated Structures from July 1, 1994 through October 1, 2004.

Hazard	Date of Loss	Description	Total Incurred Loss	Avg. Annual Loss
Wind/Hail	7/1/94	Black River Technical College	$8,877	$888
Wind/Hail	3/14/95	Southern Arkansas University-Tech Branch	$12,435	$1,244
Wind/Hail	7/21/95	Cossatot Technical College	$959	$96
Wind/Hail	1/18/96	City of Conway	$142,132	$14,213
Wind/Hail	2/27/96	Arkansas Tech University	$46,500	$4,650
Wind/Hail	3/30/96	Southern Arkansas University	$175,936	$17,594
Wind/Hail	3/30/96	South Arkansas Community College	$3,553	$355
Wind/Hail	4/5/96	Northwest Arkansas Community College	$3,031	$303
Wind/Hail	4/19/96	Petit Jean College	$966	$97
Wind/Hail	4/21/96	City of Fayetteville	$7,483	$748
Wind/Hail	5/13/96	Arkansas State University-Mountain Home	$46,230	$4,623
Wind/Hail	9/26/96	Ouachita Technical College	$5,800	$580
Wind/Hail	11/6/96	University of Central Arkansas	$59,742	$5,974

Wind/Hail	11/25/96	City of Bentonville	$7,548	$755
Wind/Hail	2/20/97	City of Conway	$7,356	$736
Wind/Hail	3/1/97	Arkansas Employment Security Department	$2,119	$212
Wind/Hail	3/1/97	Arkansas Department of Parks and Tourism	$10,000	$1,000
Wind/Hail	3/1/97	Arkansas Department of Parks and Tourism	$250	$25
Wind/Hail	7/28/97	Arkansas State University-Newport	$6,010	$601
Wind/Hail	1/6/98	Arkansas Forestry Commission	$3,924	$392
Wind/Hail	2/10/98	South Arkansas Community College	$550	$55
Wind/Hail	3/5/99	Arkansas Teacher Retirement System	$2,016	$202
Wind/Hail	3/6/99	Arkansas Tech University at Ozark	$24,822	$2,482
Wind/Hail	4/26/99	Arkansas Game and Fish Commission	$2,230	$223
Wind/Hail	6/20/99	Southeast Arkansas College	$3,358	$336
Wind/Hail	7/20/00	Arkansas Plant Board	$581	$58
Wind/Hail	9/1/00	Department of Workforce Education	$12,183	$1,218
Wind/Hail	9/2/00	Cossatot Technical College	$71,618	$7,162
Wind/Hail	11/24/01	Arkansas Game and Fish Commission	$18,233	$1,823
Wind/Hail	4/30/02	Department of Human Services	$5,949	$595
Wind/Hail	5/6/03	Arkansas Department of Parks and Tourism	$39,367	$3,937
Wind/Hail	5/16/03	Henderson State University	$21,337	$2,134
Wind/Hail	5/16/03	Arkansas State University-Technical Center	$60,325	$6,033
Wind/Hail	5/16/03	Northwest Arkansas Community College	$5,652	$565
Wind/Hail	7/22/03	Crowley's Ridge Technical Institute	$9,756	$976
Wind/Hail	12/22/03	Arkansas Department of Parks and Tourism	$7,608	$761
Wind/Hail	4/21/04	Arkansas Tech University at Ozark	$16,225	$1,623
Wind/Hail	5/30/04	Arkansas Forestry Commission	$3,085	$309
Wind/Hail	6/2/04	Arkansas Hwy and Transportation Department	$12,018	$1,202
Wind/Hail	6/2/04	Arkansas Department of Parks and Tourism	$66,302	$6,630
Total			**$934,068**	**$93,407**

2007 Update

The AID databases listed the following damage reports for wind and hail. Many of these are listed in Table 4.6.8-1 from the original plan, however a number of new events have been recorded and the supplemental school loss data has been added to enhance this loss estimation analysis.

Table 4.6.8-2: 2007 Updated Losses to State Facilities for Wind Events

Description	Date of Loss	Agency	Location	Total Loss
Wind/Hail	06/18/2007	Lee County School District	Lee County	$ 30,000
Wind/Hail	05/18/2007	Harrison School District	Harrison	$ 5,000
Wind/Hail	05/09/2007	Carlisle School District	Carlisle	$ 3,500
Wind/Hail	04/18/2007	Riverview School District	Riverview	$ 14,904
Wind/Hail	03/01/2007	Helena - West Helena School District	Helena-West Helena	$ 26,010
Wind/Hail	02/24/2007	Helena - West Helena School District	Helena-West Helena	$ -

Wind/Hail	02/24/2007	Mansfield School District	Mansfield	$ -
Wind/Hail	11/30/2006	Lee County School District	Mariana	$ 2,500
Wind/Hail	11/10/2006	Watson Chapel School District	Pine Bluff	$ 9,789
Wind/Hail	08/21/2006	University of Central Arkansas	Conway	$ -
Wind/Hail	08/21/2006	Prairie Grove School District	Prairie Grove	$ 3,680
Wind/Hail	08/21/2006	Farmington School District	Farmington	$ 14,336
Wind/Hail	08/20/2006	Westside School District	Hartman	$ 7,624
Wind/Hail	08/04/2006	North Little Rock School District	North Little Rock	$ -
Wind/Hail	07/21/2006	Searcy School District	Searcy	$ 15,980
Wind/Hail	05/10/2006	Henderson State University	Arkadelphia	$ 35,876
Wind/Hail	05/10/2006	Pine Bluff School District	Pine Bluff, Arkansas	$ 8,158
Wind/Hail	05/10/2006	Altheimer Unified School District (Insured With Other Program)	Altheimer, Arkansas	$ 1,665
Wind/Hail	05/10/2006	DeWitt School District	Dewitt, Arkansas	$ 34,879
Wind/Hail	04/07/2006	DeWitt School District	Dewitt, Arkansas	$ -
Wind/Hail	04/02/2006	Rose Bud School District	Rosebud, Arkansas	$ 91,592
Wind/Hail	04/02/2006	Augusta School District	Augusta, Arkansas	$ 3,595
Wind/Hail	03/28/2006	Lead Hill School District	Lead Hill, Arkansas	$ 692
Wind/Hail	03/28/2006	Hackett School District	Hackett, Arkansas	$ 14,626
Wind/Hail	03/27/2006	Arkansas Geological Survey	Little Rock	$ -
Wind/Hail	03/19/2006	Department of Health and Human Services	Little Rock	$ -
Wind/Hail	03/12/2006	Farmington School District	Farmington, Arkansas	$ -
Wind/Hail	03/12/2006	Gravette School District	Gravette, Arkansas	$ -
Wind/Hail	03/09/2006	Arkansas Game and Fish Commission	Columbus	$ 9,497
Wind/Hail	03/09/2006	Arkansas State University - Newport	Newport	$ 16,708
Wind/Hail	03/09/2006	Department of Health and Human Services	Conway	$ 148,475
Wind/Hail	03/09/2006	Batesville School District	Batesville, Arkansas	$ 9,943
Wind/Hail	03/09/2006	Bergman School District	Bergman, Arkansas	$ -
Wind/Hail	03/09/2006	Cutter-Morning Star School District	Hot Springs, Arkansas	$ 35,247
Wind/Hail	03/09/2006	Cotter School District	Cotter, Arkansas	$ 3,710
Wind/Hail	03/09/2006	Calico Rock School District	Calico Rock, Arkansas	$ 16,649
Wind/Hail	03/09/2006	Lakeside School District	Hot Springs, Arkansas	$ -
Wind/Hail	03/09/2006	Kirby School District	Kirby, Arkansas	$ 13,892
Wind/Hail	03/09/2006	Paragould School District	Paragould, Arkansas	$ 45,419

Wind/Hail	03/09/2006	Greene County Tech School District	Paragould, Arkansas	$ -
Wind/Hail	03/09/2006	Flippin School District	Flippin, Arkansas	$ 1,790
Wind/Hail	03/08/2006	Henderson State University	Arkadelphia	$ -
Wind/Hail	02/16/2006	North Arkansas College	Harrison	$ 43,850
Wind/Hail	01/13/2006	Pine Bluff School District	Pine Bluff, Arkansas	$ 48,677
Wind/Hail	11/27/2005	Kirby School District	Kirby, Arkansas	$ 45,542
Wind/Hail	10/31/2005	Flippin School District	Flippin, Arkansas	$ 1,003
Wind/Hail	10/31/2005	Smackover School District	Smackover, Arkansas	$ 51,260
Wind/Hail	09/24/2005	Earle School District	Earl, Arkansas	$ 2,600
Wind/Hail	09/24/2005	Bryant School District	Paron, Arkansas	$ -
Wind/Hail	09/24/2005	Carlisle School District	Carlisle, Arkansas	$ 2,446
Wind/Hail	09/24/2005	Dermott School District	Dermott, Arkansas	$ 3,061
Wind/Hail	09/24/2005	Lakeside School District (Insured With Other Program)	Lake Village, Arkansas	$ 426,599
Wind/Hail	09/24/2005	North Little Rock School District	North Little Rock	$ 6,604
Wind/Hail	08/23/2005	Lee County School District	Mariana, Arkansas	$ 12,465
Wind/Hail	08/14/2005	Arkansas Department of Parks and Tourism	Murfreesboro	$ -
Wind/Hail	07/23/2005	Prairie Grove School District	Prairie Grove, Arkansas	$ -
Wind/Hail	07/22/2005	Greene County Tech School District	Paragould, Arkansas	$ -
Wind/Hail	07/15/2005	Lee County School District	Marianna, Arkansas	$ 4,744
Wind/Hail	07/14/2005	Carlisle School District	Carlisle, Arkansas	$ 19,219
Wind/Hail	07/04/2005	Crowley's Ridge Technical Institute	Forrest City	$ -
Wind/Hail	06/28/2005	Southeast Arkansas College	Pine Bluff	$ -
Wind/Hail	06/13/2005	Arkansas Department of Parks and Tourism	Westfork	$ -
Wind/Hail	04/06/2005	Earle School District	Earle, Arkansas	$ 5,000
Wind/Hail	03/21/2005	Southern Arkansas University	Magnolia	$ -
Wind/Hail	02/07/2005	Altheimer Unified School District (Insured With Other Program)	Altheimer, Arkansas	$ 6,138
Wind/Hail	01/22/2005	Bergman School District	Bergman, Arkansas	$ 2,000
Wind/Hail	12/06/2004	Lakeside School District (Insured With Other Program)	Lake Village, Arkansas	$ 10,196
Wind/Hail	08/26/2004	Lakeside School District (Insured With Other Program)	Lake Village, Arkansas	$ 6,550
Wind/Hail	07/15/2004	Carlisle School District	Carlisle, Arkansas	$ 3,075
Wind/Hail	07/13/2004	Earle School District	Earle, Arkansas	$ 3,766
Wind/Hail	07/02/2004	Northwest Arkansas Community College	Bentonville	$ -
Wind/Hail	07/02/2004	Bergman School District	Bergman, Arkansas	$ 12,453
Wind/Hail	06/13/2004	Westside School District	Coal Hill, Arkansas	$ 2,614

Wind/Hail	06/06/2004	DeWitt School District	DeWitt, Arkansas	$ 4,430
Wind/Hail	06/02/2004	Arkansas Game and Fish Commission	Columbus	$ -
Wind/Hail	06/02/2004	Arkansas Highway and Transportation Department	Hope	$ 12,018
Wind/Hail	06/02/2004	Southern Arkansas University		$ -
Wind/Hail	06/02/2004	Arkansas Department of Workforce Services		$ -
Wind/Hail	06/02/2004	Arkansas Department of Parks and Tourism	Old Washington	$ 66,302
Wind/Hail	06/02/2004	Nevada School District	Rosston, Arkansas	$ 45,878
Wind/Hail	06/01/2004	Lakeside School District (Insured With Other Program)	Lake Village, Arkansas	$ 29,976
Wind/Hail	05/30/2004	Arkansas Agriculture Department - Forestry Commission	Little Rock	$ 3,085
Wind/Hail	04/21/2004	Arkansas Tech University - Ozark Campus	Ozark	$ 16,225
Wind/Hail	04/10/2004	Department of Health and Human Services	Alexander	$ -
Wind/Hail	12/22/2003	Arkansas Department of Parks and Tourism	Hope	$ 7,608
Wind/Hail	07/22/2003	Crowley's Ridge Technical Institute	Forrest City	$ 9,756
Wind/Hail	05/16/2003	Henderson State University	Arkadelphia	$ 21,337
Wind/Hail	05/16/2003	Arkansas State University - Technical Center	Marked Tree	$ 60,325
Wind/Hail	05/16/2003	Northwest Arkansas Community College	Bentonville	$ 5,652
Wind/Hail	05/06/2003	Arkansas Department of Parks and Tourism	Mammoth Springs	$ 39,367
Wind/Hail	04/30/2002	Department of Health and Human Services		$ 5,949
Wind/Hail	11/24/2001	Arkansas Game and Fish Commission		$ 18,233
Wind/Hail	09/02/2000	Cossatot Technical College (Not Currently Insured)		$ 71,618
Wind/Hail	09/01/2000	Department of Workforce Education		$ 12,183
Wind/Hail	07/20/2000	Arkansas Agriculture Department - Plant Board		$ 581
Wind/Hail	06/20/1999	Southeast Arkansas College		$ 3,358
Wind/Hail	04/26/1999	Arkansas Game and Fish Commission		$ 2,230
Wind/Hail	03/06/1999	Arkansas Tech University - Ozark Campus		$ 24,822
Wind/Hail	03/05/1999	Arkansas Teacher Retirement System (Not Currently Insured)		$ 2,016
Wind/Hail	02/10/1998	South Arkansas Community College		$ 550
Wind/Hail	01/06/1998	Arkansas Agriculture Department - Forestry Commission		$ 3,924
Wind/Hail	07/28/1997	Arkansas State University - Newport		$ 6,010
Wind/Hail	03/01/1997	Arkansas Department of Workforce Services		$ 2,119
Wind/Hail	03/01/1997	Arkansas Department of Parks and Tourism		$ 250
Wind/Hail	03/01/1997	Arkansas Department of Parks and Tourism		$ 10,000

Wind/Hail	02/20/1997	City of Conway (Not Currently Insured)		$ 7,356
Wind/Hail	11/25/1996	City of Bentonville (Not Currently Insured)		$ 7,548
Wind/Hail	11/06/1996	University of Central Arkansas		$ 59,742
Wind/Hail	09/26/1996	Ouachita Technical College		$ 5,800
Wind/Hail	05/13/1996	Arkansas State University - Mountain Home		$ 46,230
Wind/Hail	04/21/1996	City of Fayetteville (Not Currently Insured)		$ 7,483
Wind/Hail	04/19/1996	Petit Jean College		$ 966
Wind/Hail	04/05/1996	Northwest Arkansas Community College		$ 3,031
Wind/Hail	03/30/1996	Southern Arkansas University		$ 175,936
Wind/Hail	03/30/1996	South Arkansas Community College		$ 3,553
Wind/Hail	02/27/1996	Arkansas Tech University		$ 46,500
Wind/Hail	01/18/1996	City of Conway (Not Currently Insured)		$ 142,132
Wind/Hail	07/21/1995	Cossatot Technical College (Not Currently Insured)		$ 959
Wind/Hail	03/14/1995	Southern Arkansas University-Technical Branch		$ 12,435
Wind/Hail	07/01/1994	Black River Technical College		$ 8,877
TOTAL				**$ 2,359,947**

With the addition of these reports, the following statistics were calculated.

- The total incurred losses for state-owned facilities equal $2,359,947.
- There were 120 damaged facilities. The average loss per facility equals $19,666.
- There were 82 wind/hail events. The average loss per event equals $28,779.
- This data covers the 13-year period from 1994 through 2007. The average annual loss equals $181,534.

The HMP Sub-Committee determined that this historical evidence is the best available data for estimating losses in the future related to Straight-line winds and hail events.

2010 Update

The AID database does lists the following structures being damaged by Straight-line winds from 2007 to 2010.

Table 4.6.8-3: 2010 Updated Losses to State Facilities for Wind Events

Description	Date of Loss	Agency	Location	Total Incurred
Wind/Hail	10/17/2007	Arkansas Agriculture Department - Forestry Commission	El Dorado	-
Wind/Hail	11/14/2007	Arkansas Department of Correction	Pine Bluff	48,848.00
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Mt. Magazine	6,271.59
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Lake Ouachita	765.05
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Lake Frierson	22.08
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Lake Dardanelle	11,490.60
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Jacksonport	30.35
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Bull Shoals	-
Wind/Hail	01/29/2008	Arkansas Department of Correction	Luxora	-
Wind/Hail	01/29/2008	Arkansas Tech University	Russellville	23,821.93
Wind/Hail	01/29/2008	Arkansas Northeastern College	Blytheville	15,000.00
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Petit Jean	835.05
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Toltec Mounds	417.53
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	White Oak	417.53
Wind/Hail	01/29/2008	Arkansas Department of Parks and Tourism	Parkin	626.29
Wind/Hail	02/05/2008	Arkansas Department of Correction	Pine Bluff	47,716.29
Wind/Hail	03/03/2008	Department of Human Services	Benton	8,095.87
Wind/Hail	03/31/2008	Arkansas Department of Community Correction	Texarkana	51,286.81
Wind/Hail	04/03/2008	Arkansas Highway and Transportation Department	Van Buren	-
Wind/Hail	04/09/2008	Arkansas Building Authority	Ft. Smith	158,000.00
Wind/Hail	05/02/2008	Northwest Arkansas Community College	Bentonville	8,637.72
Wind/Hail	05/10/2008	Arkansas Highway and Transportation Department	Stuttgart	87,357.05
Wind/Hail	09/08/2008	Arkansas Department of Parks and Tourism	Dardanelle	-
Wind/Hail	09/14/2008	Northwest Technical Institute	Springdale	-
Wind/Hail	09/14/2008	Arkansas State University - Other Locations	Piggott	-
Wind/Hail	02/11/2009	Arkansas Department of Parks and Tourism	Morrilton	59,499.26
Wind/Hail	02/11/2009	Arkansas Tech University	Russellville	40,500.74
Wind/Hail	04/09/2009	Rich Mountain Community College	Mena	

				2,800,000.00
Wind/Hail	04/09/2009	Pulaski Technical College	North Little Rock	-
Wind/Hail	06/12/2009	Crowley's Ridge Technical Institute	Forrest City	5,702.69
Wind/Hail	06/12/2009	University of Central Arkansas	Conway	-
Wind/Hail	06/30/2009	Contractors Licensing Board	North Little Rock	40,000.00
Wind/Hail	06/30/2009	Arkansas Department of Correction	Grady	-
Wind/Hail	07/30/2009	Arkansas Department of Correction	Cummins	-
Wind/Hail	09/22/2009	University of Central Arkansas	Conway	14,223.94
Wind/Hail	09/22/2009	Henderson State University	Arkadelphia	-
Wind/Hail	10/15/2009	Arkansas Game and Fish Commission	Sugar Grove	-
Wind/Hail	10/29/2009	Arkansas Department of Parks and Tourism	McNeil	25,000.00
Wind/Hail	10/29/2009	Arkansas Highway and Transportation Department	McGehee	-
Wind/Hail	10/29/2009	Southern Arkansas University-Technical Branch	East Camden	4,200,000.00
Wind/Hail	10/29/2009	Pulaski Technical College	North Little Rock	-
Wind/Hail	12/24/2009	Arkansas Tech University	Russellville	-
Totals				$7,754,557

- The total incurred losses for state-owned facilities equal $7,754,557.
- There were 44 damaged facilities. The average loss per facility equals $176,239.
- There were 44 wind/hail events. The average loss per event equals $180,338.
- This data covers the 3-year period from 2007 through 2010. The average annual loss equals $2,584,852.

4.6.9 Estimating Potential Losses of State Facilities to Drought

Based on Arkansas Insurance Department data, drought has not affected insured state facilities in the past 10 years, nor are historical drought losses to state structures known. Because drought effects are generally to water resources and agriculture rather than structures, the potential losses to state facilities to drought are considered to be near $0.

2007 Update

The HMP Sub-Committee reassessed the drought hazard as part of the 2007 update and found no new data that could enhance the loss estimation. The Sub-Committee continued to agree that state facilities were not at risk from the drought hazard and therefore the estimated losses remain at or near $0 for all potential events.

2010 Update

The HMP Sub-Committee again reassessed the drought hazard as part of the 2010 update and found no new data that could enhance the loss estimation. The Sub-Committee continued to agree that state facilities were not at risk from the drought hazard and therefore the estimated losses remain at or near $0 for all potential events.

4.6.10 Estimating Potential Losses of State Facilities to Thunderstorms, Hail and Lightning

This hazard was identified and added as part of the previous plan revision. Therefore there was no existing loss estimation for this hazard. The HMP Sub-Committee has determined that the following loss estimation must be considered along with the separate loss estimations for tornadoes, flooding and Straight-line winds.

Potential losses to state facilities resulting from this hazard were estimated using recent historical data from the Arkansas Insurance Department. The loss estimations for Straight-line winds were based on the AID data for "winds/hail" so this estimation is considered valid and complementary to this analysis for the potential losses from hail. Also the estimations for "water" for the flooding section and for tornadoes all relate to this analysis.

The data below details the losses from lightning. Between 1994 and 2007, approximately 91 lightning events damaged 102 state structures resulting in losses of $769,855 (Table 4.6.10-1). Averaged over a 13-year period, the losses to state structures from lightning damage would be $59,219 annually (Table 4.6.10-1).

Table 4.6.10-1: Insured Losses resulting from Lightning Strikes to State-owned and Operated Structures from July 1, 1994 through July 14, 2007.

Date of Loss	Agency	Location	Total Loss	Average Annual Loss
07/03/2007	North Little Rock School District	North Little Rock	$ -	$ -
05/15/2007	Riverview School District	Riverview	$ 2,000	$ 154
04/14/2007	Beebe School District	Beebe	$ 3,000	$ 231
04/13/2007	Department of Arkansas Heritage - Historic Arkansas Museum	Little Rock	$ 6,791	$ 522
03/01/2007	Beebe School District	Beebe	$ 2,181	$ 168
09/27/2006	North Little Rock School District	North Little Rock	$ 285	$ 22
09/22/2006	Flippin School District	Flippin	$ 606	$ 47
08/28/2006	Smackover School District	Smackover	$ 4,606	$ 354
08/21/2006	Arkansas Department of Emergency Management	Conway	$ -	$ -
08/20/2006	West Fork School District	West Fork	$ 647	$ 50
08/12/2006	Poyen School District	Poyen	$ 9,878	$ 760
07/23/2006	War Memorial Stadium Commission	Little Rock	$ -	$ -
05/03/2006	Searcy School District	Searcy, Arkansas	$ 12,107	$ 931
04/20/2006	Lakeside School District	Hot Springs, Arkansas	$ 28,706	$ 2,208
04/13/2006	Lake Hamilton School District	Percy, Arkansas	$ -	$ -
04/03/2006	Palestine-Wheatley School District	Palestine, Arkansas	$ 4,875	$ 375
04/01/2006	Arkansas Department of Correction	Pine Bluff	$ -	$ -
03/13/2006	Magnet Cove School District	Malvern, Arkansas	$ 5,100	$ 392

10/17/2005	Helena - West Helena School District	Helena, Arkansas	$ -	$ -
10/03/2005	Mansfield School District	Mansfield, Arkansas	$ -	$ -
09/28/2005	Riverview School District	Riverview, Arkansas	$ 2,220	$ 171
09/24/2005	Harrison School District	Harrison, Arkansas	$ 9,957	$ 766
09/24/2005	North Little Rock School District	North Little Rock	$ 8,250	$ 635
09/23/2005	North Little Rock School District	North Little Rock	$ 1,902	$ 146
09/14/2005	Huntsville School District	Huntsville, Arkansas	$ 6,185	$ 476
08/23/2005	North Little Rock School District	North Little Rock	$ -	$ -
08/23/2005	North Little Rock School District	North Little Rock	$ 1,085	$ 83
08/23/2005	Pine Bluff School District	Pine Bluff, Arkansas	$ -	$ -
08/23/2005	North Little Rock School District	North Little Rock	$ 625	$ 48
08/15/2005	North Little Rock School District	North Little Rock	$ 3,487	$ 268
08/06/2005	Arkansas Department of Veterans Affairs	Little Rock	$ -	$ -
07/21/2005	Arkansas Department of Parks and Tourism	Hot Springs	$ 18,821	$ 1,448
07/19/2005	Arkansas Department of Emergency Management	Conway	$ -	$ -
07/16/2005	Office of Secretary of State	Little Rock	$ -	$ -
06/27/2005	Palestine-Wheatley School District	Palestine, Arkansas	$ 9,889	$ 761
06/17/2005	Lake Hamilton School District	Pearcy, Arkansas	$ 1,199	$ 92
06/09/2005	Walnut Ridge School District (Insured With Other Program)	Walnut Ridge, Arkansas	$ 6,543	$ 503
06/07/2005	Arkansas Department of Correction	Benton	$ -	$ -
05/25/2005	Lake Hamilton School District	Pearcy, Arkansas	$ 3,442	$ 265
05/23/2005	Elkins School District	Elkins, Arkansas	$ 18,166	$ 1,397
05/22/2005	Northwest Technical Institute	Springdale	$ -	$ -
04/29/2005	Rose Bud School District	Rosebud, Arkansas	$ -	$ -
04/26/2005	Arkansas Educational Television Commission		$ -	$ -
04/21/2005	Walnut Ridge School District (Insured With Other Program)	Walnut Ridge, Arkansas	$ 4,132	$ 318
03/25/2005	Riverview School District	Searcy, Arkansas	$ 1,939	$ 149
03/21/2005	Parkers Chapel School District	El Dorado, Arkansas	$ 1,700	$ 131
02/22/2005	Cedarville School District	Cedarville, Arkansas	$ -	$ -
11/23/2004	Arkansas State Police Commission	Little Rock	$ 17,239	$ 1,326
11/23/2004	Arkadelphia School District	Arkadelphia, Arkansas	$ 16,785	$ 1,291
11/11/2004	Arkansas Department of Environmental Quality	Little Rock	$ 4,339	$ 334
10/30/2004	Lake Hamilton School District	Pearcy, Arkansas	$ 2,789	$ 215

10/18/2004	Crowley's Ridge Technical Institute	Forrest City	$ -	$ -
10/18/2004	Department of Health and Human Services	Jonesboro	$ -	$ -
08/09/2004	Warren School District (Insured With Other Program)	Warren, Arkansas	$ 17,365	$ 1,336
07/28/2004	Mansfield School District	Mansfield, Arkansas	$ 1,883	$ 145
07/16/2004	Arkansas Game and Fish Commission	Little Rock	$ -	$ -
07/16/2004	Pine Bluff School District	Pine Bluff, Arkansas	$ -	$ -
07/15/2004	Riverview School District	Searcy, Arkansas	$ 8,060	$ 620
07/15/2004	Elkins School District	Elkins, Arkansas	$ 3,019	$ 232
07/13/2004	Palestine-Wheatley School District	Palestine, Arkansas	$ 8,575	$ 660
07/12/2004	Carlisle School District	Carlisle, Arkansas	$ 2,467	$ 190
07/04/2004	Farmington School District	Farmington, Arkansas	$ 6,254	$ 481
07/04/2004	Huntsville School District	Huntsville, Arkansas	$ 8,880	$ 683
07/02/2004	Hackett School District	Hackett, Arkansas	$ 3,148	$ 242
06/22/2004	North Little Rock School District	North Little Rock	$ 1,594	$ 123
06/11/2004	North Little Rock School District	North Little Rock	$ 5,139	$ 395
06/08/2004	Lake Hamilton School District	Pearcy, Arkansas	$ 17,986	$ 1,384
06/06/2004	Pulaski Technical College	North Little Rock	$ 2,272	$ 175
08/30/2003	Arkansas Department of Emergency Management	Little Rock	$ 25,912	$ 1,993
06/11/2003	Arkansas Agriculture Department - Forestry Commission	Malvern	$ 21,710	$ 1,670
03/17/2002	Arkansas Department of Emergency Management		$ 2,123	$ 163
07/12/2001	Arkansas Agriculture Department - Forestry Commission		$ 62,160	$ 4,782
05/27/2001	Southeast Arkansas College		$ 5,107	$ 393
05/26/2001	Henderson State University		$ 32,988	$ 2,538
04/03/2001	East Arkansas Community College		$ 6,031	$ 464
06/17/2000	Henderson State University		$ 13,325	$ 1,025
05/06/2000	Pulaski Technical College		$ 7,290	$ 561
07/27/1999	Arkansas Agriculture Department - Forestry Commission		$ 2,951	$ 227
04/03/1999	South Arkansas Community College		$ 21,909	$ 1,685
03/05/1999	Pulaski Technical College		$ 356	$ 27
08/05/1998	University of Central Arkansas		$ 3,816	$ 294
07/27/1998	Pulaski Technical College		$ 166	$ 13
06/11/1998	Arkansas Tech University - Ozark Campus		$ 5,951	$ 458
03/30/1998	Department of Health and Human Services - Health Department		$ 19,050	$ 1,465

03/05/1998	Arkansas Department of Emergency Management		$ 8,738	$ 672
01/08/1998	Department of Health and Human Services - Health Department		$ 4,445	$ 342
10/31/1997	Pulaski Technical College		$ 12,010	$ 924
08/18/1997	Pulaski Technical College		$ 8,600	$ 662
07/14/1997	Department of Information Systems		$ 733	$ 56
07/10/1997	Pulaski Technical College		$ 9,515	$ 732
07/10/1997	Arkansas Department of Parks and Tourism		$ 58,371	$ 4,490
06/30/1997	Pulaski Technical College		$ 4,003	$ 308
06/27/1997	University of Central Arkansas		$ 24,248	$ 1,865
06/16/1997	Arkansas Department of Emergency Management		$ 7,050	$ 542
03/01/1997	Pulaski Technical College		$ 24,488	$ 1,884
11/25/1996	East Arkansas Community College		$ 2,521	$ 194
07/29/1996	Arkansas Northeastern College		$ 6,721	$ 517
07/29/1996	Department of Health and Human Services		$ 28,488	$ 2,191
05/27/1996	Rice Belt Vo - Tech (Not Currently Insured)		$ 2,580	$ 198
04/14/1996	Arkansas State University - Beebe		$ 23,603	$ 1,816
05/13/1995	Arkansas State Police Commission		$ 3,136	$ 241
07/12/1994	Arkansas State Police Commission		$ 1,647	$ 127
			$ 769,855	**$ 59,220**

From the report on the previous page, the following statistics were calculated.

- The total incurred losses for state-owned facilities equal $769,855.
- There were 102 damaged facilities. The average loss per facility equals $7,547.
- There were 91 lightning events. The average loss per event equals $8,459.
- This data covers the 13 year period from 1994 through 2007. The average annual loss equals $59,220

The HMP Sub-Committee determined that this historical evidence is the best available data for estimating losses in the future related to lightning events. Losses related to hail are estimated in the previous section since the AID categorized hail along with winds.

2010 Update

Potential losses to state facilities resulting from this hazard were estimated using recent historical data from the Arkansas Insurance Department. The loss estimations for Straight-line winds were based on the AID data for “winds/hail” so this estimation is considered valid and complementary to this analysis for the potential losses from hail. Also the estimations for “water” for the flooding section and for tornadoes all relate to this analysis.

Table 2.6.10-2: 2010 Update Losses to State Facilities for Lightning

Description	Date of Loss	Agency Code	Agency	Location	Total Incurred
Lightning	07/17/2007	120A	Arkansas State University - Beebe	Beebe	-
Lightning	04/22/2008	063	Office of Secretary of State	Little Rock	-
Lightning	03/28/2009	480	Arkansas Department of Correction	Calico Rock	50,000
Lightning	05/01/2009	480	Arkansas Department of Correction	Tucker	-
Lightning	05/13/2009	440	Arkansas Oil and Gas Commission	El Dorado	-
Lightning	06/11/2009	193	South Arkansas Community College	El Dorado	28,094
Lightning	07/17/2007	120A	Arkansas State University - Beebe	Beebe	-
Totals					$78,094

4.6.11 Estimating Potential Losses of State Facilities to Hazardous Material Events

The HMP Sub-Committee has considered various methods for estimating potential losses to state facilities and has determined that the best method is to review historical events and losses and extrapolate this to produce an estimate of future losses. Based on historical data, there is no evidence of state facilities being impacted by hazardous material events. Therefore, the potential losses to state facilities because of HAZMAT events are considered to be near $0.

2010 Update

The HMP Sub-Committee again researched the hazardous materials hazard and found no new data to enhance this loss estimation. The estimated losses of state facilities related to this hazard are considered very low and are still considered to be at or near $0 for future events.

4.6.12 Estimating Potential Losses of State Facilities to Nuclear Events

The HMP Sub-Committee has considered various methods for estimating potential losses to state facilities and has determined that the best method is to review historical events and losses and extrapolate this to produce an estimate of future losses. Based on historical data, there is no evidence of state facilities being impacted by nuclear events. Therefore, the potential losses to state facilities because of nuclear events are considered to be near $0.

2010 Update

The HMP Sub-Committee again researched the nuclear event hazard and found no new data to enhance this loss estimation. The estimated losses of state facilities related to this hazard are still considered very low and are still considered to be at or near $0 for future events.

4.6.13 Estimating Potential Losses of State Facilities to Terrorism Events

The HMP Sub-Committee has considered various methods for estimating potential losses to state facilities and has determined that the best method is to review historical events and losses and extrapolate this to produce an estimate of future losses. Based on historical data, there is no evidence of state facilities being impacted by terrorist events. Therefore, the potential losses to state facilities because of terrorist events are considered to be near $0.

2010 Update

The HMP Sub-Committee again researched the terrorism hazard and found no new data to enhance this loss estimation. The estimated losses of state facilities related to this hazard are still considered very low and are still considered to be at or near $0 for future events.

4.6.14 Estimating Potential Losses of State Facilities to Biological Events

The HMP Sub-Committee has considered various methods for estimating potential losses to state facilities and has determined that the best method is to review historical events and losses and extrapolate this to produce an estimate of future losses. Based on historical data, there is no evidence of state facilities being impacted by biological events. Therefore, the potential losses to state facilities because of biological events are considered to be near $0.

2010 Update

The HMP Sub-Committee again researched the biological event hazard and found no new data to enhance this loss estimation. The estimated losses of state facilities related to this hazard are considered very low and are still considered to be at or near $0 for future events.

All Hazard Mitigation Plan
State of Arkansas

Chapter 5 – Mitigation Strategy

Updated September 2, 2010

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Section 5: Mitigation Strategies

5.1 Hazard Mitigation Goals

Hazard Mitigation Goals	
IFR REQUIREMENT 201.4(c)(3)(i):	[The mitigation strategy shall include] a description of State goals to guide the selection of activities to mitigate and reduce potential losses.
Explanation:	The State's goals as written in the plan reflect the State's vision for long-term hazard mitigation and loss reduction. This section *should* describe how the plan's goals were developed. These goals, along with their corresponding objectives, guide the development and implementation of mitigation actions. Although the Rule does not require a description of objectives, States are highly encouraged to include a description of the objectives developed to achieve the goals so that reviewers understand the connection between goals, objectives, and actions. The goals and objectives should: ▪ Be based on the findings of the local and State risk assessments. ▪ Represent a long-term vision for hazard reduction or enhancement of mitigation capabilities.

In developing the goals, objectives and action items, the State Hazard Mitigation Planning Sub-Committee considered the following:

The mission of the Arkansas Department of Emergency Management:

"Arkansas Code Annotated (ACA) 1275101 et al) directs the Arkansas Department of Emergency Management to maintain a management system that effectively and efficiently provides mitigation of and recovery from the effects of natural and man caused disasters. This goal is accomplished through a series of programs designed to identify all disasters threatening the State; assist state agencies, local governments, volunteer and other organizations in determining the means to mitigate disaster effects; develop procedures for fast and efficient deployment of identified resources to effectuate mitigation and recovery; continually exercise all plans, evaluate results and make modifications to ensure procedures are effective; and, coordinate the efforts of all organizations responding to disasters."

The mission of the State of Arkansas All Hazard Mitigation Plan:

"To make Arkansans' communities, businesses, local governments, and state agencies less vulnerable to the effects of natural, man-made, and technological hazards through a coordinated approach to mitigation policy and state and local mitigation planning activities."

The mission of the State of Arkansas Department of Health:

"To promote public health policies and practices that assures a healthy quality of life for Arkansans. To be the recognized leaders in public health, and to work with communities to build a healthy future. The Arkansas Department of Health and Human Services and Centers for Disease Control (CDC) work together to protect and prepare Arkansans in the event of a bioterrorism attack."

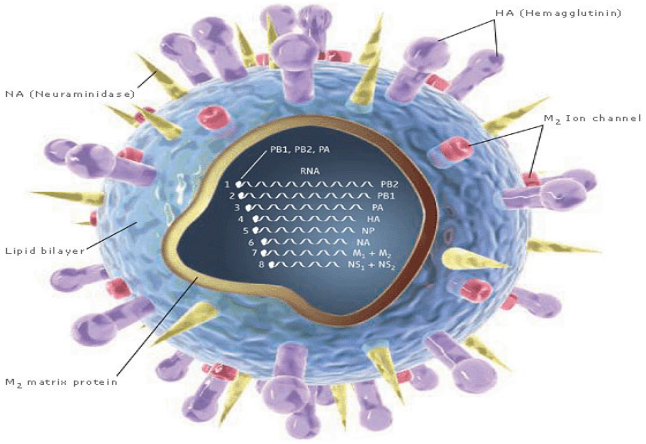

Illustration: Chris Bickel/Science. Reprinted with permission from Science Vol. 312, page 380 (21 April 2006) © 2006 by AAAS

The Arkansas Department of Emergency Management is committed to the All-Hazard Mitigation planning approach. Goals and objectives in the plan must reflect current damage analysis as well as priorities reflected in local risk assessments. The state's mitigation goals and objectives will address the hazards that received the highest threat rating. These hazards include flooding, tornadoes, earthquakes, winter weather, and severe storms. The HMP Sub-Committee has also considered the EMAP standards for mitigation in the development of this mitigation strategy. The details of the EMAP Mitigation Standards are listed below:

EMAP Standard 5.4: Hazard Mitigation

A. The intent of a hazard mitigation program is to target resources and prioritize mitigation activities to lessen the effects of disasters to citizens, communities, businesses and industries.

B. The entity shall develop and implement a strategy to eliminate hazards or mitigate the effects of hazards that cannot be eliminated.

C. The program participates in federal, state/territorial and local mitigation programs.

D. The program identifies on-going mitigation opportunities.

E. The program has the capability to track repetitive loss.

F. The program provides incentives to encourage mitigation activities sponsored by public/private partnerships.

G. The program implements mitigation projects according to a plan that sets priorities based upon loss reduction.

H. The program provides technical assistance in developing, adopting, and implementing building codes, fire codes, and land-use ordinances.

I. The mitigation strategy shall be based on the results of hazard identification and risk assessment, impact analysis, program assessment, operational experience and cost-benefit analysis. The program's mitigation strategy is based upon the following:

1. Identification of the hazards most likely to affect the jurisdiction.

2. The risk those hazards pose to the jurisdiction.

3. The consequences of those hazards to the functions and services provided by the jurisdiction.

4. The administrative and fiscal capability of the jurisdiction to support the mitigation strategy.

5. The operational experience of the jurisdiction to implement the strategy.

6. Cost-benefit analysis of the strategy.

7. For purposes of EMAP, impact analysis means consequence analysis.

J. The mitigation strategy shall consider, but is not be limited to, the following:

1. The use of applicable building construction standards.

2. Hazard avoidance through appropriate land-use practices.

3. Relocation, retrofitting, or removal of structures at risk.

4. Removal or elimination of the hazard.

5. Reduction or limitation of the amount or size of the hazard.

6. Segregation of the hazard from that which is to be protected.

7. Modification of the basic characteristics of the hazard.

8. Control of the rate of release of the hazard.

9. Provision of protective systems or equipment for both cyber and physical risks.

10. Establishment of hazard warning and communication procedures.

11. Redundancy or duplication of essential personnel, critical systems, equipment, information, operations, and materials.

12. The mitigation strategy shall address consequences of hazards identified by the program.

Mitigation Goals and Objectives

The Hazard Mitigation Planning Sub-Committee framed the State Hazard Mitigation Goals and Objectives contained in this section during several visioning sessions moderated by staff from the Arkansas Department of Emergency Management. During the initial meeting, Sub-Committee members were provided with a set of mitigation categories developed by the ADEM Mitigation Branch as an aid in categorizing proposed mitigation activities. The categories covered broad classes of operational necessities such as education and training, coordination between state agencies, coordination with local governments, volunteer organizations and the private sector and technical assistance.

The HMP Sub-Committee members, along with the ADEM staff, then used the results to rough out a series of goals and objectives, which were presented to the overall planning team at the subsequent meetings and further refined to their current form. This process allowed for the testing of the validity of the projects based on the goals and objectives, and the validity of the goals and objectives based on the projects. Where objectives have no implemented programs, new programs can be designed and where programs cannot be linked to specific objectives, new objectives can be considered.

The following goals and objectives for hazard mitigation were established from the State Hazard Mitigation Planning Sub-Committee's discovery and deliberation process. The goals represent a vision for hazard mitigation and disaster resistance for the state government of Arkansas. Each mitigation goal and objective was reviewed and approved by the Governor's Pre-Disaster Mitigation Advisory Council and the Governor's Earthquake Advisory Council during a meeting held on January 20th, 2010 in Little Rock, Arkansas. The Sub-Committee assessed the mitigation goals and objectives from the 2007 update plan during the 2010 update process. The Sub-Committee agreed that the previous listing of goals remained valid. Some slight revisions were made to the existing goals and are included below.

GOAL 1: The reduction of vulnerability in Arkansas to all hazards and the promotion of sustainable infrastructure and environment.

> **Mitigation Objective 1.1:** Research and participate in all appropriate federal programs related to disaster planning and mitigation including FEMA, DHS, CDC, and others.

Mitigation Objective 1.2: Hold regular meetings to communicate mitigation goals, objectives and actions with state, county and local jurisdictions and stakeholders from the private sector.
Mitigation Objective 1.3: Institutionalize hazard mitigation by educating and assisting The Governor's Office and The Arkansas General Assembly in developing policies and state legislation that will further hazard mitigation and sustainability.

Mitigation Objective 1.4: Expand mitigation opportunities throughout Arkansas.

Mitigation Objective 1.5: Promote NFIP compliance as the major starting point for any community serious about hazard mitigation.

Mitigation Objective 1.6: Coordinate with non-profit organizations that engage in emergency response or planning activities or are responsible for promoting and or implementing sustainable development or "smart growth" initiatives.

GOAL 2: Identify mitigation grant opportunities for state and local governments, their sub-jurisdictions and the general public, and provide effective technical support.

Mitigation Objective 2.1: Provide direct technical assistance to local public officials and help local jurisdictions to obtain funding for mitigation planning and project activities.

Mitigation Objective 2.2: Provide floodplain management resources.

Mitigation Objective 2.3: Allocate federal and state grant funding to local jurisdictions for the purpose of implementing local mitigation plans and eligible hazard mitigation projects.

GOAL 3: Offer training, education, and technical assistance to local jurisdictions as they develop local hazard mitigation plans and mitigation projects.

Mitigation Objective 3.1: The state will work with local jurisdictions to improve the local hazard mitigation planning process including technical assistance in developing, adopting, and implementing building codes, fire codes, and land-use ordinances.
Mitigation Objective 3.2: Increase awareness and knowledge of hazard mitigation principles and practices among local public officials.

GOAL 4: Formulate objectives using state of the art knowledge to reduce vulnerability to all identified hazards.

Mitigation Objective 4.1: Maximize the utilization of best-available technology.

Mitigation Objective 4.2: Cooperate and coordinate with partners at all government levels in planning and use of best technology.

Mitigation Objective 4.3: Identify and track repetitive losses from all hazards and analyze this data to prevent future losses.

Mitigation Objective 4.4: Develop a methodology for identifying, prioritizing and implementing new mitigation activities based largely on loss reduction criteria.

Mitigation Objective 4.5: Develop and monitor any mitigation data deficiencies referenced in the current state mitigation plan.

Source: FEMA

5.2 State Capability Assessment

State Capability Assessment	
IFR REQUIREMENT 201.4(c)(3)(ii):	[The State mitigation strategy shall include] a discussion of the State's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: - an evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas: [and] - a discussion of State funding capabilities for hazard mitigation projects.
Explanation:	The State **shall** include a discussion of its financial, legal, and programmatic ability to carry out mitigation actions in the pre-and post-disaster setting to achieve its mitigation objectives and, ultimately, its goals. The mitigation strategy *should* not only address the ways the State's existing capabilities can aid the mitigation effort, but also address areas in which the State needs to strengthen its capabilities. Without an assessment of the State's capability, implementation of the plan could stall from inadequate resources. The State **shall** conduct an evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas. The State *should* discuss existing and emerging State policies and programs for both pre- and post-disaster mitigation. The discussions *should* include: implementation opportunities and problems (e.g., financial/staffing resources, lack of informed public, non-mandated improvements, etc.), opportunities for improving State capabilities, conflicts created by public investment policies (e.g., policies that have promoted public investment in hazard-prone areas), and problems created by private development projects in hazard-prone areas. The State *should* highlight implementation tools, policies, and programs that have proven to be effective in achieving mitigation objectives (e.g., planning legislation requiring integration of mitigation actions in comprehensive plans). The State *should* also identify those laws, regulations, and policies that can be amended to integrate mitigation actions or to remove provisions that hinder mitigation efforts. The State **shall** describe its assessment of its funding capabilities for hazard mitigation projects. The discussion *should* include positive aspects, as well as problems encountered, and identify areas where the State needs to seek outside funding sources.

In the 2010 update, The Hazard Mitigation Planning Sub-Committee worked with the staff of the Mitigation Branch of ADEM and many of the state agencies to evaluate the state laws, regulations, policies, and state-funded or administered programs related to hazard mitigation and development in hazard-prone areas. As part of the process, all of these agencies were contacted in order to re-assess the overall state capabilities in terms of hazard mitigation. This state capability assessment section was updated to reflect this new data collected from the agencies. Modifications to this section include the addition of new programs as well as updates to information about the existing programs.

Capability Assessment Highlights

Although it is recognized that Arkansas leads the nation in providing state funds for mitigation activities, there are many policies and programs that need to be addressed. Legislative needs include requiring safe rooms to be added to all new school construction, new mobile home parks, and new public housing, requiring all local governments to adopt the new International Building Code, and strengthening current land use legislation to require developers to account for runoff and any environmental degradation. State capabilities could also be improved by requiring that all local governments become members of the NFIP as a requirement for any state mitigation funding.

Among the best examples of hazard mitigation in state government are the Arkansas Hazard Mitigation Program, the Arkansas Safe Room/Shelter Program, the FEMA-funded state administered hazard mitigation programs, and The Department of Health and Human Services – Bioterrorism Preparedness Program. These are described in some detail below. There are, however, numerous other programs, funding sources, executive orders, policies, and regulations that support or facilitate hazard mitigation in the state. These are described in the sections below.

Arkansas Hazard Mitigation Program: The 1993 Arkansas Legislature approved Amendment 1049 to Act 511, establishing Arkansas as the first state in the nation to develop the Arkansas Mitigation Program of $1,000,000.00. The goal of the program is to assist county governments that have suffered repetitive disaster losses. This is accomplished by funding projects that permanently solve repetitive problems. The Arkansas Hazard Mitigation Program is available for all counties to use. Every year, county judges are encouraged to apply for projects within their jurisdictions. The Arkansas Mitigation Program challenges counties to select priority sites where repetitive damages occur and find permanent solutions to these problems. Completed projects have saved thousands of dollars. As more projects are funded, the savings to Arkansas will continue to grow. Total Mitigation Funds to Date: $9,090,272.00.

Arkansas Safe Room/Shelter Program: Homeowners who built a safe room or storm shelter after January 1999 are eligible to receive a rebate of up to $1,000 or 50 percent of the cost, whichever is less. The Arkansas Safe Room/Storm Shelter Grant Program funds above-ground and in-ground shelters. Safe rooms and in-ground shelters can be designed in a number of ways. However, the safe room/in-ground shelter must meet requirements established in "FEMA Publication 320" and/or meet the "National Performance Criteria for Tornado Shelters." In-ground shelters have no state regulation. ADEM requires, however, that it be constructed of a waterproof material, properly ventilated, and the door must meet the National Performance Criteria for Tornado Shelters. The shelters must meet city and/or county codes, if there are any. As of June 2010, 13,957 shelter rebates have been funded at a cost of $13,595,163.81 with state funding.

Federal Hazard Mitigation Programs: The Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation (PDM) Program have been the state's most important programs for hazard mitigation in recent years. The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Unlike the Federal Emergency Management Agency's (FEMA's) more familiar disaster assistance programs that help pay for the permanent repair and restoration of existing facilities, the HMGP goes beyond simply fixing the damage. The HMGP will, within the limits of state and federal guidelines, help fund a wide range of new projects that reduce hazard vulnerability and the potential of future damage. The FMA program, was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist States and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program. The Pre-Disaster Mitigation Competitive (PDM-C) program provides funds on a competitive basis to states, territories, Indian tribal governments, local jurisdictions, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds. As of June 2010 total Federal Mitigation Funds: $46,044,715.00.

Arkansas Department of Health – Bioterrorism Preparedness Program: After the events of September 11th, bioterrorism has become a high priority for the federal government and subsequently for the State of Arkansas. The Center of Disease Control (CDC) has assumed responsibility for the national effort for preparedness related to biological hazards, and has funded the State of Arkansas's Bioterrorism Preparedness Program with federal grant funding. This preparedness effort is focused on potential terrorism agents such as anthrax and small pox, but these efforts are also mitigating the potential effects of naturally occurring diseases such as West Nile Virus, Influenza, and now the Avian Flu. This program supports the development and funding of regional plans to purchase training, equipment, and supplies that enhance preparedness to respond to disease outbreaks involving 500 or more citizens.

2010 Update Methodology

The Hazard Mitigation Planning Sub-Committee reviewed the existing State Capability Assessment from the 2007 plan and then developed a logical, efficient methodology for contacting each of the agencies and re-assessing their program statuses. The revision and update methodology consisted of the following steps:

- Data Review – Information from the existing State Capability Assessment was collected and thoroughly reviewed for completeness.
- Identification of Agency Contacts – Based on the existing data from 2007 list of planning team members, a specific contact for each agency program was identified for subsequent correspondence. When no contact was previously identified, the agencies were contacted directly in order to find the appropriate program manager.
- Email Correspondence – The existing State Capability data was separated into individual components for each of the programs. This program-specific data was then formatted into a standardized email explaining the purpose of the planning process and the necessity for the confirmation and update of the 2007 descriptions. These emails were then sent out to each of the individual program managers within the various agencies requesting a reply either confirming the existing data or providing updated descriptions.
- Phone Interviews – Members of the HMP Sub-Committee contacted each program manager by phone as a follow-up to the initial email correspondence. The phone interviews were conducted to ensure confirmation of the receipt of the emails and for brief conversations with the program managers to obtain 2010 update information.
- Data Collation – As data was collected from the agencies regarding their specific capabilities, this was collated in spreadsheet format along with the 2007 data. This spreadsheet served as the final data collection device and also as a project management tool for tracking the correspondence with the agencies.
- Finalization and Formatting – The final updated information for the State Capability Assessment was reviewed and then formatted for inclusion in this plan document.

5.2.1 ADEM Capability Assessment

The Arkansas Department of Emergency Management is the lead agency for emergency planning and hazard mitigation in the state. While assessing the overall state capabilities and contacting the various agencies, the HMP Sub-Committee determined that ADEM required separate treatment due to the number of individual programs and the overall focus on disaster planning, response and recovery. Based on this decision, the various programs, policies and capabilities managed by ADEM were extracted from the complete listing. These ADEM-managed programs are listed separately in this section and are prioritized over the remaining agency programs due to their primary focus on disaster planning and hazard mitigation. The various programs, policies and capabilities of ADEM with respect to mitigation are listed below along with detailed program descriptions and current 2010 contact information.

Definitions:

- *Support loss reduction* – Programs, plans, policies, regulations, funding or practices that help implement mitigation measures.
- *Facilitate loss reduction* – Programs, plans, policies, etc., that make implementing mitigation measures easier.
- *Hinder loss reduction* – Programs, plans, policies, etc., that pose obstacles to implementing mitigation measures.

Agency: Arkansas Department of Emergency Management
Program: Public Assistance Program (Federal)
Contact: Scott Bass, Disaster Recovery Manager
501.683.6700, scott.bass@adem.arkansas.gov
Description: The Arkansas Department of Emergency Management (Grantee) administers the Federal Public Assistance (PA) Grant Program. Federal assistance will be implemented when the situation is clearly beyond the capability of both local and state governments. A team of local, state and federal personnel will complete preliminary damage assessments (PDA's) which will help with determining eligibility for a Presidential Declaration. Federal determination is based on a number of factors which include population (implied tax base), impact upon jurisdictions infrastructure and recent disaster history. The PA program is available to assist with reimbursement of repairs to damaged eligible public facilities. It is made available to eligible applicants (local governments, state governments and certain private non-profit organizations) that are located in a designated damage area. The federal cost share for this program will not be less than seventy-five percent of eligible expenses for emergency measures and permanent restoration. This Post Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Department of Emergency Management
Program: Hazard Mitigation Grant Program (State)
Contact Bonnie Arnold, State Mitigation Grant Coordinator
501.683.6700, bonnie.arnold@adem.arkansas.gov
Description: The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Unlike the Federal Emergency Management Agency's (FEMA's) more familiar disaster assistance programs that help pay for the permanent repair and restoration of existing facilities, the HMGP goes beyond simply fixing the damage. The HMGP will, within the limits of state and federal guidelines, help fund a wide range of new projects that reduce hazard vulnerability and the potential of future damage. The State of Arkansas, through ADEM, administers the Hazard Mitigation Grant Program (HMGP). This program is managed under the policies of Section 404 of Public Law 93-288, as amended, the Robert T. Stafford Disaster Relief and Emergency Assistance Act. This Post Disaster program supports loss reduction by providing funding for mitigation initiatives. Since 1999, around $2,000,000 is awarded to the state for the HMGP.

Agency: Arkansas Department of Emergency Management
Program: Severe Repetitive Loss Program
Contact: Veronica Pogue, PDM-C Grant Coordinator
501.683.6700, veronica.pogue@adem.arkansas.gov
Description: The SRL program provides an opportunity for communities to identify and mitigate the most often reoccurring repetitive flood loss properties. FEMA approves eligible sub-applications based on priorities set by the Applicant or program priorities. The Arkansas Department of Emergency Management will maintain an up-to-date database containing information on all repetitive loss properties in the State. The elimination of these properties from the list will be the number one priority of all mitigation grant programs available to the State. FMA, PDMC, HMGP, SRL, and NFIP coordinators will give funding priority, based on the state ranking system, to the acquisition or relocation of properties on this list. Program coordinators will advise communities of available funding. The goal is the elimination of all NFIP repetitive loss claims in the state within 10 years as funds become available. This Pre- Disaster program supports loss reduction by providing funding for mitigation initiatives. The SRL program has allotted 70 million dollars nationwide to help reduce the number of Severe Repetitive Loss properties. Currently in 2010 the State is acquiring 3 SRL properties in one FMA acquisition project.

Agency: Arkansas Department of Emergency Management
Program: Public Assistance Program (State)
Contact: Scott Bass, Disaster Recovery Manager
501.683.6700, scott.bass@adem.arkansas.gov
Description: The State Public Assistance Program is authorized under Arkansas Code Annotated 12-75-101 et al. The Arkansas Department of Emergency Management administers the State Public Assistance (PA) Program. The state PA program is designed to fill the gap between local recovery efforts and federal disaster assistance following a disaster situation. The program provides assistance for debris removal, emergency protective measures, and permanent restoration of infrastructure. The state's share of these expenses cannot be more than 35 percent (35%) of eligible costs. The state cannot provide assistance until the situation has clearly exceeded the capability of local government. The state PA program does not offer 406 Mitigation.

Agency: Arkansas Department of Emergency Management
Program: Pre-Disaster Mitigation Program
Contact Veronica Pogue, PDM-C Grant Coordinator,
501.683.6700, veronica.pogue@adem.arkansas.gov
Description: The Pre-Disaster Mitigation Competitive (PDM-C) program provides funds on a competitive basis to states, territories, Indian tribal governments, local jurisdictions, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. There has been a decrease of the number of PDM projects approved due to congressional earmarks for 2010. All applicants and sub-applicants must be participating in the National Flood Insurance Program (NFIP) and must not be withdrawn, suspended, or on probation from the program. In addition, as of November 1, 2003, local governments, Indian tribal governments applying as sub-applicants, and universities must have a FEMA approved Hazard Mitigation Plan to be eligible to receive project grant funding under the PDM-C program. 44 CFR Part 201, Hazard Mitigation Planning, establishes requirements for state, tribal, and local hazard mitigation planning.

This Pre- Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: **Arkansas Department of Emergency Management**
Program: Flood Mitigation Assistance Program
Contact: Terry Gray, Mitigation Branch Manager
501.683.6724, terry.gray@adem.arkansas.gov
Description: The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist states and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program. Three types of FMA grants are available to states and communities:
• ***Planning Grants:*** to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants.
• ***Project Grants:*** to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least $1,000 within any ten-year period since 1978. Currently in 2010, the State has approved the project application for 1 acquisition project that includes 6 residential properties three of which are severe repetitive loss properties.
• ***Technical Assistance Grants:*** for the state to help administer the FMA program and activities. Up to ten percent (10%) of project grants may be awarded to states for Technical Assistance Grants." This Pre- Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: **Arkansas Department of Emergency Management**
Program: Fire Protection Services Fund (Act 833)
Contact: Jimmy Woods, ADEM Fire Services Coordinator
501.683.6700, jimmy.woods@adem.arkansas.gov
Description: Fire Services has a vital role in the State of Arkansas. The Fire Services Office provides:
• Administration and distribution of the Act 833 grant program for Arkansas fire departments.
• Review and certify that departments are in accordance with Act 833 of 1991.
• Provide technical assistance and grant information and carry out administrative functions and directives from the Arkansas Fire Protection Services Board.
• Support for developing new fire departments. This Pre- Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: **Arkansas Department of Emergency Management**
Program: Arkansas Safe Room / Shelter Rebate Program
Contact: Bonnie Arnold, State Mitigation Grant Coordinator
501.683.6700, bonnie.arnold@adem.arkansas.gov
Description: In the spring of 1999, the Arkansas Mitigation Branch sponsored a statewide shelter rebate program for persons who had installed in-ground shelters or safe rooms since January 21, 1999. Act 646 increased the amount of State Hazard Mitigation funds from $1 million to $2.25 million. ADEM decided to put these new funds to good use, helping to save lives by providing an incentive to Arkansans for having shelters installed on their property since January 21, 1999. Homeowners who built a safe room or shelter after January 1999 are eligible to receive a rebate of up to $1,000 or 50 percent of the cost, whichever is less. Safe rooms and in-ground shelters can be designed in a number of ways. However, both types of shelters must meet requirements established in "FEMA Publication 320" and/or meet the "National Performance Criteria for Tornado Shelters." There are no state regulations for in-ground shelters. ADEM requires, however, that it be constructed of a waterproof material, have proper ventilation and the door must meet the National Performance Criteria for Tornado Shelters. The shelters must meet city and/or county codes if there are any. To date, 13,957 shelter rebates have been funded at a cost of $13,595,163.81 with state funding. This Pre-Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Department of Emergency Management
Program: Arkansas Hazard Mitigation Program
Contact: Bonnie Arnold, State Mitigation Grant Coordinator
501.683.6700, bonnie.arnold@adem.arkansas.gov
Description: The 1993 Arkansas Legislature approved Amendment 1049 to Act 511, establishing Arkansas as the first state in the nation to develop the Arkansas Mitigation Program of $1,000,000.00. The goal of the program is to assist county governments that have suffered repetitive disaster losses. This is accomplished by funding projects that permanently solve repetitive problems. The Arkansas Hazard Mitigation Program is available for all counties to use. Every year, county judges are encouraged to apply for projects within their jurisdictions. The Arkansas Mitigation Program challenges counties to select priority sites where repetitive damages occur and find permanent solutions to these problems. Completed projects have saved thousands of dollars. As more projects are funded, the savings to Arkansas will continue to grow.

Agency: Arkansas Department of Emergency Management
Program: Governors Earthquake Advisory Council (GEAC)
Contact: Myra Jane Biggers, Earthquake Coordinator
870.935.8528, myra.biggers@adem.arkansas.gov
Description: The GEAC was appointed by then Governor Clinton in 1984. Members are representatives from state agencies, utilities, universities, hospitals, engineers, geologists, local government, and legislators. It serves as a forum for sharing ideas and information, networking of professionals, lobbying for legislative changes, search for programs and funds, and planning. Past activities include promotion of seismic safety for the state, retrofit projects in schools and hospitals, school safe rooms, promotion of disaster resistant communities, creation of the Hazard Mitigation Planning Sub-Committee, formation of a Disaster Resistant Home Coalition, and the formation of the Pre-Disaster Mitigation Advisory Council. Recent activities include consultation with the SONS07 exercise as well as a regional meeting outlining recent Arkansas All Hazard Mitigation Plan updates on 7.20.2009. No funding available.

Agency: Arkansas Department of Emergency Management
Program: Arkansas Pre-Disaster Mitigation Advisory Council (APDMAC)
Contact: Terry Gray, Mitigation Branch Manager
501.683.6724, terry.gray@adem.arkansas.gov
Description: The APDMAC provides the same services to the Pre-Disaster Mitigation Program as the Governor's Earthquake Advisory Council provides to the Earthquake Program except it addresses all hazards. The council members include all of the Governor's Earthquake Advisory Council plus additional members. It was originally formed to support the Project Impact Program in 1999. The APDMAC holds its next meeting on 7.20.2010. Topics include the current status of the Arkansas All-Hazard Mitigation Plan three-year revision, as well as the SONS10 exercise. No funding provided.

Agency: Arkansas Department of Emergency Management
Program: Arkansas Earthquake Program
Contact: Myra Jane Biggers, Earthquake Coordinator
870.935.8528, myra.biggers@adem.arkansas.gov
Description: ADEM, under the authority granted by Act 247 of 1989," works to ensure the safety and well being of the citizens of Arkansas from the risks associated with earthquakes within the State of Arkansas, as well as from seismic events outside the state which would have a direct effect on the state. The Earthquake Program carries out this mandate in a number of program areas. The law places emphasis on earthquake mitigation, preparedness, response, and recovery related functions, requiring the full cooperation of all other state and local government agencies, departments, and personnel. The pre-disaster program is required to coordinate comparable functions of the federal government including its various departments and agencies with recent earthquake program initiatives include consultation with the SONS 07 exercise as well as the Catastrophic Earthquake Planning effort.

Agency: Arkansas Department of Emergency Management
Program: Hazardous Materials Program
Contact: Kenny Harmon, Hazardous Materials Program Manager
501.683.6700, kenny.harmon@adem.arkansas.gov
Description: Provides Pre-disaster Hazardous Materials training to groups and organizations throughout the state. Updates and maintains a database and file of all Tier II and TRI reports. The information is used in the event of emergencies to provide data analysis for LEPC emergency planning, and to support the Freedom of Information Act. Fees collected from Tier II reporting are used to facilitate safety training for HAZMAT trainers as well as first responders. This Pre-Disaster program supports loss reduction by training first responders.

Agency: Arkansas Department of Emergency Management
Program: Emergency Operations Planning
Contact: Danna McGinty, Planning Branch Manager
501.683.6700, danna.mcginty@adem.arkansas.gov
Description ADEM has developed and updated the state's Emergency Operations Plan to set the procedures for responding to a variety of hazards and to identify the various agencies and departments with functional responsibilities. This includes significant details for the various human-caused hazards such as nuclear and biological. Emergency Operations Plans are updated to meet NIMS compliancy as well as create a

uniformed structure for response capabilities. This Pre-Disaster program supports loss reduction by providing planning resources to the counties.

Agency: Arkansas Department of Emergency Management
Program: Citizen Corps Grant Program
Contact: Andrew Pannell, State Citizen Corps Coordinator
501.683.6700, andrew.pannell@adem.arkansas.gov
Description: The purpose of this pre-disaster program is to supplement and assist state and local efforts by offering programs for volunteers in communities to become involved. This includes establishing Citizen Corps Councils to expand each of the five programs included in Citizen Corps to include Community Emergency Response Team (CERT), Neighborhood Watch/USA Watch, Medical Reserve Corps (MRC), Volunteers in Police Service (VIPS), and Fire Corps in the communities of Arkansas. The program supports and promotes efforts to involve a wide range of volunteer groups in activities that enhance individual, community, and family preparedness and contribute to the strengthening of homeland security.

Agency: Arkansas Department of Emergency Management
Program: Chemical Stockpile Emergency Preparedness Program
Contact: Sandi Hensley, CSEPP Branch Manager
501.683.6721, sandi.hensley@adem.arkansas.gov
Description: The Pine Bluff Arsenal is one of six locations in the nation where chemical weapons are stockpiled. The United States Congress has ordered that these weapons be eliminated in the safest manner possible. The Chemical Stockpile Emergency Preparedness Program (CSEPP) was established to enhance the emergency preparedness in communities around the chemical stockpiles. The Pine Bluff Arsenal currently stores blister agents (the nerve agents GB and VX have been eliminated). The agents are stored in a high security area. The blister agents, HD and HT, are stored in thick walled ton containers within earth-covered concrete structures called "igloos." All of the agents are closely monitored. The Pine Bluff Arsenal communicates daily with Jefferson and Grant counties and the Arkansas Department of Emergency Management to inform them of activities involving the stockpile. This Pre- Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Department of Emergency Management
Program: ADEM Training Plan
Contact: Mark Hooker, Training Branch Manager
501.683.6700, mark.hooker@adem.arkansas.gov
Description: This plan details the overall strategic direction for ADEM in terms of training requirements for the Emergency Management/First Responder community. This plan is updated as needed on an annual basis and a copy can be found on the ADEM website.

Agency: Arkansas Department of Emergency Management
Program: Community Emergency Response Team
Contact: Andrew Pannell, State Citizen Corps Coordinator
501.683.6700, andrew.pannell@adem.arkansas.gov
Description: Initially, Pre-disaster CERT programs were developed to assist communities in taking care of themselves in the aftermath of a major disaster when first responders are overwhelmed or unable to respond because of communication or transportation difficulties. As the CERT concept has taken hold across the country, they

have become much more than originally envisioned. CERTs have proven themselves to be an active and vital part of their communities' preparedness and response capabilities. For example, CERTs have been used to:

- Distribute and/or install smoke alarms and batteries to the elderly and disabled.
- Assist with evacuations and traffic control. Act as victims in training exercises.
- Promote community awareness of potential hazards and preparedness measures.
- Supplement staffing at special events, such as parades.

CERTs are an investment of local government's time and resources. To capitalize on this investment, program sponsors can view CERT members as a volunteer resource that can assist with public safety activities. Such an approach will actively involve members in serving their communities beyond disaster response and add value to the CERT program. The best source of help in an emergency or disaster is the paid or volunteer professional responder. But, if they are not available to address immediate life-saving needs or to protect property, CERT members can help. CERTs are not intended to replace a community's response capability, but rather, to serve as an important supplement to it. The agency sponsoring the CERT program is creating a volunteer resource that is part of the community's operational capability following a disaster. That agency should develop training standards for CERT personnel and protocols for their activation and use. CERT members must keep safety in mind as their first priority. CERT volunteers must know their capabilities and the limitations of their training and equipment and work within those limitations. CERTs are considered "Good Samaritans" and covered under the Volunteer Protection Act. CERT volunteers do not have any authority beyond serving as "Good Samaritan" when helping others. When deployed appropriately CERTs can complement and enhance first-response capabilities in neighborhoods and workplaces by ensuring the safety of themselves and their families until first responders arrive. CERTs can then assist first-response personnel as directed. This Pre-Disaster program supports loss reduction by providing funding for pre disaster training initiatives.

Agency: Arkansas Department of Emergency Management
Program: Homeland Security Grant Program
Contact: Kathy Wright, Domestic Preparedness Branch Manager
501.683.6700, kathy.wright@adem.arkansas.gov
Description: The objective of this program is to enhance the capacity of state and local emergency responders to prevent, respond to, and recover from a weapons of mass destruction (WMD) terrorism incident involving Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) Events devices, cyber attacks, and major disasters. Funds are provided to enhance homeland security and emergency operations planning, training, exercise, and to purchase specialized equipment to enhance the capability of state and local agencies to prevent, respond to, and mitigate incidents of terrorism and major disasters. The most recent posted Homeland Security Grant Program funding priorities include:

- AWIN communications enhancement
- Enhance local communications systems
- Enhance response capability through the purchase of specialized equipment in the areas of HAZMAT, Decon, Bomb/IED, Agriculture, Search and Rescue, EMS, and SRT/SWAT
- Support the State’s Fusion Center

This Pre Disaster program supports loss reduction by providing funding local response initiatives. Funding comes from three different venues: rental income; direct appropriations from state legislature and capital improvement bonds.

Agency: Arkansas Department of Emergency Management
Program: Arkansas Emergency Management Association
Contacts: Scott Bass, Disaster Recovery Manager
501.683.6700, scott.bass@adem.arkansas.gov
Description: The Arkansas Emergency Management Association, AEMA, is dedicated to serving the emergency management community by offering pre-disaster opportunities for training, scholarship and fellowship. AEMA hosts an Annual Emergency Management Conference each fall to bring together Arkansas' emergency managers and responders in order to share the latest in planning, training and technology and to review disaster response and recovery.

5.2.2 Capability Assessment for Other State Agencies

While the Arkansas Department of Emergency Management is the lead agency for emergency planning and hazard mitigation in the state, many other state agencies play an important role in supporting mitigation. Each of these state agencies was contacted individually in order to develop a complete picture of the overall capabilities of the state. All identified programs, polices and capabilities are listed below with detailed descriptions and current 2010 contact information for the program managers. The combination of the ADEM programs along with these programs from other agencies, provide a complete assessment of the mitigation-related capabilities for the State of Arkansas.

Agency: Arkansas Building Authority
Programs, Plans, Policies, Regulations, Funding or Practice: ABA State Property
Contact: Anne W. Laidlaw, RPA Director
501.682.1833, alaidlaw@aba.state.ar.us
Description: ABA is the state government's leasing agent, construction overseer, and examiner of architectural/engineering plans. ABA sets policies, guidelines, standards and procedures. Act 716 of 1975 authorizes ABA to obtain sites; to construct, equip, maintain and operate public buildings; authorize the leasing of property for and by state agencies; assist state agencies in architectural and engineering needs; and assist other state agencies in the construction and maintenance of public buildings. Funding comes from 3 different venues: rental income; direct appropriations from state legislature and capitol improvement bonds.

Agency: Arkansas Building Authority
Programs, Plans, Policies, Regulations, Funding or Practices: ABA State Property
Contact: Anne W. Laidlaw, RPA Director
501.682.1833, alaidlaw@aba.state.ar.us
Description: ABA maintains a database of state owned property and of leasing transactions that are within the purview of the Real Estate Services Section. Databases regarding on-going capital improvement projects are also maintained. This data is essential in determining exposure of state property to hazards.

Agency: Arkansas Department of Economic Development
Programs, Plans, Policies, Regulations, Funding or Practices: Community Development block grant loan and grant programs
Contact: Michael Gaines, Deputy Director of Administration
501.682.1124, mgaines@arkansasedc.com
Description: Several of the eight CDBG programs fund projects in eligible communities that improve, repair or rehabilitate housing or infrastructure systems to meet urgent needs or to deal with an imminent threat to public health and safety. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Department of Environmental Quality
Programs, Plans, Policies, Regulations, Funding or Practices: ADEQ
Contact: Karen Bassett, ADEQ Response Planning
501.682.0962, bassett@adeq.state.ar.us
Description: ADEQ protects and enhances the state's environment through regulatory programs, proactive programs and educational activities. Regulatory programs exist for air, water, solid waste, hazardous waste, regulated storage tanks and mining. Operating permits are issued for monitoring of compliance and are issued to businesses and farms. ADEQ manages many programs to assist businesses, educators and the public with regulatory and other issues, and offers loans and tax credits for environmental improvement projects. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Forestry Commission
Programs, Plans, Policies, Regulations, Funding or Practices: National Fire Plan Hazard Mitigation
Contact Don McBride, Director
501.296.1870, don.mcbride@arkansas.gov
Description: The AFC, in cooperation with the USDA Forest Service and the Southern Group of State Foresters, provides funding for interactions with and providing training and technical assistance to rural communities and volunteer fire departments in conducting community wildfire hazard risk assessments, development of mitigation projects to reduce the risk from wildfire fires and the development of Community Wildfire Protection Plans. Priorities will concentrate on aiding communities having a high risk or threat from wildfires. Communities are encouraged to implement "Firewise" concepts and work toward certification as Firewise Communities/USA. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Forestry Commission
Programs, Plans, Policies, Regulations, Funding or Practices: Rural Fire Protection
Contact: Don McBride, Director
501.296.1870, don.mcbride@arkansas.gov
Description: A Rural Fire Protection Division within the AFC was established legislatively in 1979. The purpose of this division is to encourage and assist in the establishment, development, and the operation of fire protection districts and associations in rural areas that previously had little or no fire protection available. Grants, loans, and equipment are available through AFC and other sources. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Forestry Commission
Programs, Plans, Policies, Regulations, Funding or Practices: Landowner Assistance
Contact: Don McBride, Director
501.296.1870, don.mcbride@arkansas.gov
Description: AFC offers landowners a variety of free technical assistance services in forest management. This includes examinations based on the objectives of the landowner of the property, and includes written forest management plans, and information and site recommendations for protection, restoration, and improvement of water and wetland resources. Fire lane construction and prescribed burning can be conducted for a fee. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Geographic Information Office
Programs, Plans, Policies, Regulations, Funding or Practices:
Contact: Learon Dalby, GIS Program Manager
501.682.2929, learon.dalby@arkansas.gov
Description: Assist state and local government agencies with GIS design and data creation standards; coordinate statewide GIS data creation standards; administer GeoStor, the on-line GIS data clearinghouse for Arkansas; serve as liaison between local and state GIS activities and federal GIS activities.

Agency: Arkansas Geographic Information Office
Programs, Plans, Policies, Regulations, Funding or Practices: Arkansas Centerline File (ACF) Program
Contact: Learon Dalby, GIS Program Manager
501.682.2929, learon.dalby@arkansas.gov
Description: Developed to support state legislative initiatives to establish spatial data infrastructure benefits the GIS user communities in areas such as E-911 applications, location-based services, homeland security, and various government entities. Free services to cities and counties include inter and intra agency coordination, training and guidance and technical support for ACF data development, and maintenance of a master statewide layer via program participant updates. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Geographic Information Office and Arkansas Assessment Coordination Department
Programs, Plans, Policies, Regulations, Funding or Practices:
Arkansas County Assessor Mapping Program (CAMP)
Contact: Learon Dalby, GIS Program Manager
501.682.2929, learon.dalby@arkansas.gov
Description: Provides technical and GIS input and support for county assessors for the development of cadastral mapping with a goal of giving the public, including mitigation planners, easier access to assessment data. Free services include GIS hardware and software installation, training, technical support, and publishing a statewide master cadastral layer via GeoStor. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Geological Survey
Programs, Plans, Policies, Regulations, Funding or Practices:
Contact: Scott Ausbrooks, Registered Professional Geologist
501.683.0119, scott.ausbrooks@arkansas.gov
Description: Evaluates geologic hazards, collects geologic data, develops geo-hazard maps, interprets geologic damage reports for damage assessment following disasters, and provides scientific advice on what to expect for potential damage, personal safety issues, and mitigation measures concerning geo-hazards. As far as funding, no funds dispersed to cities or counties for related projects. The Arkansas Geological Survey (AGS) has installed six state-of-the-art permanent seismic monitors to establish better and more uniform earthquake detection across the State of Arkansas. These monitors were strategically placed within selected State Parks across the State. These seismic monitors of the Arkansas Seismic Network (ASN) were seamlessly integrated with seismic monitors of both the regional and national networks. The Center for Earthquake Research and Information (CERI) at the University of Memphis will provide continuous maintenance and reporting services for the network. Link to the network http//www.geology.ar.gov/geohazards/ark_seismic_network.htm.

Agency: Arkansas Natural Resources Commission
Programs, Plans, Policies, Regulations, Funding or Practices: Floodplain Management Program
Contact Jon Sweeney, Deputy Director & Chief Engineer
501.682.3962, jon.sweeney@arkansas.gov
Description: Act 629 of 1969 authorizes cities, towns, counties, and the Arkansas Natural Resources Commission, where necessary, to enact and enforce land use measures which will prevent and alleviate flood hazards and losses in flood-prone areas of the state. Program resources and responsibilities include State Coordinator for the NFIP; Administrator of the Community Assistance Program - State Services Support Element Grant provided by the NFIP; provider of general information and assistance apart from the NFIP. Duties of the Floodplain Management Section include: visiting communities (towns, cities and counties) participating in the NFIP to provide general and technical assistance, conducting training and educational workshops, providing information to the public regarding the NFIP and floodplain management, and providing assistance for mitigation during the recovery phase of a disaster operation. As far as funding, no funds dispersed to cities or counties for related projects.

Agency: Arkansas Natural Resources Commission
Programs, Plans, Policies, Regulations, Funding or Practices: Dam Safety Program
Contact: Jon Sweeney, Deputy Director & Chief Engineer
501.682.3962, jon.sweeney@arkansas.gov
Description: The purpose of the DSP is to a) provide for the comprehensive regulation and supervision of dams for the protection of the health, safety, and welfare of the citizens of Arkansas, and b) to assure proper planning, design, construction, maintenance, monitoring, and supervision of dams, including such preventive measures necessary to provide an adequate margin of safety. Duties of the DSP include: reviewing applications for permits to assure proper safety standards are met, issuing permits to construct and operate a dam in the state, inspecting dams under state jurisdiction, providing information and education to dam owners and the public, overseeing the development and implementation of emergency action plans for high hazard dams, responding to dam emergencies, maintaining a database and files on dams in the state

and collecting annual permit fees. As far as funding, no funds dispersed to cities or counties for related projects.

Agency: Arkansas Natural Resources Commission
Programs, Plans, Policies, Regulations, Funding or Practices: Arkansas Wetland Mitigation Bank Program
Contact: Jon Sweeney, Deputy Director & Chief Engineer
501.682.3962, jon.sweeney@arkansas.gov
Description: The Arkansas Wetland Mitigation Bank Program is a state-sponsored initiative aimed at providing off-site mitigation opportunities to Section 404 permit recipients required to provide compensatory mitigation for impacts of approved wetland projects. Arkansas statutes allow the state to acquire degraded wetlands and restore the wetland functions that previously occurred on the areas. This is accomplished by re-establishing the wetland hydrology and vegetation. As far as funding, no funds dispersed to cities or counties for related projects.

Agency: Arkansas Natural Resources Commission
Programs, Plans, Policies, Regulations, Funding or Practices: Arkansas Wetland and Riparian Zones Tax Credit Program
Contact: Jon Sweeney, Deputy Director & Chief Engineer
501.682.3962, jon.sweeney@arkansas.gov
Description: This program allows a credit against the tax imposed by the Arkansas Income Tax Act for any taxpayer engaged in the development or restoration of wetlands and riparian zones. The program is designed to encourage private landowners to restore and enhance existing wetlands and riparian zones, and when possible, create new wetlands and riparian zones. This program benefits the landowners through tax credits and the state by increasing wetlands and riparian zones, which provide flood control, water quality enhancement, fish and wildlife habitats, recreation and ground water recharge. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Natural Resources Commission
Programs, Plans, Policies, Regulations, Funding or Practices: Conservation District Grant Program
Contact: Jon Sweeney, Deputy Director & Chief Engineer
501.682.3962, jon.sweeney@arkansas.gov
Description: The purpose of this program is to enhance the capability of conservation districts to carry out conservation within their respective districts. Projects eligible for grant funds must carry out resource enhancement, restoration or protection and must be new or in addition to those in which a district is currently involved. Projects intended to replace existing programs are not eligible for grant funding. Only conservation districts may make applications for assistance. Maximum total grant money available per district is $25,000 per year. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Highway and Transportation Department
Programs, Plans, Policies, Regulations, or Practices: Technology Transfer Program (T2)
Contact: Bethany Swindell, Disaster Liaison
501.569.2930, bethany.swindell@arkansashighways.com
Description: The Technology Transfer Program is responsible for assisting cities and counties in implementation of transportation related technology. The objective is a safer, more efficient, and more economical road and street program. Targeted operations include construction and maintenance, materials, administration, and computer programs.

Agency: University of Arkansas at Little Rock
Programs, Plans, Policies, Regulations, Funding or Practices: Arkansas Center for Earthquake Engineering and Technology Transfer (ACEETT)
Contact: Dr. Haydar Al-Shukri, Director
501.569.8164, hjalshukri@ualr.edu
Description: This collaborative program between UALR and ADEM assists the State of Arkansas in hazard mitigation planning and public education. ACEETT has four distinct but overlapping tasks for its mission. These include 1) public education, 2) hazard mitigation, 3) earthquake monitoring, and 4) scientific research. ACEETT provides general information on earthquakes, the new Madrid Fault, maps and preparedness and response. Secondly, it provides on-going ACEETT research; one of the most recent is the Paleoseismology research study in eastern Arkansas to map and locate geological features such as sand blows and possible near surface faulting. Lastly, the center will initiate the Arkansas Seismic Observatory to monitor earthquake activity throughout the state. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Manufactured Home Commission
Programs, Plans, Policies, Regulations, Funding or Practices: NA
Contact: Whit Waller, Director
501.324.9032, whit.waller@arkansas.gov
Description: Licensing authority for all manufacturers, dealers, installers, and salespersons engaged in the business of manufactured housing. Responsibilities include enforcing construction and safety standards for manufactured housing, dealer lot inspections and monitoring of consumer complaints. The AMHC sets, administers, and enforces standards for the proper installation of manufactured homes in the State of Arkansas. The commission is funded through special revenues from fees charged to dealers, manufactures, and installers.

Agency: Governor's Office
Programs, Plans, Policies, Regulations, Funding or Practices: Executive Order EO-04-02
Contact: Gary Grimes, Agency Liaison
501.683.6431, gary.grimes@governor.arkansas.gov
Description: Executive order signed by Governor Mike Huckabee on August 4th, 2004 that orders that, as directed by Section 322 of the Federal Disaster Mitigation Act of 2000, all state offices, agencies, departments, and commissions integrate sound mitigation measures into all future planning initiatives and coordinate these efforts with the Arkansas Department of Emergency Management and the Arkansas All-Hazards Mitigation Plan. Also provides 3 million annually for mitigation programs.

Agency: Arkansas Department of Health
Programs, Plans, Policies, Regulations, Funding or Practices: Preparedness & Emergency Response Program
Contact: Cathy Flanagin, Associate Branch Chief
501.661.2248, cathy.flanagin@arkansas.gov
Description: The Preparedness and Emergency Response Program was established shortly after the events of September 11, 2001 to ensure the safety of Arkansas citizens from a variety of man-made or natural disasters. The CDC provides funding and technical assistance to the state for planning, drills and exercises and equipment. The Arkansas preparedness program works with internal and external partners in the area of planning, City Readiness Initiative, Strategic National Stockpile, surveillance, epidemiology, public health labs, crisis communication, the health alert network, training, exercises and drills. The program continues to grow and build upon previous efforts. The program has also responded to a number of real events in the state including the largest pre-event evacuation of NDMS patients, hurricane evacuees from LA, a major ice storm encompassing the northern one half of the state, tornadoes and the 2009 H1N1 pandemic.

Agency: Arkansas Department of Health and Human Services
Programs, Plans, Policies, Regulations, Funding or Practices: Strategic National Stockpile
Contact: Richard Taffner, SNS Coordinator
870.425.6985, richard.taffner@arkansas.gov
Description: In 1999 Congress charged the Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) with the establishment of the National Pharmaceutical Stockpile (NPS). The mission was to provide a re-supply of large quantities of essential medical material to states and communities during an emergency within twelve hours of the federal decision to deploy. The Strategic National Stockpile (SNS) is a national repository of antibiotics, chemical antidotes, antitoxins, life-support medications, IV administration, airway maintenance supplies, and medical/surgical items. The State of Arkansas is a full participant in this important federal program. **City Readiness Program Initiative**. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Department of Health and Human Services
Programs, Plans, Policies, Regulations, Funding or Practices: Health Alert Network
Contact: Alyce Wagner, Director of Health Alert Network
501.280.4174, alyce.wagner@arkansas.gov
Description: The State of Arkansas is participating in the federally funded Health Alert Network (HAN). This program includes planning and funding for improving local technical capabilities for public health including high speed internet connectivity and statewide databases for nurses and other primary health care providers. This Pre Disaster program supports loss reduction by providing funding for mitigation initiatives.

Agency: Arkansas Livestock and Poultry Commission
Programs, Plans, Policies, Regulations, Funding or Practices: AR Animal Disease Emergency Response Plan, Inspections and Veterinary Diagnostic Lab
Contact: Dr. George P. Badley, DVM, State Veterinarian
501.907.2400, pbadley@alpc.ar.gov
Description: The Arkansas Livestock and Poultry Commission were created by Act 87 of 1963. The Commission has full authority for the control, suppression, and eradication of livestock and poultry diseases and pests, and supervision of livestock and poultry sanitary work in this state. It has the duty for the development of the livestock and poultry industries in the state and for administering the provisions of laws and regulations pertaining to livestock and poultry. The Commission is authorized to enter into cooperative agreements with several federal agencies in matters relating to livestock and poultry disease control programs. Act 150 of 1985 act clarifies and expands authority.

Agency: University of Arkansas for Medical Sciences
Programs, Plans, Policies, Regulations, Funding or Practices Agency: Bioterrorism Steering Committee
Contact: Leslie Taylor, Associate Vice Chancellor
501.686.8998, leslie@uams.edu
Description: As the state's only academic medical center, UAMS is assisting other organizations in the state and region in their bioterrorism planning efforts. UAMS faculty and staff are active in basic and applied research involving bioterrorism and have been successful in obtaining federally funded grants for the study of the potential intentional use of Severe Acute Respiratory Syndrome (SARS), Avian Influenza, Tularemia and other agents. UAMS has also obtained grants for statewide continuing education in coordination with its Area Health Education Centers (AHECs) to provide instructions on terrorism to health and emergency response professionals throughout the state. UAMS is also retooling its undergraduate curriculum to include more teaching on bioterrorism, disaster preparedness and infectious diseases using an additional federal grant. As far as funding, no funds dispersed to cities or counties for related projects.

Agency: Arkansas Hospital Association
Programs, Plans, Policies, Regulations, Funding or Practices Agency: Hospital Preparedness
Contact: Melody Parsley, Hospital Preparedness Section Chief
501.280.4166, melody.parsley@arkansas.gov
Description: The Arkansas Hospital Association (AHA) is a membership organization, which for 70 years has assisted its members through collective initiatives which facilitate the integration and improvement of the delivery of healthcare services throughout Arkansas. This association is now involved in a variety of disaster preparedness initiatives especially relating to biological hazards but also related to delivering mass care during large scale natural events. The Arkansas Department of Health Hospital Preparedness program is responsible for the coordination of the ASPR Hospital Preparedness Program. ADH partners with the Arkansas Hospital Association (AHA) and 84 acute care hospitals throughout the state to ensure that Arkansas Hospitals are prepared to meet the medical needs of their patients and communities. Several Arkansas hospitals have been involved in real world events including a direct hit by a tornado, no power or water for an extended period during an ice storm and the reception of NDMS patients evacuated prior to Hurricane Gustav. The program works closely with

the hospitals on communication, drills and exercises, mass fatality plans, evacuation and alternate care sites.

Agency: University of Arkansas
Programs, Plans, Policies, Regulations, Funding or Practices Agency: Center of Excellence for Poultry Science
Contact: Fred Dustan Clark, DVM, PhD, Interim Associate Center Director of Extension and Extension Veterinarian 0205 POSC Center of Excellence for Poultry Science
479.575.4375, fdclark@uark.edu
Description: This program is very involved with the poultry industry in the state. This program educates future workers and provides subject matter expertise to businesses and government. As far as funding, no funds dispersed to cities or counties for related projects.

Agency: The Poultry Federation
Programs, Plans, Policies, Regulations, Funding or Practices Agency: NA
Contact: Marvin Childers, President
501.375.8131, marvin@thepoultryfederation.com
Description: The purposes of The Poultry Federation are to promote and protect all poultry interests relating to production, distribution, merchandising and consumption of poultry and poultry products; to disseminate information relating to the various phases of the poultry industry in order to improve and expand markets; to increase efficiency in production and marketing; to encourage and support research in production and marketing of poultry; and to encourage and support youth programs in poultry work. The Poultry Federation has offices in Arkansas, Missouri and Oklahoma. Not a government agency.

Agency: The Emergency Poultry Disease Committee
Programs, Plans, Policies, Regulations, Funding or Practices Agency: NA
Contact: Dr. James Barton, Veterinarian
479.290.2409, james.barton@tyson.com
Description: This committee is made up of private sector veterinarians and industry experts committed to protecting the poultry flocks within the State of Arkansas. They focus on disaster planning, disease identification and surveillance and response/containment issues. Per Dr. George Badley, this committee is made up of state and federal veterinarians, who receive no grant money whatsoever. It's an unfunded committee. They have response plans that information is kept only amongst the members on the committee. They are also part of a tri-state committee in the following states: AR, OK, and MO.

Agency: National Animal Health Monitoring System
Programs, Plans, Policies, Regulations, Funding or Practices Agency: National Animal Health Monitoring System
Contact: George W. Hill, Acting NAHMS Center Director
970.494.7250, george.w.hill@aphis.usda.gov
Description: The National Animal Health Monitoring System (NAHMS) was initiated in 1983 for the purpose of collecting, analyzing, and disseminating data on animal health, management, and productivity across the United States. The NAHMS unit conducts national studies on the health and health management of America's domestic livestock populations. These studies are designed to meet the information needs of the industries associated with these commodities, as identified by people within those industries.

Agency: National Animal Health Monitoring System
Programs, Plans, Policies, Regulations, Funding or Practices Agency: National Surveillance Unit
Contact: George W. Hill, Acting NAHMS Center Director
970.494.7250, george.w.hill@aphis.usda.gov
Description: The National Surveillance Unit (NSU), established by Veterinarian Services (VS) in 2003, is the first unit within VS to have personnel devoted solely to animal disease surveillance and surveillance enhancement. The NSU was established to coordinate activities related to US animal health surveillance, to address the recommendations regarding surveillance in the Animal Health Safeguarding Review, and to facilitate the development of a National Animal Health Surveillance System. The NSU works under the direction of the Veterinary Services National Surveillance Coordinator (Dr. Valerie Ragan) and in collaboration with the National Center for Animal Health Programs, which continues to be responsible for managing and implementing program disease surveillance.

Agency: Animal and Plant Health Inspection Services (APHIS)
Programs, Plans, Policies, Regulations, Funding or Practices Agency: Animal Disease Risk Assessment, Prevention, and Control Act of 2001 (PL 107-9)
Contact: George W. Hill, Acting NAHMS Center Director
970.494.7250, george.w.hill@aphis.usda.gov
Description: Protecting American agriculture" is the basic charge of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS). APHIS provides leadership in ensuring the health and care of animals and plants. The agency improves agricultural productivity and competitiveness and contributes to the national economy and the public health. Arkansas is a full participant in the various programs from APHIS especially related to potential biological hazards that could impact the poultry and cattle industry of the state. Projects focus on monitoring animal health and animal health management practices primarily via specific commodity surveys represent the US population of animals and producers. Activities include survey design, questionnaire design, data collection, data analysis, data summarization and last the dissemination of results. Results are for public consumption via hard copy and postings on the web.

Agency: Department of Arkansas Heritage
Programs, Plans, Policies, Regulations, Funding or Practices Agency: Historic Places and Landmarks Database
Contact: Joia Burton, Grants Administrator
501-324-9880, joia@arkansasheritage.org
Description: The Department of Arkansas Heritage maintains a number of databases with over 20,000 historical locations throughout the state. These listings include buildings, houses, industrial sites, agricultural facilities, cemeteries and other types of structures. These databases are constantly updated and are used to develop better mitigation strategies to protect the historical foundation of Arkansas. Network is backed up once a week.

Agency: Arkansas Archeological Survey
Programs, Plans, Policies, Regulations, Funding or Practices Agency:
Archeological Site Databases
Contact: Dr. Jamie Lockhart, Coordinator
479.575.6551, jlockhart@uark.edu
Description: Automated Management of Archeological Site Data in Arkansas (AMASDA) database now contains more than 44,000 entries for prehistoric and historic sites located throughout the state that have been identified as historical in nature. This includes pre-historic and historic mounds, campsites, cemeteries, battlefields and settlements. This database is constantly updated and is being used to develop better mitigation strategies to protect the historical foundation of Arkansas.

Source: FEMA

5.3 Local Capability Assessment

Local Capability Assessment	
IFR REQUIREMENT 201.4(c)(3)(ii):	[The State mitigation strategy shall include]: a general description and analysis of the effectiveness of local mitigation policies, programs and capabilities.
Explanation:	The plan **shall** include a general description of local mitigation policies, programs, and capabilities. The State **shall** also describe how local pre- and post-disaster mitigation policies, programs, and capabilities, such as building codes, zoning, or land use policies, were evaluated to determine their effectiveness. This *should* include existing and emerging capabilities. The description can be kept general and does not need to be detailed for all localities. The State *should* include in its description the following: implementation opportunities and problems (e.g., financial /staffing resources, lack of informed public, non-mandated improvements, etc.), opportunities for building local capabilities, and problems created by public investment policies (e.g., policies that may have inadvertently promoted public investments in hazard-prone areas). The State *should* highlight local implementation tools, policies, and programs that have proven to be effective in achieving mitigation objectives (e.g., adoption of planning legislation requiring integration of mitigation actions in comprehensive plans).

Local governments have policies, programs and capabilities designed to mitigate – or assist in the mitigation of – the impacts of hazard events on communities. Each community has its own policies, programs and capabilities, depending upon a number of factors such as size of area and population, and amount of funding available through local resources. Regardless of its relative size or wealth, each community will have a core set of policies, programs and capabilities at its disposal related to hazard reduction and mitigation, building codes and land use plans and regulations.

For the 2010 update process, a thorough analysis of the capabilities of local governments across the state (Table 5.3-1) was conducted. The Sub-Committee determined that the implementation of the pre and post disaster policies currently in place has proven to be effective for many jurisdictions. Enforcement of Zoning and Land Use Regulations and floodplain management ordinances continues to mitigate damages and fatalities by regulating the type of development that occurs in hazard prone areas. Implementation of mitigation projects, for example safe rooms in schools, will provide shelter for the residents of the jurisdiction in which they are constructed. The state and local governments have all felt an economic slowdown in the past few years. This has reduced many favorable means in the areas of staffing, informing the public, and mitigation projects for some jurisdictions. Many of the state and local officials have had to reduce spending in various ways to keep budgets from collapsing in these trying times. Many agencies have postponed hiring until there is an economic turnaround. Some are also delaying spending in areas such as public notifications or costly mitigation projects that those match funds could be used for a much more urgent funding need. However, even with the hard economic times, many local governments have still taken advantage of funding opportunities through the FEMA grant programs and this shows how the state's efforts to meet their plan objectives are being accomplished through local mitigation plan integration.

Table 5.3-1: Summary of local capability policies relevant to hazard mitigation in Arkansas

Existing Local Policies			
Policy	***Description***	***Applicability***	***Effectiveness***
Building Codes	State laws enable local governments (cities and counties) to adopt and enforce building permit processes and building codes. State-enforced building code requirements apply only to non-state-owned structures and to state-constructed structures, including public school buildings. The design and construction of other buildings are governed by locally determined and enforced building codes.	The adoption and enforcement of building codes relate to the design and construction of structures for mitigating winds and flood damage. Examples include: requirements for anchoring structural framing to foundations and using hurricane clips and shear-walls; and use of building permits to enforce flood-plain management regulations before construction begins.	Practically all medium and large-sized cities in the state, covering approximately 55% of the state's population and most of its development activity, have adopted and enforced building codes. Few small cities (typically those under 1,500 in population) and no county governments, which have jurisdictional authority over the unincorporated, rural areas of the state, require building permits or have adopted building codes. Without a systematic knowledge of construction planned and underway, localities not requiring building permits lack a practical means to effectively administer a flood plain management program. The 2002 International Building Code was adopted by the state in the 2003 legislative session. This code could achieve blanket coverage beyond those urban areas that have and enforce building codes. (The Attorney General delivered in September 2003 an opinion pertaining to the legality of these codes – Opinion No. 2003-198.)

The Arkansas Fire Prevention Code

The "building code" in Arkansas is part of the Arkansas Fire Prevention Code. The Arkansas Fire Prevention Code consists of three volumes.

- Volume I is the Fire Code based on the International Fire Code
- Volume II is the Building Code based on the International Building Code
- Volume III is the Residential Code based on the International Residential Code.

Arkansas reviews the International Codes and then makes changes to best suit our state. The current version is the 2002 Edition of the Arkansas Fire Prevention Code based on the 2000 Editions of the International Fire, Building, and Residential Codes. The current AFPC went into effect on January 1, 2003. There are chapters in each volume that relate to natural hazards such as earthquakes, floods, tornados, winter storms, and wild fires.

Volume I, the Fire Code, addresses the following areas with respect to hazard mitigation.

- Administration and Enforcement in Chapter 1.
- General Precautions Against Fire in Chapter 2.
- Emergency Planning and Preparedness in Chapter 3.
- Fire-Resistance-Rated Construction in Chapter 7.
- Fire Protection Systems in Chapter 9.
- Means of Egress in Chapter 10.

Volume II, the Building Code addresses the following areas with respect to hazard mitigation.

- Chapter 1 - Administration and Enforcement.
- Chapter 5 deals with General Building Heights and Areas.
- Chapter 9 deals with Fire Protection Systems.
- Chapter 10 deals with Means of Egress.
- Chapter 11 addresses Accessibility.
- Chapter 14 addresses Exterior Walls and Chapter 15 addresses Roof Assemblies and Rooftop Structures.
- Chapter 16, Structural Design (includes Wind Loads, Snow Loads, Rain Loads, and Earthquake Loads).
- Chapter 17, Structural Tests and Special Inspections
- Chapter 18, Soil and Foundations
- Chapter 31, Special Construction

Code Revision and Adoption

The state adopted the new Arkansas Fire Prevention Code in 2007. This new code is based on the 2006 Editions of the International Fire, Building, and Residential Codes. This revision was managed by the Fire Code Revision Committee consisting of approximately 30 people from various disciplines. The committee consists of municipal fire marshals, building officials, architects, engineers, and officials from other state agencies. There are also representatives from the Arkansas Home Builders Association, Arkansas Oil Marketers Association, Manufactured Housing Association, and several

other special interest groups. The Arkansas Fire Prevention Code is adopted in accordance with the Administrative Procedures Act of the State of Arkansas (ACA 25-15-201 through 214).

2007 Arkansas Fire Prevention Code Adopted

The 2007 Arkansas Fire Prevention Code will be effective August 1, 2008. This should allow adequate time for printing and for code officials and design professionals to obtain the new code. The 2007 Arkansas Fire Prevention Code is the result of countless hours of hard work by many dedicated individuals across Arkansas. The 2007 Arkansas Fire Prevention Code, Volume II, will contain Appendix L which will provide an alternative to the seismic design provisions found in the structural design chapter of Volume II. Appendix L was not adopted by the State of Arkansas but will be available for local jurisdictions to adopt by ordinance. The proposed 2007 Arkansas Fire Prevention Code was "reviewed without objection" on April 3, 2008, by the Committee On Administrative Rules And Regulations Of The Arkansas Legislative Council. On January 3, 2008, the Rules Committee asked the State Fire Marshal's Office to reconsider the seismic provisions found in Volume II (Building Code Volume) of the proposed 2007 Arkansas Fire Prevention Code. After several months of diligent work by many individuals and agencies, the conflict was resolved by means of an Appendix to address the seismic concerns. Please feel free to contact the State Fire Marshal's Office if you need additional information.

Application and Enforcement

The Arkansas Fire Prevention Code is adopted by the state and applies statewide. It applies equally in downtown Little Rock as in the rural parts of the state. Many cities adopt the AFPC by way of a local ordinance; however this action is not necessary to allow enforcement.

- Many cities have full time career fire departments with members assigned as inspectors or fire marshals. Most of these same cities also have building departments with inspectors and plan reviewers.
- Most of Arkansas is rural and served by volunteer fire departments. Most of these departments do not have members who are familiar or trained in code enforcement or plan review. Since these departments are volunteers, it is difficult for them to address fire and building code issues even with additional training.

The development maintenance of the Fire Prevention Code is one of the most important local capabilities for promoting hazard mitigation. However, the state recognizes the requirements for additional enforcement especially in the rural areas that are geographically at high risk to the various natural hazards.

Existing Local Policies			
Policy	***Description***	***Applicability***	***Effectiveness***
Zoning & Land Use Planning and Subdivision Regulations	State laws enable local governments to adopt and enforce zoning based upon locally developed and adopted land use plans. Adoption of land use regulations is a local government decision. There are no state-prepared comprehensive land use plans or provisions for land use controls at the state government level.	Zoning can keep inappropriate development out of hazard-prone areas and can designate certain areas for such things as conservation, public use, or agriculture. Zoning regulations are administered by planning commissions, established by local government ordinances and comprised of citizens appointed by the local governing bodies. Several cities, particularly the larger ones, have chosen to exercise "extra-territorial jurisdiction" within x-miles of their city limits, allowing these governments to enforce their land use regulations relative to platted subdivisions in these outlying areas. A few of the state's largest cities (notably Little Rock and Fort Smith) are enabled through state legislation to extend zoning into these extra-territorial areas.	Though numerous city governments in the state have adopted zoning land use plans and zoning ordinances, typically only the largest (10,000 population and larger) have professional planning personnel to provide consistent and on-going enforcement of land use regulations. Land use controls are politically unacceptable in the rural areas of the state, thus only a handful of counties (Pulaski & Washington may be exceptions) have adopted land use regulations. It is not likely this will change in the near future. As a practical matter, because most of the new development in the state is occurring in or near high-growth cities having active land use planning programs exercising extra-territorial enforcement, most of the currently new private development in the state is subject to some measure of land use controls. Subdivision Regulations, typically a component of cities' zoning and building permit regulations, offer highly effectively tools for cities to control land displacement, drainage, contour enhancement and other improvements that directly impact hazard mitigation. Working with the Municipal League and city governments, the state can help effect and promote, through state laws and technical assistance, pro-active mitigation activities that cities across the state might achieve using subdivision regulations and building codes.
Existing Local Policies			
Policy	***Description***	***Applicability***	***Effectiveness***
Local Emergency Management	Each county in Arkansas has a local emergency management program to coordinate efforts to plan for and respond to a wide range of natural and man-made hazards. These programs vary based on the size, population, hazards and financial situation of the county. Each of these programs has an area coordinator who acts as the liaison to	Human resources are most important in emergency planning. The area coordinator position for each county is vital to the overall planning efforts. These emergency management personnel and their associate area coordinators are very involved in mitigation planning and usually act as the person of primary responsibility for meeting the requirements of DMA 2000. By developing	These programs are very effective. They are central organizations in the statewide preparedness efforts and they are the lead local agent for the implementation of various federal programs related to homeland security and disaster preparedness. These programs are extremely effective at coordinating resources, developing plans, facilitating trainings and conducting readiness exercises.

	ADEM with respect to state and federal initiatives and funding opportunities.	detailed emergency plans, facilitating trainings and conducting exercises, these people improve the effectiveness in the area and protect the population and critical facilities.	

Existing Local Policies			
Policy	***Description***	***Applicability***	***Effectiveness***
Floodplain Management	The following state laws govern floodplain management: Chapter 268. Flood Loss Prevention: 14-268-101. Legislative determination. 14-268-102. Definitions 14-268-103. Penalty. 14-268-104. Authority to adopt measures 14-268-105. Public nuisance - Injunction or abatement 14-268-106. Floodplain administrator. 15-24-102 Commission Powers and Duties General 15-24-109. Accreditation of floodplain administrators.	There is no state or federal grants for local governments to help support the cost of floodplain management. Though all counties and cities are expected to participate in the NFIP in order to qualify for hazard mitigation assistance, funding and staffing are entirely local responsibilities.	Floodplain management is generally not a priority for cities and counties. For counties, management of the floodplain program is typically assigned to the county director of emergency services; for the larger cities, the job is typically assigned to the city department issuing building permits or the city engineering department; and for small cities, with limited to no full-time staff, the designee is the mayor, who for almost all small cities is mayor only on a part-time basis. For practically all of the locally designated floodplain program managers, oversight of the program is only one of many responsibilities.

The Natural Resources Commission provides oversight for all local floodplain management training. Compliance with state flood loss prevention statutes is required for a community to remain in good standing with the National Flood Insurance Program (NFIP), and Title XIV of the Arkansas Code Ann. §14-268-106 requires that Floodplain Administrators be accredited by the Arkansas Natural Resources Commission (ANRC, formerly the Arkansas Soil and Water Conservation Commission). Renewal of accreditation under the provisions of §1803.1 *et. seq* of Title XVIII of the ANRC Rules governing the Floodplain Administrator Accreditation Program is a three-step process:

1. The Floodplain Administrator must submit the attached renewal application form.
2. The Floodplain Administrator must submit the required fee.
3. The Floodplain Administrator must complete the required continuing education.

2010 Update

Ten (10) one-day workshops will be held at various locations around the State. These workshops are intended for both experienced and new floodplain administrators. They give local floodplain administrators a chance to ask questions and be updated on important activities and changes in floodplain management, the National Flood Insurance Program (NFIP), new flood maps, and other issues. On October 1, 2009, as part of FEMA's Digital Vision initiative, the FEMA Map Service Center discontinued general distribution of paper mapping products. This affects Flood Insurance Rate Maps, Flood Hazard Boundary Maps, Flood Boundary and Floodway Maps, and Flood Insurance Study reports. The focus on 2009 workshops is accessing and using digital map products from a variety of sources.

As of June 17, 2010 there were 402 local floodplain administrators in the State of Arkansas. The state is continuing its efforts to educate local officials on the importance of properly administered programs and program administrators on management techniques. The state is also considering encouraging, perhaps through financial incentives, certified local floodplain managers to provide training and technical assistance to other communities in their region. The planning and development districts in the state could be engaged to assist with this effort.

Existing Local Policies			
Policy	***Description***	***Applicability***	***Effectiveness***
Local Public Health	Each county has a County Health Unit and each of the five geographic Public Health Regions of the state has a regional Health Office. These units are jointly sponsored by the local county and by the state to ensure a variety of health-related services.	The County Units and Regional Offices along with the staff members that support them (full-time, part-time and volunteer) are involved in a variety of day-to-day health services as well as being responsible for local disaster planning and any related hazard mitigation activities. These units are primary responders for any biological hazards and are responsible for health care issues during natural hazard events.	Public health is an important aspect for all local governments. These agencies support the public with programs related to human immunodeficiency virus (HIV), personal immunization, maternity issues, laboratory services, radiation health near ANO, as well as a variety of other day-to-day health issues. The management of these departments is usually a full-time director with a staff size respective to the population, the current issues and the budgetary constraints. These programs are extremely effective at providing care and information to the general public. These units have become much more effective in the past few years due to the new nationwide focus on public health and potential biological hazards and bio-terrorism fears. Most of these agencies have received additional funding and support from the state and from the federal government or improved technology and internet connectivity via Health Alert Network (HAN), emergency planning and new equipment for radiation detection and disease surveillance capabilities.

Existing Local Policies			
Policy	***Description***	***Applicability***	***Effectiveness***
Local Emergency Planning Committees	The federal government has enacted a variety of laws to protect the general population from hazardous materials including the Community Right to Know Act, the Superfund Act and SARA Title 3 reporting for chemicals. In conjunction with these laws, each local area is required to establish an LEPC to monitor HAZMAT issues. Each county in Arkansas has established an LEPC with the County Emergency Management Coordinator, members of the community, and local businesses with expertise with chemicals.	These committees are used for hazard mitigation. They meet regularly and discuss local issues pertaining to hazardous materials and chemicals at fixed facilities as well as materials transported through the area. These committees work with local businesses and with other federal, state and local government agencies to maximize the protection of the citizens while causing minimal financial impact to local businesses.	Some LEPC are extremely effective and some are less so. LEPCs in areas with large facilities and large quantities of chemicals are generally better attended and better funded while some rural areas with no significant hazards have a standing committee to meet the federal requirements but these groups do not have any issues or responsibilities. These LEPCs in Arkansas work together with ADEM to identify hazardous material issues, to inform the public about hazards in their area and assist the local county coordinators with disaster planning related to these human-caused hazards.

5.4 Mitigation Actions

Mitigation Actions	
IFR REQUIREMENT 201.4(c)(3)(iii):	[The State plans shall include an] identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering and an explanation of how each activity contributes to the overall mitigation strategy. This section should be linked to local plans, where specific local actions and projects are identified.
Explanation:	Based on the risk assessment portion of the plan, the State **shall** include in its statewide mitigation strategy actions it has identified through its planning process as well as those actions identified in Local Plans. The State *should* describe what agencies and interested parties were involved in identifying priorities, how actions were evaluated, and how such actions correspond to the plan's mitigation goals and objectives. Mitigation actions *should* be directly tied to goals and objectives and provide the means to achieve them. Actions can be: Statewide or property specific. Regulatory or programmatic. Targeted at government agencies or private industry. Construction activities or public outreach.

Mitigation Action Agenda

The Hazard Mitigation Planning Sub-Committee, ADEM Mitigation Branch staff, and the general public (through an online survey and public meetings) considered numerous mitigation goals during the mitigation prioritization process. These meetings are detailed in Chapters 1-3 of this plan. State mitigation goals and objectives have been reviewed by the Mitigation Advisory Council. The list of goals and objectives for the latest plan (Version 4) were reviewed and accepted during the last council meeting on January 20, 2010 in Little Rock, Arkansas. The following list details mitigation measures in the State of Arkansas.

State Mitigation Goals

The reduction of vulnerability in Arkansas to all hazards and the promotion of sustainable infrastructure and environment.

Identify mitigation grant opportunities for state and local governments, their sub-jurisdictions and the general public, and provide effective technical support.

Offer training, education, and technical assistance to local jurisdictions as they develop local hazard mitigation plans and mitigation projects.

Formulate objectives using state of the art knowledge to reduce vulnerability to all identified hazards.

Prioritizing Mitigation Actions

The Mitigation Action Agenda represents the mitigation actions and initiatives identified by the State Hazard Mitigation Planning Sub-Committee for the state government of Arkansas to pursue during the next three years. (State agency mitigation actions and initiatives are explained in the Mitigation Objectives and Actions Table of this plan). This action agenda was reviewed by the state agencies participating in the state plan, other non-participating but interested state agencies, local emergency management organizations, and others before being submitted to the Arkansas Department of Emergency Management for approval and promulgation. All local mitigation plans will be available for evaluation of local mitigation actions and incorporated into this plan.

High priority actions were those deemed both very necessary to meeting the goals agreed upon and listed at the head of each subsection of mitigation actions, as well as those that fit well with the criteria listed in the STAPLEE table below.

STAPLEE defined: The selected criteria that FEMA has proposed for all jurisdictions to consider consist of a common set of evaluation criteria, known as the STAPLEE evaluation criteria. This set of criteria will enable you to examine the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) opportunities and constraints of implementing a particular mitigation measure using a consistent framework.

Medium priority actions were those deemed very necessary to meeting the listed goals, but not meeting all of the STAPLEE, particularly technical feasibility or cost effectiveness. Low priority actions are those that are deemed important to meeting the mitigation goals, and may be of questionable economic feasibility or technically difficult to implement. All of the actions have been deemed environmentally sound. Actions are not sequential; each high priority action is an on-going effort by ADEM to meet each of the broad mitigation goals. The identified mitigation actions and initiatives in this section are not in a 1-2-3 order. The actions within each priority range are concurrent and non-sequential. The reason for this is that the philosophy of the State Hazard Mitigation Branch to foster holistic state agency and local programs is to make hazard mitigation a way of doing business. Rather than encouraging eligible agencies to just develop a list of planning and construction projects for federal hazard mitigation grants when they become available, the state program encourages agencies and organizations to include mitigation as they consider construction and location of new buildings, make existing facilities safer, and as they develop strategic plans for organization operations.

The State Hazard Mitigation Branch also does not target available resources to a handful of local jurisdictions or to just a few hazards. Pouring most or all available resources into a small area (three to five flood-prone counties, for example) or for limited mitigation tasks (for elevating or purchasing of repetitive loss properties, for example) is politically untenable and it discourages non-funded jurisdictions from developing hazard mitigation programs.

The State Hazard Mitigation Branch requires any mitigation project proposed for funding through the federal hazard mitigation grant programs to meet the following objectives:

1. Support the goals and objectives of the State of Arkansas All-Hazards Mitigation Plan.
2. Reduce identified hazard risk.
3. Prevent repetitive losses.
4. Protect critical areas from natural and man-made hazards.

Proposed state projects must compete with projects proposed by eligible local governments; this ensures that federal grant-funded state and local projects address state hazard mitigation priorities.

Any state government construction project – regardless of the potential funding source – has to be cost-effective, technically feasible and meet all appropriate federal, state, and local environmental laws and regulations before it is started.

State government projects funded by federal hazard mitigation grant programs administered by the Arkansas Department of Emergency Management have to meet specific criteria related to cost-effectiveness, environmental soundness, and technical feasibility. These criteria are established in the state's Hazard Mitigation Branch administrative plan and the hazard mitigation projects will be evaluated using the agency capabilities and priorities invoked in the following table.

Prioritization and Review Criteria

Evaluation Category	Sources of Information
Social	Members of local, county and state government were members of the Hazard Mitigation Planning Sub-Committee (HMPSC) and had input throughout the planning process. It must be noted that many small town political leaders are also business or professional persons. Community priorities must be evaluated within the context of social effects on communities. Existing community plans will be used wherever possible. Members of the media were contacted and invited to attend all HMPSC meetings.
Technical	The following persons/agencies were consulted regarding the technical feasibility of the various projects: Arkansas Geological Commission, University of Arkansas Extension Service, Arkansas Natural Resources Commission, Arkansas Health Departments, Arkansas Highway and Transportation Department, Arkansas Department of Environmental Quality, Arkansas Governor's Pre-Disaster Advisory Council, Arkansas Governor's Earthquake Advisory Council, and Arkansas Forestry Service. All of these had their comments and suggestions incorporated. Technical expertise will be a requirement for any local action, and building technical expertise is also a mitigation objective.
Administrative	Staffing for proper implementation of the plan currently will rely on existing members of the various agencies involved. It is the opinion of the HMPSC that insufficient staff is available due to budget constraints, as the staff has been cut to a minimum and many agencies have staff members who are overloaded with work. Technical assistance is available from various state agencies. Some local jurisdictions have incorporated hazard mitigation efforts into their Capital Improvement Plans. Operations costs are under discussion by the relevant department heads.

Political	The governor of Arkansas has issued an Executive Order instructing all state agencies to assist ADEM in mitigation planning and implementation of mitigation goals. Political considerations will also be evaluated locally for actions.
Legal	Members of the HMPSC discussed legal issues with the county commissioners, and it was their opinion that no significant legal issues were involved in the projects that were selected by the HMPC.
Economic	Economic issues were the predominant issues discussed by all concerned. Each entity felt that the projects selected would have a positive effect, in that the projects would attract business and recreation to the areas and help the community be better prepared for a disaster. Funding for the various projects was a major concern as local budgets were not capable of fulfilling the needs, due to the economic downturn. Reliance on outside grants will be relied on heavily for completion of projects.
Environmental	Arkansas Department of Environmental Quality, Arkansas Forestry Commission, and the Arkansas Natural Resources Commission were all consulted regarding the environmental impact of the various projects and it was felt that there would be no negative impact. Local governments are currently considering zoning of environmentally sensitive areas.

In the following mitigation actions, the evaluation of the criteria outlined was used to prioritize each action and is presented in a column with each action. As stated above, high priority actions were those deemed both very necessary to meeting the goals agreed upon and listed at the head of each subsection of mitigation actions, as well as those that fit well with the criteria listed in the STAPLEE table above. Medium priority actions were those deemed very necessary to meeting the listed goals, but not meeting all of the STAPLEE, particularly technical feasibility or cost effectiveness. Low priority actions are those that are deemed important to meeting the mitigation goals, and may be of questionable economic feasibility or technically difficult to implement. All of the actions have been deemed environmentally sound. Actions are concurrent and non-sequential; each high priority action represents an on-going effort by ADEM to meet each of the broad mitigation goals.

The provided mitigation action table displays information on and prioritization of the objectives and actions for each goal. The responsible agency, the timeline, funding sources, guiding rationale, and contribution to each goal were noted. The table also shows which STAPLEE guidelines were met by the action, as well as priorities for each action based on the STAPLEE categories.

The HMP Sub-Committee reviewed the cost effectiveness for each mitigation action listed in the mitigation plan. Some projects are pending a benefit-cost analysis before final implementation.

Mitigation for Elimination, Modification and Control of Hazards

The HMP Sub-Committee has considered a wide range of mitigation strategies and projects to eliminate and reduce damages across the state. The first strategies to be considered related to the ability for planners and responders to affect or control the various identified hazards. However, the team understood that these are usually the least effective measures due to man's lack of power over the weather and natural phenomena. In general the HMP Sub-Committee has determined that the State of Arkansas has little to no control over the hazards that may potentially affect the citizens and infrastructure. There are practically no opportunities for the emergency management community to significantly impact these events prior to their happening.

The EMAP standards for mitigation specifically reference the following four overarching strategies to be considered:

- Removal or elimination of the hazard.
- Reduction or limitation of the amount or size of the hazard.
- Modification of the basic characteristics of the hazard.
- Control of the rate of release of the hazard.

Based on these four strategies the HMP Sub-Committee has admitted its limited power to mitigate under these circumstances. See below for specific comments related to each identified hazard:

- Tornado: There are no strategies or actions that can be taken to eliminate or reduce the severity of a tornado. The efforts the committee makes are to attempt to shelter the public in the event of a tornado.
- Severe Winter Weather: There are no strategies or actions that can be taken to eliminate or reduce the severity of a winter storm in an area. The efforts the committee makes are to reduce or eliminate some of the effects of an event.
- Flood: There are some strategies that can be taken to reduce or eliminate floods such as drainage projects, storm water management plans, and dam and levee development. This hazard is one of the few natural hazards that can be affected; especially flash flooding in urban environments.
- Earthquake: There are no strategies or actions that can be taken to eliminate or reduce the severity of an earthquake in an area. The efforts the committee makes are to attempt to reduce damage to structures and infrastructures when an event occurs.
- Wildfire: There are a variety of strategies for controlling, reducing and eliminating wildfires, such as brush control, forest management, and minimizing the contact between people with fire and dry, at-risk locations.
- Landslide: In general, there are no strategies or actions that can be taken that will eliminate or reduce the severity of a landslide in the area. However, some structural projects at known at-risk locations could limit the landslide potential.
- Expansive Soil: There are no strategies or actions that can be taken to eliminate or reduce the severity of expansive soil in an area. Locations with expansive soil history can be avoided for future development sites.
- Straight-line Winds: There are no strategies or actions that can be taken to eliminate or reduce the severity of straight-line winds in an area.
- Drought: In general, there are no strategies or actions that can be taken to eliminate or reduce the severity of a drought in an area. However, water conservation can help in prolonging the pre-drought period.
- Hazardous Materials: There are ways to eliminate or control the overall HAZMAT hazard in the state; however this would require new laws and regulations and enforcement. The amount of hazardous materials in the state could be significantly limited and controlled but it would require a major shift in state policy and would force change on a large number of businesses and individuals.
- Nuclear Events: This hazard could be eliminated or controlled by shutting down the ANO plant. However, this location supplies a significant portion of the state's electricity, so it is highly unlikely that the state government would seek to curtail the operations of this vital location.
- Terrorism: The mitigation actions and strategies to eliminate or reduce the severity of terrorism are very limited for this hazard mitigation plan. However, the

State of Arkansas is always working with the Department of Homeland Security to reduce or eliminate the threat of terror.

- Biological Event: To a large extent, there are no strategies or actions that can be taken to eliminate or reduce the severity of a biological event in an area. However, there are actions that can be taken to prevent diseases from entering the state. These include border inspections, and on-going surveillance.

Local Plan Input for State of Arkansas Mitigation Strategy

The HMP Sub-Committee researched and collated data from each FEMA approved local hazard mitigation plan. These plans include as of January, 2010:

• Arkansas County • Ashley County • Benton County • Bradley County • Calhoun County • Chicot County • Clark County • Clay County • Cleburne County • Cleveland County • Columbia County • Conway County • Craighead County • Crawford County • Crittenden County • Cross County • Dallas County • Desha County • Drew County • Faulkner County • City of Foreman • Franklin County • Fulton County • Garland County • Grant County • Hempstead County • Hot Spring County • Howard County • Independence County • Jackson County • Jefferson County • Johnson County • Lafayette County	• Lawrence County • Lincoln County • Little Rock • Logan County • Lonoke County • Marmaduke School District • City of Mena • Monroe County • Montgomery County • Miller County • Mississippi County • City of Mountain View • North Little Rock • Ouachita County • Perry County • Phillips County - pending adoption • Pope County • Poinsett County • Pike County • Prairie County • Pulaski County • Saline County • Scott County • Sebastian County • Sevier County • Sharp County • St. Francis County • Union County • Washington County • White County • Woodruff County

Through the local mitigation plan review process, it is mandatory that ADEM perform a state-level review of each local jurisdictional mitigation plan before submission to FEMA. The “proposed” and “on-going” mitigation actions listed in each local mitigation plan must benefit the overall State of Arkansas mitigation strategy. Local mitigation goals, although varied by region, must still facilitate overall state objectives.

The mitigation actions were evaluated for the effectiveness to the mitigation strategies using a scale to determine the usefulness of the project for the hazard mitigation plan. A score was given to each mitigation action to rate efficacy. Below is a list of the rating scale:

1. The objective has been met and/or is continued = very effective.
2. The objective is close to being met = effective.
3. The objective has been started but is less than 50% of being met and effectiveness in not known.
4. The objective has not been started and effectiveness is unknown.

GOAL 1: The reduction of vulnerability in Arkansas to all hazards and the promotion of sustainable infrastructure and environment.

Objectives	Actions	Responsible Agency	Projected Timeline	Projected Resources	Rationale for Action	Contribution to Mitigation Objective	STAPLEE	Project Cost-Effective	Priority	Version 4 Comments and Evaluation 2010
1.1 Research and participate in all appropriate federal programs including FEMA, DHS, CDC, and others.	**1.1.1** Place FEMA and ADEM under the DHS umbrella to streamline operations.	DOD, DHS	On-going	PDM HMGP Existing state resources	Streamline operations and de-duplicate goals and objectives for each agency.	Funding for mitigation projects is streamlined through ADEM administrators	Meets all criteria	Yes	High	New Data **Evaluation: 4** Has not started.
1.2 Hold regular meetings to communicate mitigation goals, objectives and actions with federal, state, county, and local jurisdictions and stakeholders from the private sector.	**1.2.1** Continually update membership of a Hazard Mitigation Planning Sub-Committee, and hold regular meetings of the Sub-Committee.	ADEM/Mitigation	On-going	PDM HMGP Existing state resources	Involves encouragement of participation at all public and private levels.	Communication is a must to institutionalize mitigation and sustainability.	Meets all criteria	Yes	High	Membership still active and currently holding meetings twice per year. The last meeting was held on Jan. 20, 2010. **Evaluation: 1** Considered productive and vital.
1.2	**1.2.2** Continue to assist the Governor's Pre-Disaster Mitigation Advisory Council and the Governor's Earthquake Advisory Council.	ADEM, AGC	On-going	PDM, HMGP, Existing state resources	Involves on-going efforts on mitigation.	Regular meetings are a good way to communicate.	Meets all criteria	Yes	High	Membership still active and holding meetings twice per year. The last meeting was held on Jan. 20, 2010 in Little Rock, Arkansas. **Evaluation: 2** Considered productive and vital.

1.2	**1.2.3** Open formal communication to facilitate regular contact with Local Emergency Planning Committees [LEPC]	ADEM/Disaster Management	On-going	Existing state resources	LEPCs are all involved in local mitigation planning	Links mitigation with preparedness.	Cost effectiveness under consideration	Yes	Medium	Each local LEPC is contacted by Local ADEM Coordinator no less than once per year. The Arkansas State Emergency Response Commission currently aids in all LEPC dialogue. **Evaluation: 2** Considered productive and vital.
1.2	**1.2.4** Formally include the public health agencies throughout the state in the mitigation planning process for expert input on biological hazards.	ADEM and Arkansas Department of Health	On-going	PDM, HMGP, Existing state resources	Biological hazard to humans, poultry and cattle is considered a high priority. Therefore subject matter expertise is required to plan and respond to these types of events.	Links mitigation to preparedness on these biological issues.	Meets all criteria	Yes	High	Public Health Agency officials currently serve on the Governor's Pre-Disaster Mitigation Advisory Council. **Evaluation: 2** Biological hazard information is vital to the state.

1.2	**1.2.5** Establish a full-time position for coordination between ADEM and the Department of Health.	ADEM and Arkansas Department of Health	On-going	CDC grant funding including bioterrorism preparedness and Health Resources and Services Administration (HRSA) funds.	ADEM requires subject matter expertise on public health matters for biological events, and for mass care issues. Therefore this position has been created and will be maintained in the future as a planning liaison between the two departments.	Facilitates inter-agency coordination between ADEM and the Department of Health. Assists Department of Health with emergency planning and response priorities.	Meets all criteria	Yes	High	Position is currently filled and funded. Applications for funding will continue as needed. **Evaluation: 2** Position is vital to the state.
1.2	**1.2.6** Continued participation with CDC and DHS for the establishment and the distribution of pharmaceuticals under the federal Strategic National Stockpile (SNS) program.	Arkansas Department of Health	On-going	CDC grant funding	The federal government has instituted the SNS and considers it a priority strategy in combating potential bioterrorism events and other types of biological hazards. This program requires state and local participation for effective storage and distribution.	Ensures that appropriate vaccines and other medications will be available in times of great distress. This stockpile will reduce the number of victims and assist with disease containment issues.	Meets all criteria	Yes	High	ADEM collates information from CDC to prepare for SNS pharmaceutical distribution events. ADEM is now structured as a direct extension of the Department of Homeland Security. **Evaluation:2** Participation is vital to the state.

1.2	**1.2.7** The Department of Health has established a set of full-time positions for regional area response coordinators to assist communities with public health bioterrorism preparedness.	Arkansas Department of Health	On-going	CDC grant funding	Many local public health agencies do not have subject matter expertise in disaster planning. These positions provide points of contact for local agencies in their coordinated effort with the State Department.	Assists with meetings and communications between the local health departments and staff and the State Department of Health.	Meets all criteria	Yes	High	Position is currently filled and funded. Applications for funding will continue as needed. **Evaluation: 2** Positions are vital to the state.
1.2	**1.2.8** Continue Citizen Corp. participation	ADEM/Administration Division	On-going	Homeland Security Grant	Large scale events will require the cooperation and assistance from local personnel.	Promotes efforts to involve a wide range of volunteer groups in activities that enhance individual, community, and family preparedness and contribute to the strengthening of homeland security.	Meets all criteria	Yes	High	ADEM has added a Citizen Corp. council to establish an RFP process for all CCP Grants **Evaluation:2** Position is vital to the state.
1.2	**1.2.9** Conduct nuclear event exercises with ANO and local jurisdictions.	ADEM	On-going	Existing state resources	Event at ANO will impact the facility and all of the surrounding jurisdictions.	Promotes the communication and response techniques for an event at ANO.	Meets all criteria	Yes	High	ANO exercise performed on annual basis. **Evaluation: 2** Exercises are an important part of being prepared for disasters.

1.2	**1.2.10** Provide local residents with an Emergency Instruction Booklet (EIB), an evacuation and response information booklet regarding ANO.	Arkansas Department of Health	On-going	Departme nt of Health	Local residents need information about what to do during an event at ANO.	Provides information to residents about ANO and actions to be taken during a nuclear event.	Meets all criteria	Yes	High	EIB has been completed and distributed. This booklet is updated based on AAR from annual exercise. **Evaluation:2** Will be continued as needed.
1.2	**1.2.11** Conduct annual pipeline event training classes for local first responders.	ADEM	On-going	Private sector pipeline companies	Up to date response techniques and pipeline information reduces risk of injury when responding to a pipeline event.	Trains local first responders on how to respond to a pipeline event.	Meets all criteria	Yes	High	Pipeline training events are active and are continued through the "Arkansas 1 Call" initiative. **Evaluation: 2** Training exercises are an important part of being prepared for disasters.
1.2	**1.2.12** Conduct weekly test of ANO warning sirens.	Arkansas Department of Health	On-going	Arkansas Departme nt of Health	Siren notification is a timely and effective mode of communication for notifying residents of an event at ANO.	Ensures the operation of warning sirens to protect the general public.	Meets all criteria	Yes	High	Weekly tests are completed and on-going to date. **Evaluation: 2** Exercises are an important part of being prepared for disasters.

1.3 Institutionalize hazard mitigation by educating and assisting the Governor's Office and the Arkansas General Assembly in developing policies and state legislation that will further hazard mitigation and sustainability.	**1.3.1** Brief elected officials frequently on the benefits of hazard mitigation and sustainability.	ADEM	On-going	Existing state resources	Legislative awareness is invaluable.	Provides legal underpinning for mitigation activities.	Meets all criteria	Yes	High	ADEM director briefs governor on hazard mitigation in Arkansas. **Evaluation: 2** Informing the public and local officials is important to the state.
1.3	**1.3.2** Advocate inclusion of sustainable development policies and pre-disaster mitigation opportunities in public policies.	ADEM, Governor's Office	On-going	Existing state resources	Sustainability and mitigation are inseparable.	Creates institution of mitigation and sustainability.	Meets all criteria	Yes	High	Milestones have been accomplished in this area over the past 3 years. These include policies building codes SB984 and HB2022. **Evaluation: 2** Policies are vital to the state and local governments.
1.3	**1.3.3** Re-organize the Department of Health to become a division within the Department of Health and Human Service.	Governor's Office, State Legislature, Department of Health	On-going	Existing state resources	The Department of Health will be able to function with better coordination in conjunction with the staff of the Department of Human Services. This organization is able to meet strategic priorities with a larger budget and larger staff.	This develops a larger organization that is better able to plan for and respond to biological hazards and mass care events.	Meets all criteria	Yes	Low	This re-organization was completed, and reversed in 2007. The Arkansas Department of Health will exist as a stand-alone entity **Evaluation: 4** This action will continue to be looked in to.

1.3	**1.3.4** Establish procedures for assessing recovery after HAZMAT/biological events such as returning to buildings and general oversight guidance.	Department of Health	On-Going	Hazardous Materials Emergency Preparedness Training and Planning Grant, Existing state resources	Procedures are necessary for assessing the aftermath of hazardous materials releases or biological events. Also procedures for determining the safety of contaminated buildings before they are re-opened to the public.	This preparedness effort assists with the overall mitigation efforts in the state.	Meets all criteria	Yes	Medium	Procedures have been completed, and are updated with coordination from the Department of Health. **Evaluation:2** Resiliency from disaster events is important to the state.
1.3	**1.3.5** Advocate the implementation of laws and regulations related to the subject of quarantine in times of disease outbreak.	Department of Health, ADEM, Governor's Office	On-going	Existing state resources, CDC grant funding	Quarantine issues are highly charged and can have profound ramifications for the people affected. Many will not voluntarily submit to the time constraints and financial effects of quarantine without legal implications.	These new laws could significantly assist responders in containing outbreaks without wasting time and effort enacting quarantine procedures.	Meets all criteria	Yes	High	Judges in Arkansas are provided guidance outlining specific laws that can be enacted in times of disaster, or an epidemic. **Evaluation: 2** Laws and regulations are important to protect the public.
1.3	**1.3.6** Realign the state regions for emergency management and public health so that they all match. This will be better for regional	ADEM and the Department of Health	2 years Proposed Status"	DHS and CDC grant funding	The state has been divided into regions by each organization but the regions do not match. Some counties have to meet with different regions for different purposes. This	This regional realignment will contribute to mitigation by making it easier for all counties to work together in coordinated regions as opposed to one region for	Meets all criteria	Yes	Medium	This project has not been selected as an "action item" to this point **Evaluation: 4** This is still being looked into.

	coordination.				realignment would benefit these counties and the state as a whole by simplifying this regional coordination.	emergency management and another for public health.				
1.3	**1.3.7** Manage and fund the school safe room program in Arkansas	Governor's Office	On-going	PDM-C and HMGP	Build community sized safe rooms and shelters at school locations across the state.	Safe rooms save lives.	Meets all criteria	Yes	High	From 2007 to 2010 a total of 22 safe rooms have been completed in AR totaling over $10,000,000.00 . **Evaluation:2** This is an important program to the state.
1.3	**1.3.8** Manage and fund the individual safe room program in Arkansas	Governor's Office	On-going	PDM, HMGP, State Funds	Fund safe rooms and in-ground shelters for citizens across the state	Safe rooms save lives.	Meets all criteria	Yes	High	From 2007 to 2010 over 3,000 individuals have received funding through this project. **Evaluation:2** The safe room program is an important program to the state.
1.3	**1.3.9** Work with the USDA APHIS Veterinary Services to continue participating in the Domestic Detection and Surveillance	Arkansas Livestock and Poultry Commission	On-going	APHIS grants, Existing state resources	This federal program is extremely important for early detection of disease cases. Local participation and reporting is vital to this program.	This program is instituted at the national level in partnership with state and local government for reporting and implementation.	Meets all criteria	Yes	High	USDA APHIS is active with many Domestic Detection and Surveillance Programs **Evaluation: 2** Domestic detection and surveillance of

	Program including on-going programs from the National Surveillance Unit and the National Animal Health Monitoring System.									animals is important to the state.
1.3	**1.3.10** Create state drought plan and appointment of state climatologist.	ANRC	On-going	PDM	State needs a drought strategy and an officer to administer it.	Furthers hazard mitigation and sustainability.	Technical feasibility under considerati on	Yes	Medium	Arkansas now has a state climatologist. Will apply for funding as needed. **Evaluation: 2** A state climatologist is important for coordination of weather related issues throughout the state.
1.4 Expand mitigation opportunities throughout Arkansas.	**1.4.1** Publicize mitigation program successes through news media and on the ADEM website.	ADEM	On-going	HMGP, Existing state resources	Mitigation successes are important for motivation.	FEMA promotes mitigation successes.	Technical feasibility under considerati on	Yes	Medium	Mitigation success stories currently posted on ADEM website and news media outlets. **Evaluation: 2** Informing the public on success stories is vital to the current programs.
1.4	**1.4.2** Work with Arkansas Natural Resources	ADEM, ANRC	On-going	Existing state resources	CRS and NFIP are important to the economic health of	CRS provides for provisions and extra protection for communities.	Political feasibility and cost effectivene	Yes	Medium	In Arkansas, over 60 counties and 320 towns and

	Commission [ANRC] to aid communities in qualifying for CRS NFIP rating.				communities.		ss rated per community			cities have joined the NFIP since its creation in 1968. **Evaluation: 2** Any program that helps communities to reduce or eliminate the threat of flooding is essential.
1.4	**1.4.3** Perform acquisition and/or relocation of repetitive-loss properties.	ADEM, ANRC	On-going	PDM, HMGP, FMA, SRL, and RFC	Prevent repetitive loss.	Economic priority.	Cost effectiveness under consideration per property	Yes	High	Currently ADEM has applications a sent to FEMA to acquire 6 repetitive loss properties totaling $950,400.00. **Evaluation: 2** Any program that helps communitie to reduce or eliminate the threat of flooding is essential.
1.4	**1.4.4** Develop Continuity of Operations Plans for all state departments and agencies.	ADEM, and all state organizations with vital functions	On-going	DHS/FEMA grants, state budgetary funds	Continuity of Operations planning is a vital way to minimize any disruptions to vital government services.	This planning effort would prevent loss of important data and ensure that the state government is able to continue operating in times of distress.	Meets all criteria	Yes	High	COOP project is in progress in AR. Project is in "plan maintenance" phase. **Evaluation: 2** This is an important program to the state.
1.4	**1.4.5** Distribute NOAA All-Hazard radios.	ADEM	On-going	HMGP	Part of preparedness is severe weather notification.	Important part of sustainability.	Meets all criteria	Yes	High	All-Hazard radios are available to CSEPP residents

										outside of siren range free of charge. **Evaluation: 2** Public awareness is important to all communities in the state.
1.4	**1.4.6** Publish and disseminate the USDA APHIS information about bio-security for poultry.	Arkansas Livestock and Poultry Commission, ADEM	On-going	USDA APHIS, and CDC	The USDA has produced a detailed document with the top six methods for preventing the spread of disease. This document will be re-produced and made available to commercial and private poultry farmers as a viable mitigation strategy.	These recommendations are very important to containing a disease outbreak.	Meets all criteria	Yes	Medium	Pan-Flu and other literature are produced and disseminated to the poultry industry throughout AR **Evaluation: 2** Public awareness is important to all communities in the state.
1.4	**1.4.7** Identify and update identified structures in the Buffer Zone Protection Program.	ADEM/Administration	On-going	DHS grant	High priority structures are provided with funding to set protection barriers around the facility.	The barrier program provides additional security measures to high priority identified structures.	Meets all criteria	Yes	High	Buffer Zone protection funding is active in AR. In 2006, 13 sites were outfitted with barriers. **Evaluation: 2** More barriers will follow when funding is available.
1.4	**1.4.8** Develop Mutual Aid agreements between local jurisdictions to	ADEM	On-going	Existing local resources	Many HAZMAT events that occur are beyond the capabilities of a jurisdiction to	Encourages assistance and communication from neighboring jurisdictions on	Meets all criteria	Yes	High	2005 Mutual Aid Act required local jurisdictions to sign Mutual Aid

	assist in responding to hazardous material events.				respond.	responding to major HAZMAT events.				Agreements for HAZMAT response. **Evaluation:2** These agreements are important in time of disaster.
1.4	**1.4.9** Monitor and update the ADEM 5-year strategic plan.	ADEM	On-going	DHS grants and existing state resources	This plan is one of the primary elements of ADEM's overall strategy for disaster preparedness. This plan must be continually updated to match the changing priorities of the governor and the federal government.	This planning process ensures that the state's emergency management program is proactively addressing future goals and requirements. By developing this 5-year plan and then continually monitoring it, ADEM is initiating best-practices for the future and has a blueprint to guide future growth and program development.	Meets all criteria	Yes	High	Plan was last updated in 2007. Specific date can be referenced from ADEM. **Evaluation:2** Plan will be updated as necessary and during the 5 year update.
1.4	**1.4.10** Fund road and bridge projects	ADEM, Arkansas DOT	On-going	State Funds	This program has been successful in the past in repairing and strengthening the road system after being damaged by disasters. As future events occur, road and bridge damage is highly likely. Therefore the	This program has been successful in the past and will be necessary to repair damage from future events. This program is in an ideal position to be expanded from a recovery based operation to a pre-disaster mitigation related activity.	Meets all criteria	Yes	High	Current program in place. ADEM State Mitigation Grant Coordinator handles it. **Evaluation: 2** As funds become available.

					continuation of support for this program is essential to the state's mitigation efforts.					
1.5 Promote NFIP compliance as the major starting point for any community planning hazard mitigation.	**1.5.1** Identify non-participating communities in local jurisdictions and provide information on NFIP.	ADEM, ANRC	On-going	Existing state resources	Ability to concentrate efforts to encourage all local communities to join NFIP.	NFIP identified as important first step in mitigation planning.	Meets all criteria	Yes	High	ADEM and the State Climatologist promote the basic NFIP participation. **Evaluation: 2** Community participation in the NFIP is important to the state.
1.5	**1.5.2** Enroll communities in NFIP.	ADEM, ANRC	On-going	Existing state resources	NFIP identified as important first step in planning.	NFIP programs and FMA.	Political feasibility under considerati on	Yes	Medium	ADEM and the State Climatologist promote the basic NFIP participation. **Evaluation: 2** Community participation in the NFIP is important to the state.
1.5	**1.5.3** Fund the position of NFIP program manager that holds a Certified Floodplain Manager [CFM] certificate.	ADEM, ANRC	On-going	Existing state resources	Floodplain managers must understand NFIP regulations.	Floodplain management important effort in sustainability.	Political feasibility under considerati on	Pending	Low	Arkansas currently has a CFM-rated NFIP administrator. **Evaluation: 2** Community participation in the NFIP is important to the state.

1.6 Coordinate with non-profit organizations that engage in emergency response or are responsible for promoting and/or implementing sustainable development or "smart growth" initiatives.	**1.6.1** Identify and establish partnerships with all non-profit agencies involved in emergency response or implementing sustainable development.	ADEM	On-going	Existing state resources	All stakeholders on same page.	Smart Growth important mitigation philosophy.	Political feasibility under considerati on	Yes	Low	American Red Cross, Salvation Army, and Feed the Children along with other non-profits are utilized during disasters. **Evaluation: 2** This is important in time of disaster.

GOAL 2: Identify mitigation grant opportunities for state and local governments, their sub-jurisdictions and the general public, and provide effective technical support.

Objectives	Actions	Responsible Agency	Projected Timeline	Projected Resources	Rationale for Action	Contribution to Mitigation Objective	STAPLEE	Project Cost-Effective	Priority	Version 4 Update 2010
Objective 2.1 Provide direct technical assistance to local officials and help local jurisdictions obtain funding for mitigation planning and project activities.	**2.1.1** Develop and provide risk assessment products to assist local jurisdictions in the planning process.	ADEM, FEMA	On-going	PDM, HMGP	Risk assessment important first step in prioritizing mitigation objectives.	Increase local jurisdiction's ability to assess risks.	Meets all criteria	Yes	High	Currently, 62 local hazard mitigation plans throughout the State of Arkansas. **Evaluation: 4** Currently the state does not have a risk assessment database for the communities.
2.1	**2.1.2** Work with local public health departments to improve emergency planning and response capabilities for biological events.	ADEM, Department of Health	On-going	Existing state resources, CDC grants, DHS/FEMA grants	Public health staff and resource will be vital to any response and recovery related to disease outbreaks or bioterrorism incidents.	All response will begin at the local level and this increase in communications and training and coordination will improve the capabilities of these local departments.	Meets all criteria	Yes	High	Currently, the ADEM Planning Branch Manager is the lead coordinator on this ongoing initiative. **Evaluation: 1** This program is vital to the state.
2.1	**2.1.3** Compile all local mitigation strategies and prioritize them on a statewide basis.	ADEM/Mitigation Branch	Completed for this plan version.	PDM, HMGP, existing state resources	Many local mitigation projects are very successful at decreasing large amounts of potential future damage. These projects have been identified in the various local mitigation plans and can be compiled, analyzed and prioritized.	As the state compiles all on-going and proposed mitigation projects, ADEM will be in a better position to assist the local agencies with funding opportunities to initiate these projects.	Meets all criteria	Yes	High	All current FEMA approved mitigation plans have been incorporated in the Arkansas All-Hazard Mitigation Plan (Version 4). **Evaluation: 1** This has not been started.

2.2 Provide floodplain management resources.	**2.2.1** Communicate with local floodplain administrators to increase knowledge of good floodplain management practices.	ADEM/Operations, ANRC	On-going	Existing state resources	Best practices should be standardized.	Close the feedback loop.	Cost effectiveness under consideration	Yes	Medium	AFMA holds 2 annual meetings and much training are facilitated. **Evaluation: 2** This program is vital to the state.
2.2	**2.2.2** Fund mitigation drainage projects.	ADEM, ANRC	On-going	State Funds/HMGP/FMA	Flood damage often results from blocked drainage.	Decrease flood damages.	Meets all criteria	Yes	High	The State of Arkansas seeks funding through HMGP and FMA when communities are interested in drainage projects. **Evaluation: 2** Reducing flooding is vital to the state.
Objective 2.3 Allocate federal and state grant funding to local jurisdictions for the purpose of implementing local mitigation plans and eligible hazard mitigation projects.	**2.3.1** Provide federal Flood Mitigation Assistance (FMA) planning grants to local jurisdiction when available.	ADEM, ANRC	On-going	HMGP/FMA/PDM/SRL/ and RFC Grant Programs	Mitigation planning is the first step in decreasing damage.	Decrease flood damage.	Meets all criteria	Yes	High	The State of Arkansas is encouraging all state communities to participate in a FEMA approved hazard mitigation plan to be eligible for mitigation funds. **Evaluation: 2** Helping jurisdictions with funding is vital for mitigation efforts.
2.3	**2.3.2** Provide federal Hazard Mitigation Grant Program (HMGP) planning grants	ADEM/Administration Division	On-going	HMGP and PDM	Local communities need help in constructing mitigation plans.	Decrease economic load on local jurisdictions.	Meets all criteria	Yes	High	Administration Division currently manages HMGP as well as PDM

	and Pre-Disaster Mitigation (PDM) grants to local jurisdictions for such programs as safe room reimbursement for the purposes of implementing hazard mitigation projects.									grant allocation in AR. **Evaluation: 2** Helping jurisdictions with funding is vital for mitigation efforts.
2.3	**2.3.3** Fund projects that utilize Digital Flood Insurance Rate Maps (DFIRM) maps or DFIRM data for mitigation planning or project activities.	ADEM	On-going	Existing state resources	DFIRM maps are best available technology.	Planning effectiveness increased.	Cost effectiveness under consideration	Yes	Medium	Approximately 60% of the State of Arkansas is in the process of changing their NFIP maps to DFIRM maps. **Evaluation: 2** This is an important program to the state.
2.3	**2.3.4** Allocate CDC grant funding to local health units to improve their emergency planning for bioterrorism and naturally occurring biological outbreaks and mass care situations resulting from natural hazards.	Department of Health	On-going	CDC Grant Funding	Preparedness and disaster planning for public health is of vital importance. These efforts will ensure better response and recovery thereby reducing the damages and effects of a major event.	Planning, response and recovery effectiveness increased.	Meets all criteria	Yes	High	Annual CDC funding currently numbers around 7-8 million dollars for the State of Arkansas **Evaluation: 2** This is an important program to the state.

GOAL 3: Offer training, education, and technical assistance to local jurisdictions as they develop local hazard mitigation plans and mitigation projects.

Objectives	Actions	Responsible Agency	Projected Timeline	Projected Resources	Rationale for Action	Contribution to Mitigation Objective	STAPLEE	Project Cost-Effective	Priority	Version 4 Update 2010
Objective 3.1 The state will work with local jurisdictions to improve the local hazard mitigation planning process.	**3.1.1** Provide hazard mitigation technical assistance for local mitigation planning.	ADEM, FEMA	On-going	HMGP and Existing state resources	Local officials seldom have access to technical expertise.	Improve local mitigation planning efforts.	Meets all criteria	Yes	Medium	Hazard mitigation technical assistance is available from the ADEM Mitigation branch. **Evaluation: 1** Assisting local jurisdictions is important to the state.
3.1	**3.1.2** Provide public education to include mitigation ideas in school curriculums.	ADEM	On-going	PDM	Schools provide access to citizens of tomorrow.	Strengthen local mitigation planning efforts.	Cost effectiveness under consideration	Yes	Medium	FEMA and ADEM provide public education to school districts in Arkansas. **Evaluation: 2** This is an important program to the state.
3.1	**3.1.3** Collate local mitigation plan vulnerabilities assessments and estimated loss data into overall State of Arkansas mitigation strategy.	ADEM	On-going	HMGP	Local plans are required by DMA 2000 and they help the local jurisdictions and the state to improve overall mitigation strategy.	This will improve the local mitigation planning efforts.	Meets all criteria	Yes	High	ADEM mitigation branch works with local jurisdictions to complete hazard mitigation plans. 62 plans have been FEMA approved to date. **Evaluation: 4** This program and database has not been established.
3.1	**3.1.4** Fund the full-time emergency planners to act as	ADEM, Department of Health	On-going	Existing state resources,	These area coordinators can provide technical	These coordinators contribute by assisting the locals	Meets all criteria	Yes	High	Full-time hazard planners have been added to the

	regional area coordinators to assist local planners with the development of viable plans and to improve response capabilities.			DHS/FEMA grants, CDC grants	assistance to locals and act as liaisons with the various state agencies.	with all of their various planning, response and mitigation activities.				Northeast Arkansas region in 2006. **Evaluation: 2** This program will continue as funds become available.
3.1	**3.1.5** Assist local planners with table-top and full scale emergency exercises to practice response and improve operations and coordination.	ADEM	On-going	Existing state and local resources, DHS/FEMA grants, CDC, Grants, USDA/APHIS grants	Exercises are a great form of mitigation by improving the overall preparedness of a jurisdiction. Organizations determine areas of strength and areas in need of improvement.	Organizations that have practiced various forms of response are better prepared and therefore reduce the damages and effects of large scale events.	Meets all criteria	Yes	High	Each AR county works with ADEM to facilitate a table top exercise every year. **Evaluation: 2** Training for disasters is important to the state.
3.1	**3.1.6** Increase the number of animal disease related exercises in the state.	Arkansas Livestock and Poultry Commission, ADEM, APHIS, Local responders	On-going	USDA/APHIS grants, DHS/FEMA grants, existing state resources	ARLPC has already conducted some emergency exercises in conjunction with federal, state and local officials. These exercises are valuable training events and more of these are required to increase the level of response.	These exercises are vital to improving the animal health response of the state.	Meets all criteria	Yes	High	ADEM Training/Exercise Branch Manager as well as the Domestic Preparedness Exercise Coordinator are in the process of developing additional animal disease related exercised for AR. **Evaluation: 2** Training for disasters is important to the state.
3.1	**3.1.7** Provide technical assistance to local governments to assist with the development of	ADEM	On-going	DHS/FEMA grants, existing state resources	Local governments need to develop contingency plans to ensure continuity of operations. AR will provide support	The state can provide this support and assistance to the local government.	Meets all criteria	Yes	Medium	ADEM and Department of Information Systems is working to have all 75 counties to have up

	Continuity of Operations Plans (COOP).				and assistance to local agencies.					to date COOP plans. **Evaluation: 2** This is an important program to the state.
3.1	**3.1.8** Conduct training for local emergency planners and responders to improve their capabilities.	ADEM	On-going	Existing state and local resources, DHS/FEMA grants, CDC, Grants, USDA/APHIS grants	Training is a major component of all disaster preparedness. Improvements to human resources will improve response and recovery and therefore limit overall damages and effects.	These training sessions are conducted by the state for the benefit of the local organizations.	Meets all criteria	Yes	High	ADEM continues to facilitate training on a regular basis for first responders in the state. **Evaluation: 2** Training for disasters is important to the state.
3.1	**3.1.9** Identify and train additional state and local resources for veterinarian expertise. These resources would focus on monitoring, testing, and disease surveillance.	ADEM, Arkansas Livestock and Poultry Commission, Division of Agriculture, University of Arkansas, Fayetteville	On-going	State Funds/DHS Grants	In the case of an outbreak of animal disease, the current state resources would be quickly overwhelmed. More trained, expert, local resources and equipment are necessary for surveillance and containment response, and mass animal euthanasia.	These positions and additional training sessions are for the benefit of the state as well as for the benefit of all the affiliated local organizations.	Meets all criteria	Yes	High	Over the past fiscal year, DHS grants have funded training for AR county DECON teams, DHS grants have also provided equipment, training and exercise funding. **Evaluation: 1** Training for disasters is important to the state.
3.1	**3.1.10** Assist the University of Arkansas County Extension Services to improve training for local responders for animal disease	ADEM, Arkansas Livestock and Poultry Commission	On-going	Existing state and local resources, DHS/FEMA grants, USAD/APHIS grants	These extension services are already in existence and are assisting local jurisdictions. Expanding these programs will help	These extension services can act as local training programs to assist with preparedness.	Meets all criteria	Yes	Medium	AWR-180- Foreign Animal Disease Response Train the Trainer classes were offered at University of AR extension offices. **Evaluation: 1**

	events.				with overall preparedness and mitigation.					Training for disasters is important to the state.
3.1	**3.1.11** Compile all local loss estimation information into the collated state plan's vulnerability analysis.	ADEM, Local emergency management organizations	Completed for Version 4.	PDM, HMGP, existing state resources	As local planning efforts are completed, the state can collate the local loss estimates into the overall statewide risk assessment and further refine the analysis. This more detailed information will assist the state in identifying vulnerabilities.	As the state refines the overall State Risk Assessment, ADEM will be in a better position to assist local agencies with their individual risk assessments and vulnerability analysis.	Meets all criteria	Yes	High	All current local FEMA approved Vulnerability Analysis data has been incorporated into the State of Arkansas All-Hazard Mitigation Plan (Version 4) **Evaluation:** **Evaluation: 4** This program has not been established.

Objective 3.2 Increase awareness and knowledge of hazard mitigation principles and practices among local public officials.	**3.2.1** Conduct mitigation outreach activities for local public officials.	ADEM	On-going	HMGP and Existing state resources	Increase awareness of mitigation efficacy.	All mitigation is local.	Meets all criteria	Yes	Low	ADEM continues to conduct mitigation outreach programs for public officials. One example is memos sent to local jurisdictions after Federal disaster declarations. **Evaluation: 2** Informing the public and local officials is important to the state.
3.2	**3.2.2** Conduct educational presentations for local public officials.	ADEM	On-going	HMGP and Existing state resources	Increase awareness of mitigation efficacy.	All mitigation is local.	Cost effectiveness under consideration	Yes	Low	ADEM regional directors currently contact local public officials in their region to update

										them on new initiatives across the state. **Evaluation: 2** Informing the public and local officials is important to the state.
3.2	**3.2.3** Develop/ provide local planners and consultants with a uniformed methodology of listing hazard probability data in hazard mitigation plans.	ADEM	1 year	Existing state resources	As local planning efforts are completed, the state can collate the local probability data with a uniformed methodology for better consistency and accuracy for consolidating probability in the state hazard mitigation plan.	All mitigation is local.	Meets all criteria	Yes	Medium	ADEM will set a standard methodology for reporting probability data for local hazard mitigation plans. **Evaluation:** 4 New

GOAL 4: Formulate Objectives using state of the art knowledge to reduce vulnerability to all identified hazards

Objectives	Actions	Responsible Agency	Projected Timeline	Projected Resources	Rationale for Action	Contribution to Mitigation Objective	STAPLEE	Project Cost-Effective	Priority	Version 4 Update 2010
Objective 4.1 Maximize utilization of best technology	**4.1.1** Provide a training workshop to educate local jurisdictions to operate Pre-disaster Mitigation (PDM) Grants E-Grant system.	ADEM, FEMA	Complete	PDM	E-grant system required by FEMA for PDM applications.	Easier to obtain grants from FEMA.	Meets all criteria	Yes	High	ADEM assists local communities with the FEMA E-Grants System. **Evaluation: 1** Informing the public and local officials is important to the state.
4.1	**4.1.3** Mandate the use of GIS data as a recognized essential tool in decision making.	ADEM	On-going	FMA, USGS, and Existing state resources	GIS best practice for interpretation of spatial data.	GIS best technology.	Meets all criteria	Yes	High	Geostor is a GIS data warehouse server open to ADEM and other agencies. **Evaluation: 2** GIS data is essential to the state's mapping needs.
Objective 4.2 Cooperate and coordinate with partners at all government levels in planning and use of best technology.	**4.2.1** Develop and update databases of all livestock and poultry locations including major small flock distribution points in the state. Also include emergency resources for response and recovery for	Arkansas Livestock and Poultry Commission Division of Agriculture, University of Arkansas, Fayetteville	On-going	USDA/APHIS grants, existing state resources, private industry	This database and the associated locations are very helpful for preparedness, response and reducing the resulting damages. Sources of small quantities of feed and birds will be documented statewide.	Use of database and GIS technology to assist response and recovery. The objective of the work would be to provide educators with an effective means of communicating bio-security information to small flock owners. Much of the documentation	Meets all criteria	Yes	Medium	Continues to collect data when available. **Evaluation: 2** GIS data is essential to the state's mapping needs.

	animal diseases - including a GIS spatial component.					will be obtained through site visits.				
4.2	**4.2.2** Incorporate a progressive geographic information system (GIS) as the primary tool for spatial data management for hazard mitigation throughout the state.	ADEM	On-going	FMA, USGS and Existing state resources	GIS is best practice for interpretation of spatial data.	GIS is best technology.	Meets all criteria	Yes	Medium	Each state-owned or operated critical facility with a complete address was manually verified and exported into GIS database format. **Evaluation:1** Provided Baseline Dataset maps in Chapter 3.
4.2	**4.2.3** Support maintenance of statewide spatial database and facilitate local access to data.	ADEM, Arkansas Building Authority, Arkansas Geographic Information Office	On-going	PDM	Shared data is best way to ensure standardization.	Incorporation of multiple data sources.	Cost effectiveness under consideration	Pending	Medium	Arkansas Geographic Office works with all state agencies to standardize GIS data formats. **Evaluation: 2** GIS data is essential to the state's mapping needs.
4.2	**4.2.4** Update a structured process whereby strategic state assets such as buildings can be accurately mapped and maintained within electronic databases (latitude-	ADEM, Arkansas Building Authority, Arkansas Geographic Information Office, and the Arkansas Insurance Department	On-going	PDM	Will allow assessment of vulnerability and potential losses of state facilities to be completed.	Incorporation of multiple data sources.	Meets all criteria	Yes	High	Changes are being updated on a continual basis. The database has not been linked with hazard information to show vulnerability to state facilities **Evaluation:1**

	longitude) to assist in assessing vulnerability of state facilities.									GIS data is essential to the state's mapping needs.
4.2	**4.2.5** Expand the capabilities of the State Department of Health Emergency Communications Center and the existing laboratory facilities.	Department of Health	On-going	Existing state resources, CDC grants, DHS/FEMA grants	Improving these facilities and expanding their capabilities will greatly enhance the state's ability to respond during disease outbreaks thereby limiting damages and residual effects.	Use of technology and equipment to be more prepared for any type of disaster involving a public health response.	Meets all criteria	Yes	High	Equipment upgrades such as satellite phones have been installed in EOC's using CDC Grants. **Evaluation: 1** This is an important program to the state.
4.2	**4.2.6** Expand the use and capabilities of the National Alert Warning System.	Department of Health, ADEM	On-going	Existing state resources	This is an established nationally used system that is beneficial to the state.	Existing technology that is already in use but requires constant resources to maintain and expand.	Meets all criteria	Yes	High	NAWS continues to expand in Arkansas. Not all local jurisdictions are using the system, but all counties currently are. **Evaluation: 2** Communicating disaster information is important to the state.
4.2	**4.2.7** Incorporate state of the art bio-security equipment and procedures at the Conway Livestock Auction location and other primary congregation	Arkansas Livestock and Poultry Commission	On-going	USDA APHIS grants, existing state resources	These preparedness efforts will drastically reduce the potential for widespread disease transmission.	Using new technology and updated methodology to improve bio-security at these locations will meet this mitigation objective.	Cost effectiveness, social and political issues are under consideration	yes	Medium	USDA APHIS is always updating equipment as funds become available. **Evaluation: 2** Updating equipment is important to the state.

	points in the state.									
4.2	**4.2.8** Upgrade the current laboratory capabilities for animal disease surveillance and coordination including portable equipment for the establishment of mobile labs in the affected area.	Arkansas Livestock and Poultry Commission	On-going	USDA APHIS grants, existing state resources	Additional equipment and capabilities for emergency coordination and lab testing will be vital during any pandemic event. The current state resources need improving.	These improvements of new technology and additional equipment would be used during an outbreak.	Cost effectiveness is being considered	Pending	High	Updating continues as funds become available. **Evaluation: 2** This is an important program to the state.
4.2	**4.2.9** Develop and deploy a mobile facility for poultry carcass disinfection and processing.	Arkansas Livestock and Poultry Commission, ADEM, Department of Health, Division of Agriculture, U of A, Fayetteville	Proposed	USDA APHIS grants, existing state resources, educational research grants	The ability to quickly contain a poultry disease outbreak will determine the eventual size and impact. The proposed mobile technology would be used to quickly clean an infected area thereby halting the disease.	New technology for processing and disinfecting poultry carcasses can be incorporated into mobile facilities to move throughout a regional area to work at multiple locations. This should drastically limit possible new infections due to the handling of contaminated materials.	Cost effectiveness is being considered	Pending	High	No action has been completed since no events have occurred to warrant action. **Evaluation: 2** Reducing a risk for disasters is important to the state.
4.2	**4.2.10** Incorporate the use of Arkansas Wireless Information Network (AWIN) radios across jurisdictions.	ADEM	On-going	ODP	Compatible communication capabilities across one spectrum throughout the state will be critical in a multi-jurisdictional event.	AWIN radios distributed throughout communities in Arkansas would ensure a statewide communication capability.	Meets all criteria	Yes	High	AWIN radios are now in every county across the State of Arkansas. **Evaluation: 2** Communications during disasters is important to the state.

4.2	**4.2.11** Test radiation leakage from ANO using Thermoluminescent Dosimeters (TLD's).	Arkansas Department of Health	On-going	Arkansas Department of Health	TLD's placed around a nuclear facility can give early warnings to leaks or radiation exposures in the environment.	Awareness of a radiation leak or contamination in the early stages can reduce loss of life and damage to surrounding areas.	Meets all criteria	Yes	High	Daily tests are performed for radiation leakage from ANO. **Evaluation: 2** Radiation testing is important to the state.
Objective 4.3 Identify and track repetitive losses from all hazards and analyze this data to prevent future losses.	**4.3.1** Update State Mitigation Policy	ADEM/Mitigation Branch	On-going	HMGP/PDM	Continue to update estimated loss date from local mitigation plans into the overall state mitigation policy.	Allows state to target high-loss hazards with funding concentration.	Meets all criteria	Yes	High	State will update the mitigation policies as needed. **Evaluation: 2** This is important to the state to continue to update.
Objective 4.4 Develop a methodology for identifying, prioritizing, and implementing new mitigation activities based largely on loss reduction criteria.	**4.4.1** Expand the functionality of the on-line survey tool at www.arkansasmitigation.com to allow for data collection related to new activities.	ADEM	1 year Proposed	PDM, HMGP, existing state resources	This web-based tool is already developed and can easily be modified to collect additional data from the mitigation community at large.	Data from this tool can be used by ADEM to identify and prioritize projects submitted by a variety of organizations and individuals.	Meets all criteria	Yes	Medium	No action has been taken but is still proposed for future. **Evaluation: 4** When time and funding becomes available.
Objective 4.5 Develop and monitor any mitigation data deficiencies referenced in the current state mitigation plan. (Version 4).	**4.5.1** Research and develop expansive soil historical database throughout the state. Collate data on a regional and local level.	Arkansas Geological Commission	2 year Proposed	PDM, HMGP, existing state resources	Expansive soil data limitation cited in current state mitigation plan (Version 4)	By collecting advanced expansive soil data, the HMP sub-committee will formulate loss estimations for the hazard. These loss estimations will then be compared with other natural hazard loss estimations.	Cost effectiveness under consideration	Pending	Low	Time and funding has not been available for this project. **Evaluation: 4** When time and funding becomes available.

4.5	**4.5.2** Research and develop wildfire historical database throughout the state. Collate data on a regional and local level	ADEM, Arkansas Forestry Commission, State Fire Marshall	On-going	PDM, HMGP, existing state resources	Wildfire data limitation cited in current state mitigation plan (Version 3)	By collecting advanced wildfire data, the HMP sub-committee will formulate loss estimations for the hazard. These loss estimations will then be compared with the other natural hazard loss estimations.	Meets all criteria	Yes	Low	ADEM receives a report from the Forestry Commission. **Evaluation: 2** This program is important to the state to track wildfire information.
4.5	**4.5.3** Research and develop landslide hazard historical database throughout the state. Collate data on a regional and local level	ADEM, Arkansas Geological Commission	2 year, Proposed	PDM, HMGP, existing state resources	Landslide data limitation cited in current state mitigation plan (Version 4)	By collecting advanced landslide data, the HMP sub-committee will formulate loss estimations for the hazard. These loss estimations will then be compared with the other natural hazard loss estimations.	Cost effectiveness, social and political issues are under consideration	Pending	Low	This mitigation action is a low priority and has not been completed at this time. Time and funding has not been available for this project. **Evaluation: 4** When time and funding becomes available.
4.5	**4.5.4** Research and develop drought hazard historical database throughout the state. Collate data on a regional and local level	ADEM, Arkansas Geological Commission, Arkansas Forestry Commission	3 year, Proposed	PDM, HMGP, existing state resources	Drought historical data limitation cited in current state mitigation plan (Version 4)	By collecting advanced drought data, the HMP sub-committee will formulate loss estimations for the hazard. These loss estimations will then be compared with the other natural hazard loss estimations to allocate resources with better accuracy.	Cost effectiveness, social and political issues are under consideration	Pending	Low	This mitigation action is a low priority and has not been completed at this time. Time and funding has not been available for this project. **Evaluation: 4** When time and funding becomes available.

5.5 Funding Sources

Funding Sources	
IFR REQUIREMENT 201.4©(3)(iv):	[The State mitigation strategy shall include an] identification of current and potential sources of Federal, State, local, or private funding to implement mitigation activities.
Explanation:	The plan **shall** describe the current funding sources as well as potential sources that will be pursued to fund proposed mitigation projects and actions. It *should* also identify where funding is required to implement a project/activity identified in the mitigation strategy. Funding alternatives **shall** include Federal, State, local, and private sources. The description can also include novel or alternative ways to fund actions, such as: Combining funding from various programs to implement a mitigation project. Integrating mitigation actions in implementing agencies' work plans. Identifying mitigation opportunities that may arise during scheduled infrastructure improvements, maintenance, or replacement, or other capital improvements. Building partnerships with businesses and non-profits whose properties, employees, or clients may be affected by hazards. Combining funding from various Federal programs to fund a comprehensive plan with a mitigation component.

In 2004, the Hazard Mitigation Planning Sub-Committee worked with staff from the Mitigation Branch of ADEM and many of the state agencies to evaluate the state and federal funding sources related to hazard mitigation for hazard-prone areas. As part of the 2010 update processes, all of these agencies were contacted in order to re-assess the current status of these funding programs. This funding source section was updated to reflect this new data collected from the state and federal agencies. Modifications to this section include the addition of new programs as well as updates to information about the existing programs.

The state currently uses several funding sources to implement its hazard mitigation actions. As discussed in Section 5.2: State Capability, the primary sources for funding for hazard mitigation projects have been the federally funded programs available through FEMA, the State Mitigation Program, and the State Saferoom/Shelter Program. Local governments have used a variety of other sources to fund hazard mitigation projects, including local revenues, Community Development Block Grants, and a variety of transportation and public health grant programs. Few examples of private funding for mitigation actions were found, as most disaster-related private funds are for relief immediately following a disaster to meet immediate human needs. It is likely that corporations (e.g., Wal-Mart, Home Depot) could provide funding and in-kind services for various mitigation projects that meet corporate community service goals, generally at the local government or community level. Large private foundation funding for mitigation projects in Arkansas should also be explored. For example, the Walton Family Foundation, Inc. includes three foundation focus areas, two of which (the Northwest

Region of Arkansas and the Delta Region of Arkansas and Mississippi) can be explored for mitigation funding – particularly as it pertains to the Foundation Focus Goal of "*implementing economic/community-based strategies for sustainable development*" in the Delta region of Arkansas (Phillips and St. Francis Counties).

2010 Update Methodology

As a part of the 2010 update process, developed a logical, efficient methodology for contacting each of the agencies and re-assessing their program status. The revision and update methodology for the state agencies consisted of the following steps:

- Data Review: Information from the existing funding source list was collected and thoroughly reviewed for completeness.
- Identification of Agency Contacts: Based on the existing data from 2004 and from the previous list of planning team members, a specific contact for each agency program was identified for subsequent correspondence. When no contact was previously identified, the agencies were contacted directly in order to find the appropriate program manager.
- Email Correspondence: The existing funding source data was separated into individual components for each of the programs. This program-specific data was then formatted into a standardized email explaining the purpose of the planning process and the necessity for the confirmation and update of the previous descriptions. These emails were then sent out to each of the individual program managers within the various agencies requesting a reply either confirming the existing data or providing updated descriptions.
- Phone interviews: Members of the HMP Sub-Committee contacted each program manager by phone as a follow-up to the initial email correspondence. The phone interviews were conducted to ensure confirmation of the receipt of the emails and for brief conversations with the program managers to obtain 2010 update information.
- Data Collation: As data was collected from the agencies regarding their specific capabilities; this was collated in spreadsheet format along with the previous data. This spreadsheet served as the final data collection device and also as a project management tool for tracking the correspondence with the agencies.
- Finalization and Formatting: The final updated information for the funding source list was reviewed and then formatted for inclusion in this plan document.

The results are included on the following pages:

5.5.1 ADEM Funding Sources

The Arkansas Department of Emergency Management is the lead agency for emergency planning and hazard mitigation in the state. While assessing the overall funding sources and contacting the various agencies, the HMP Sub-Committee determined that ADEM required separate treatment due to the number of individual programs and the overall focus on disaster planning, response and recovery. Based on this decision, the various funding programs managed by ADEM were extracted from the complete state agency listing. These ADEM-managed programs are listed separately in this section and are prioritized over the remaining agency programs due to their primary focus on disaster planning and hazard mitigation. The various ADEM-managed funding programs are listed below along with detailed program descriptions and current 2010 contact information.

Emergency Management Performance Grant (EMPG)

Contact: Tina Owens, Administration Division Director
Award Range: The amount awarded to each county is a fixed base amount with additional amounts based on population. Requires a fifty percent, non-federal match. Match must be provided by the receiving entity.
Description: EMPG reimburses certain eligible expenses, under program guidelines, to support state and local emergency management costs. Eligibility of all counties, cities of Little Rock & North Little Rock. Deadlines and restrictions begin from October 1, thru September 30 each year. The State of Arkansas in 2010 has been allocated $4,304,577.

State Homeland Security Grant Program

Contact: Kathy Wright, Domestic Preparedness Branch Manager
Award Range: Based upon assessment of needs and vulnerabilities and population of each county, along with other program priorities/ authorizations.
Description: This grant is specifically designed to address the homeland security and response capabilities in Arkansas by providing specific equipment and training to first responders and state agencies based on the needs and vulnerabilities and population of each county, along with other program priorities and authorizations. Eligibility includes all counties participating in the needs assessment. The deadlines are based on each grant timeframe. Counties receiving funding must participate within the strict guidelines of the grant program, including providing mutual aid to surrounding counties, completing a terrorism annex to their EOP and holding an annual terrorism exercise. Equipment purchased through the grant will be tracked by the local jurisdiction and reported to ADEM for three years after the close of the grant.

Citizen Corps (Now part of the Homeland Security Grant Program)

Contact: Andrew Pannell, State Citizen Corps Coordinator
Award Range: State funding determined by formula through DHS. Amount of funding to local jurisdictions dependent upon programs offered and amount provided to the state.
Description: The Citizen Corps Program is part of the overall Homeland Security efforts in Arkansas and the nation. The program allows for the establishment of local Citizen Corps Councils and the accomplishment of Community Emergency Response Team (CERT) training. Training is designed to give individuals and families the basic skills to help themselves and their neighbors during disasters as well as work with local emergency management to develop and promote awareness of disasters and safety practices. Other programs include Neighborhood Watch (NW), Volunteers in Police Service (VIPS), and Medical Reserve Corp (MRC). For eligibility all counties participating in the needs assessment will either have a current Citizen Corp Council or are in the process of developing one. Deadlines are based on each grant timeframe as provided by DHS. Counties receiving funding must participate within the strict guidelines of the grant program.

Citizen Corps / CERT Federal Fiscal Year 2002 Supplemental Grant

Contact: Andrew Pannell, State Citizen Corps Coordinator
Award Range: First round grants were for a maximum of $5,100.00 ($1,000 for Citizen Corps Local Council development and $4,100.00 for Community Emergency Response Team (CERT) team development). Eligible jurisdictions may request additional funding to train additional CERT teams.
Description: Citizen Corps program is part of the overall Homeland Security efforts in Arkansas and the nation. The program allows for the establishment of local Citizen Corps Councils and the accomplishment of Community Emergency Response Team (CERT) training. The training is designed to give individuals and families the basic skills to help themselves and their neighbors during disasters as well as work with local emergency management to develop and promote awareness of disasters and safety practices. Eligibility includes all counties and cities of Little Rock and North Little Rock. Funds granted through request for proposal system. Citizen Corps strives to bring together government and community leaders in all-hazards emergency preparedness. FEMA's Comprehensive Planning Guide 101 emphasizes that the most realistic and complete plans are prepared by a "team that includes representatives of the departments and agencies, as well as private sector and NGOs."

Act 833 Fire Grant Program

Contact: Jimmy Woods, ADEM Fire Services Coordinator
Award Range: Act 833 of 1991 provides one half of 1% of all turn back funds from fire insurance premiums to be divided among the seventy-five counties in Arkansas according to population. The funds in each county are divided according to population unless the county Intergovernmental Cooperation Council notifies the Quorum Court of needs of the fire departments, in which case the Quorum Court apportions the money according to those needs.
Description: Act 833 funds are to be used for training, fire fighting equipment, and initial capital construction or improvements of fire departments.

Federal Hazard Mitigation Grant Program

Contact: Terry Gray, State Hazard Mitigation Officer
Award Range: Projects that will reduce the effects of hazards and/or vulnerability to future disaster damage. Unlike FEMA's Public Assistance programs that help pay for repair and restoration of existing facilities, HMGP helps fund a wide range of new projects to reduce hazard vulnerability and future damage.
Description: Agencies that are affected by this grant program are state and local governments, private, non-profit organizations, publicly-owned special districts and Indian tribes. Applications should be turned in soon after a disaster so that opportunities are not lost during reconstruction. Communities must participate in the National Flood Insurance Program and have a FEMA approved mitigation plan. Projects cannot contribute to or encourage development in the floodplain or other hazardous areas. Projects must address repetitive losses and be cost effective (at least 1:1 cost to benefit ratio) and environmentally sound.

Flood Mitigation Assistance Program

Contact: Terry Gray, State Hazard Mitigation Officer
Award Range: Usually there is $100,000 available for projects. Seventy-five percent federal and twenty-five percent local.
Description: Acquisition, or relocation of repetitively flooded properties that have flood insurance. Agencies that are eligible are local governments, special districts and Indian tribes. Generally, Notice of Intents will be accepted anytime. Applications must be completed prior to August 1 each year. Must be member of NFIP and have an FEMA approved mitigation plan to be eligible.

- **The Severe Repetitive Loss (SRL) grant program:** Was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, which amended the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP).

  Definition: The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended (NFIA), 42 U.S.C. 4102a. An SRL property is defined as a **residential property** that is covered under an NFIP flood insurance policy and:

  (a) That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or

  (b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

  For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.

Purpose: To reduce or eliminate claims under the NFIP through project activities that will result in the greatest savings to the National Flood Insurance Fund (NFIF).

Federal / Non-Federal cost share: 75 / 25 %; up to 90 % Federal cost-share funding for projects approved in States, Territories, and Federally-recognized Indian tribes with FEMA approved Standard or Enhanced Mitigation Plans or Indian tribal plans that include a strategy for mitigating existing and future SRL properties.

- **The Repetitive Flood Claims (RFC) grant program:** Was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Up to $10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).

  FEMA may contribute up to 100 percent of the total amount approved under the RFC grant award to implement approved activities, if the Applicant has demonstrated that the proposed activities cannot be funded under the Flood Mitigation Assistance (FMA) program.

Pre-Disaster Mitigation Grant – Competitive

Contact: Terry Gray, State Hazard Mitigation Officer
Award Range: Any one project may not exceed $3,000,000 federal share. It is a seventy-five percent to twenty-five percent match ratio. The sub-grantee twenty-five match may be hard or soft or any combination.
Description: The grant may be used for mitigation planning, removal of repetitive flood loss properties and other multi-hazard mitigation projects. Eligibility requirements state that only ADEM may apply as the grantee. Sub-grantees may be other state agencies and local governments, which includes sub-jurisdictions (i.e. school districts, drainage districts, etc.). Private non-profits are not eligible, but may ask a local government to submit the grant on their behalf. To meet deadline dates, jurisdictions must be in good standing with the National Flood Insurance Program (NFIP) and have a FEMA approved mitigation plan. Applicants are strongly encouraged to make application by use of the FEMA Mitigation e-Grant Management System.

Hazardous Materials Emergency Preparedness Training and Planning Grants

Contact: Kenny Harmon Hazardous Materials Program
Award Range: $0 – $159,000
Description: The Hazardous Materials Emergency Preparedness (HMEP) grant program is intended to provide financial and technical assistance as well as national direction and guidance to enhance state, territorial, tribal, and local hazardous materials emergency planning and training. The HMEP Grant Program distributes fees collected from shippers and carriers of hazardous materials for HAZMAT training and HAZMAT planning. In order to become eligible, the state manages grants to provide training to local jurisdictions. There are no stipulations or deadlines for local jurisdictions. Jurisdictions should request hazardous materials training from ADEM.

Chemical Stockpile Emergency Preparedness Program (CSEPP)

Contact: Sandi Hensley, CSEPP State Coordinator
Award Range: Varies according to specific needs.
Description: Funding identified and provided to jurisdictions/support agencies for "off-post" preparedness. Eligibility includes designated agencies, and county jurisdictions that participate or support the CSEP Program to provide emergency preparedness and response to the communities surrounding the Pine Bluff Arsenal. Those counties are: Arkansas, Cleveland, Dallas, Grant, Jefferson, Lincoln, Lonoke, Prairie, Pulaski and Saline. (100% administered by FEMA, ADEM is the grantee). Full participation is required to receive funding to meet deadlines. Multiple administrative and financial benchmarks required.

5.5.2 Funding Sources from Other State Agencies

While the Arkansas Department of Emergency Management is the lead agency for emergency planning and hazard mitigation in the state, many other state agencies play an important role in supporting and funding mitigation. Each of these state agencies was contacted individually in order to develop a complete picture of the overall funding sources available throughout the state. All identified funding sources are listed below with detailed descriptions and current 2010 contact information for the program managers. The combination of the ADEM funding along with these programs from other agencies provides a complete assessment of the mitigation-related funding sources for the State of Arkansas.

Agency: Arkansas Department of Economic Development

Program: Community Development Block Grant Program
Contact: Julian Basil, Grants Division Director
501.682.7392, bjulian@arkansasedc.com
Award Range: Varies depending on program type.
Description: HUD funded program administered by the Arkansas Department of Economic Development to make grants to communities and loans to businesses for community and economic development. Project types are senior centers, water, wastewater, public health facilities, fire protection, community/multi-purpose centers, child care, and economic development projects. Eligible communities must be 51% low and moderate income. Only non-entitlement communities are eligible to apply. In order to manage the program effectively, ADED relies on several agencies working in partnership. The Arkansas Recovery Office is distributing $5.1 million to Arkansas communities. The 13 grants are part of the American Recovery and Reinvestment Act (ARRA). The projects have been approved and are funded by the U.S. Department of Housing and Urban Development (HUD) through the Community Development Block Grant (CDBG) program.

Agency: Arkansas Department of Finance & Administration

Program: Protection Program – Act 833
Contact: Richard Drilling, Fiscal Account Manager
501-324-9062, richard.drilling@dfa.state.ar.us
Description: Since January 1992, an extra 1/2 of 1% premium tax has been collected for the Fire Protection Program - Act 833. Disbursements are made to fire departments with the funds being used for training, equipment, and construction. Funding has helped fire departments become certified or obtain a better certification rating. Each county decides on the distribution of its funds based on the fire department's needs. The Arkansas Department of Emergency Management handles the administrative portion of the program.

Agency: Arkansas Department of Health

Program: Applied Research Grant Program
Contact: Cathy Flanagin, Associate Branch Chief
501.661.2248, cathy.flanagin@arkansas.gov
Award Range: Average project grant $48,700
Description: Arkansas colleges and universities in conjunction with private industry use this grant. The matching grant program is used to support company-defined applied research in science and engineering.

Agency: Arkansas Department of Health

Program: Basic Research Grant Program
Contact: Cathy Flanagin, Associate Branch Chief
501.661.2248, cathy.flanagin@arkansas.gov
Award Range: Average project grant $40,000
Description: Arkansas colleges and universities use this grant. The competitive grant program is used to support building basic research capacity in college and university science and engineering departments. The purpose of the Basic Research Grant Program is to promote and support the growth and development of Arkansas scientists and to enhance the status of science and engineering in Arkansas colleges and universities. The Arkansas Science & Technology Authority's Basic Research Grant Program is a competitive, (60 percent state: 40 percent institution) matching grant effort to support basic research in science and engineering. Three avenues: CDC, HHS/ASPR (Hospital Preparedness) and Pandemic Influenza planning.

Agency: Arkansas Department of Health

Program: EMS Revolving Fund Grant
Contact: Cathy Flanagin, Associate Branch Chief
501.661.2248, cathy.flanagin@arkansas.gov
Award Range: Up to $10,000
Description: Matching equipment grant. Total amount available to communities: $275,000

Agency: Arkansas Department of Health

Program: Local Grant Trust Fund
Contact: Cathy Flanagin, Associate Branch Chief
501.661.2248, cathy.flanagin@arkansas.gov
Award Range: $3,982
Description: This fund is used for the renovation of the State Health Building and for the construction and renovation of approved local health unit facilities in the state. The Individual and Family Grant Program repair placement of personal property; repair and replacement of the primary residence; funeral and medical expenses and essential transportation. Three avenues: CDC, HHS/ASPR (Hospital Preparedness) and Pandemic Influenza planning.

Agency: Arkansas Department of Health

Program: Bioterrorism Preparedness Program
Contact: Cathy Flanagin, Associate Branch Chief
501.661.2248, cathy.flanagin@arkansas.gov
Award Range: Up to $260k
Description: This program manages the state's public health planning for potential bioterrorism events. Responsibilities include working directly with local agencies on planning and response capabilities and managing the various federal health-related grants mainly from the CDC.

- 2006 - Arkansas received two new programs as part of its CDC Bioterrorism Grant. Phase 1: Pandemic Influenza and the Cities Readiness Initiative (CRI). Phase 2*:* Pandemic Influenza. The HRSA Hospital Preparedness Grant has now been reassigned for funding administration by Health and Human Services (HHS) and is now designated as the HHS Hospital Preparedness Grant.
- 2008 – Limited funding.
- 2009 – CDC listed new area for funding with emphasis on smart technology, health IT, and infrastructure building.
- 2010 – Expanded to include Public Health Labs. 20 million dollars awarded nationally.

The CDC awards nearly 85 percent of its budget through grants and contracts to help accomplish its mission to promote health and quality of life by preventing and controlling disease, injury, and disability. Contracts procure goods and services used directly by the agency, and grants assist other health-related and research organizations that contribute to CDC′s mission through health information dissemination, preparedness, prevention, research, and surveillance.

Agency: US Department of Justice

Program: Office of Community Oriented Policing Services (COPS)
Contact: Ramesa Pitts, Grant Program Specialist
202.616.9775, ask.COPS@usdoj.gov
Award Range: Maximum grant amount is 15 million
Description: The COPS Methamphetamine Initiative received $40,385,000 for agencies specified in the Consolidated Appropriations Act, 2010 (P.L. 111-117). COPS Meth grants provide funding that supports enforcement, training, and prevention

activities nationwide, but is concentrated in areas with the greatest need for assistance in combating meth production, distribution, and use. The COPS Office encourages agencies to focus on community policing approaches to meth reduction. COPS also works directly with state and local law enforcement agencies to craft innovative strategies, track and evaluate their implementation, and disseminate results to other jurisdictions confronting similar challenges. COPS award millions of dollars every year to help the community policing program keep America safe by distributing funding through a wide range of programs, both as grants and cooperative agreements. From 1995 to the current date, $117,758,890 in COPS grants were awarded to law enforcement agencies in the State of Arkansas Grants were made available for COPS Hiring Recovery Program (CHRP), Tribal Resources Grant Program and Secure Our Schools Program in 2009.

Agency: Arkansas Department of Parks & Tourism

Program: 50/50 Matching Grant
Contact: Richard Davies, Executive Director
501.682.2535, richard.davies@arkansas.gov
Award Range: Maximum grant amount is $250,000
Description: Arkansas City and county governments may apply for annual competitive grants that may be used to acquire parkland and/or develop public outdoor recreation facilities. Application deadline is the last Friday each August.
Funding: 50/50 Matching Grant for park development and land acquisition $250,000 and (2) Trails for life non-matching grants to develop standard health and fitness trials 1/4 mile $35,000 and custom health & fitness projects $70,000. The fun park has changed to $40,000.

Agency: Arkansas Department of Parks & Tourism

Program: Fun Park Grant
Contact: Richard Davies, Executive Director
501.682.2535, richard.davies@arkansas.gov
Award Range: Up to $45,000 Changed in 2009
Description: Arkansas cities with a population of 2500 persons or fewer (unincorporated rural areas must apply through the county) may apply for $45,000 to develop a localities first park with basic recreation facilities. No match is required but, the applicant must provide land for development by ownership or 25 year lease. Grant funds must be used to develop an all-inclusive park limited to only basketball courts, baseball or softball fields, play ground equipment, picnic sites, pavilion, and support facilities. 50/50 Matching Grant for park development and land acquisition. Only unincorporated rural communities in each of the 75 counties and incorporated cities with a population of less than 2,500, as established by the 2000 census, are eligible for grant funding.

Agency: Arkansas Department of Rural Services

Program: County Fair Building Grant
Contact: Lauren Gabriel, Grants Coordinator
501-682-6011, lauren.gabriel@gmail.com
Award Range: $4,000 maximum
Description: County Fair Associations located in counties of fewer than 55,000 in population are eligible for up to $4,000 and are eligible for construction or renovation of

buildings on the county fair grounds and other general improvement projects. Match ratio is 50/50. Contact Grants Coordinator for specifics and eligible projects.

Agency: Arkansas Department of Rural Services

Program: Rural Community Development Grant
Contact: Shana Jackson, Grants Coordinator
501-682-6011, shana.jackson @arkansas.gov
Award Range: $15,000 maximum
Description: Applicants from incorporated towns of less than 3,000 in population and unincorporated rural areas are eligible for up to $15,000 in matching funds under this program. The match ratio on the program is 50/50. Communities wishing to apply for projects under the program must provide one half of the cost of the project as match. Match may be comprised of in-kind labor, in-kind materials or cash and must be available at the time of application. Applications for this program are accepted August through March of each year. Communities in the past have received funding for baseball/softball fields, community centers, walking tracks, park and playground equipment, pavilions, picnic tables, and library shelving. Fire departments have received funding fornew fire stations, additional bays for existing stations, turn-out gear, communications equipment, fire trucks, SCBA's, extrication equipment and brush trucks.

Agency: Arkansas Department of Rural Services

Program: Rural Fire Protection Grant
Contact: Shana Jackson, Grants Coordinator
501-682-6011, shana.jackson @arkansas.gov
Award Range: $15,000 maximum
Description: Applicants from incorporated towns of less than 3,000 in population and unincorporated rural areas are eligible for up to $15,000 in matching funds under this program. The match ratio on the program is 50/50. Communities wishing to apply for projects under the program must provide one half of the cost of the project as match. Match may be comprised of in-kind labor, in-kind materials or cash and must be available at the time of application. Applications for this program are accepted August through March of each year. Communities in the past have received funding for baseball/softball fields, community centers, walking tracks, park and playground equipment, pavilions, picnic tables, and library shelving. Fire departments have received funding for new fire stations, additional bays for existing stations, turn-out gear, communications equipment, fire trucks, SCBA's, extrication equipment and brush trucks.

Agency: Arkansas Department of Rural Services

Program: Rural Services Block Grant
Contact: Lauren Gabriel, Grants Coordinator
501-682-6011, lauren.gabriel@gmail.com
Award Range: $30,000 or up to $50,000 with written request
Description: CDBG rural set-aside and made possible through partnership with the Arkansas Department of Economic Development. Eligibility to rural incorporated cities and unincorporated communities of fewer than 3,000 in population with at least 51% of project service area falling in 51% low-to-moderate income range. Annual grant- Match ratio 9:1 or match 10% of total project cost. Eligible projects include renovation or new construction of community centers, fire station buildings, or multi-purpose centers, or the

purchase of fire trucks (pumper, tanker, brush or service trucks). Program rules and regulations are being revised.

Agency: Arkansas Department of Workforce Education

Program: Federal Surplus Property (FSP)
Contact: Laurel Carnes, Internal Services Manager
501.682.1848, laurel.carnes@arkansas.gov
Description: FSP donates property that has been declared surplus or excess by the federal government. Public agencies, private nonprofit health and educational institutions, and homeless shelters are eligible to receive property. Fees are assessed on donated property to cover expenses. These fees usually run 10 percent or less of the market value of the donated property.

Agency: Arkansas Forestry Commission

Program: Community Forestry Grants
Contact: Don McBride, Director,
501-296-1870, don.mcbride@arkansas.gov
Award Range: $327,975 new funds
Description: 50/50 matching grants to communities for community forestry planning, tree planting, and tree maintenance. The community match is "in-kind." Four hundred ninety seven landowners applied for $8,000,000 to reduce wildfire hazards in their forests. Only $1,300,000 is available. On Dec. 15, 2009, AFC conducted a random drawing of the applications at the Ozark Folk Center in Mountain View to determine ranking for consideration of funding.

Agency: Arkansas Forestry Commission

Program: Volunteer Fire Assistance
Contact: Don McBride, Director,
501-296-1870, don.mcbride@arkansas.gov
Award Range**:** up to $215,260
Description: 50/50 matching grants to volunteer fire departments, with funds used to buy tools, small equipment, and safety gear. Volunteer Fire assistance grants are usually available in May or June every year to fire departments that serve 10,000 or fewer people. Eligible departments must match the grant on a 50-50 basis with non-federal funds.

Agency: Arkansas Highway & Transportation Department

Program: Bridge Replacement and Rehabilitation Program
Contact: Phil Brand, Division Head
501-569-2361, phil.brand@arkansashighways.com
Award Range: Up to $1 million in federal aid and $350k for signal/intersection projects
Description: Provides assistance for eligible bridges on any public road. For a bridge structure to qualify for replacement, it must be at least 20' in length, have a sufficiency rating of 50.0 or less, and be classified as functionally obsolete or structurally deficient. Replacement structures must comply with current structural standards for the type and volume of traffic the facility will carry over its design life. Bridge rehabilitation consists of work necessary to restore structural integrity or correct major safety concerns. To qualify, a bridge must have a sufficiency rating of 80.0 or less and be classified as

functionally obsolete or structurally deficient. The Department of Transportation is providing more than $24 million in grants to eight states in the Delta region. In addition to Arkansas, states receiving grants are Alabama, Illinois, Kentucky, Louisiana, Mississippi, Missouri and Tennessee.

Agency: Arkansas Highway & Transportation Department

Program: Recreational Trails Program
Contact: Bill Bastress, Recreational Trails Coordinator
501-569-2209; bill.bastress@arkansashighways.com
Award Range: Based on available federal aid
Description: Provides funds for construction and maintenance of motorized, non-motorized, and multiple-use recreational trails. Projects are solicited through an annual application process. Local, state, and federal government agencies, as well as private, non-profit organizations are eligible to submit project applications.

Agency: Arkansas Highway & Transportation Department

Program: Safety Program
Contact: John Waldrip, Traffic Safety Section Head
501-569-2930, john.waldrip@arkansashighways.com
Award Range: Federal aid for these projects ranges from ninety to one hundred percent.
Description: Provides funds for safety projects anywhere within the state. Eligible projects under this program for local roads and streets include railroad crossings protection and railroad grade separations and relocations.

Agency: Arkansas Highway & Transportation Department

Program: State Aid Program for County Roads and Bridges
Contact: Bethany Swindell, Disaster Liaison
501-569-2930, bethany.swindell@arkansashighways.com
Award Range: Governed by Act 445 of 1973, funding normally 90%
Description: Program consists of projects on major and minor collector routes not on the State Highway System that connect with local trade areas or state highways. Funds are used to construct, improve, widen, straighten, surface or reconstruct state aid roads.

Agency: Arkansas Highway & Transportation Department

Program: Surface Transportation Program (STP)
Contact: Phil Brand, Division Head
501-569-2361, phil.brand@arkansashighways.com
Award Range: Up to $1 million in federal aid, $350k for signal/intersection projects
Description: Provides funds for projects in unincorporated areas and cities with fewer than 200,000 in population. Roadway projects, such as new construction, restoration, reconstruction, rehabilitation, resurfacing, operational improvements, bridge projects, safety projects and other transportation enhancements may be undertaken on any public road functionally classified other than a rural minor collector or local road.

Agency: Arkansas Highway & Transportation Department

Program: Transportation Enhancement Program
Contact: Bethany Swindell, Disaster Liaison
501-569-2930, bethany.swindell@arkansashighways.com
Award Range: Up to $400,000 in federal aid
Description: Provides funds for transportation enhancement activities, i.e., educational activities and facilities for pedestrians and bicyclists; acquisition of scenic easements and scenic historical sites; landscaping and other scenic beautification; and rehabilitation and operation of historic transportation buildings, structures, or facilities. Cities and counties must apply for enhancement project funding and are notified when applications are being accepted.

Agency: Arkansas Highway & Transportation Department

Program: Safe Route to Schools Program
Contact: Kimberly Sanders, Interim Safe Routes to School Coordinator
501-569-2020, kim.sanders@arkansashighways.com
Award Range: Up to $1 million in federal grants
Description: Funds for education infrastructure to make it safer. Assist with kids from kindergarten through eighth grade to walk, bicycle to and from school.

Agency: Arkansas Livestock and Poultry Commission

Program: Fair Construction Funds
Contact: Dr. George Badley, DVM, State Veterinarian
501-907-2400, pbadley@alpc.ar.gov
Award Range: $0 - $847,200.
Description: Used by various fair associations for construction, repairing and improving the facilities and paying existing indebtedness incurred for such purposes. To safeguard human and animal health, assure food safety and quality, and promote Arkansas livestock and poultry industries for the benefit of our citizens. No new grants awarded.

Agency: Arkansas Livestock and Poultry Commission

Program: Livestock Inspection and Disease Control Program
Contact: Dr. George Badley,DVM, State Veterinarian
501-907-2400, pbadley@alpc.ar.gov
Award Range: Varies depending on the jurisdiction and the proposed projects.
Description: Suppression and eradication of animal diseases. The Commission works closely with USDA, Veterinary Services in controlling the movements of livestock on an intra and interstate basis to ensure compliance with state disease control laws and regulations. This encompasses the inspection of virtually all herds of cattle and swine in the state, as well as surveillance of auction barns, livestock dealers and garbage feeding establishments. The Commission, through this program, strives to protect livestock and poultry industries from dreaded and costly diseases that would affect production and marketability.

Agency: Arkansas Natural Resources Commission

Program: Beaver Project Funding
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: $5.00 per beaver
Description: This grant is used to help control Arkansas' beaver population. The grant reimburses conservation districts $5.00 per beaver for payments districts make to beaver harvesters.

Agency: Arkansas Natural Resources Commission

Program: Clean Water Revolving Loan Fund
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: Low interest loans.
Description: New collection systems; rehabilitation of existing collection systems; new treatment systems; rehabilitation of existing treatment systems. Eligible entities: cities, towns, counties, public facilities boards, improvement districts, regional wastewater treatment districts.

Agency: Arkansas Natural Resources Commission

Program: Drinking Water State Revolving Fund
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: Low interest loans
Description: All projects funded through this program must be on the DWSRF priority list. The priority list is prepared by the Arkansas Department of Health and Human Services. Types of Projects: compliance, public health, water supply, treatment, distribution storage, planning and design, consolidation, restructuring. Eligible entities: cities, towns, counties, public facilities boards, public water authorities, improvement districts, regional water distribution districts, regional development authorities.

Agency: Arkansas Natural Resources Commission

Program: Grants to Districts
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: $0-$25,000
Description: This grant is used by conservation districts to fund additional positions and programs. This money is primarily used to fund extra hours for district secretaries and to hire technicians. Only soil and water conservation districts are eligible for this grant.

Agency: Arkansas Natural Resources Commission

Program: Non-Point Source Pollution Management Grant
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: $0 - $1,000,000
Description: The ANRC accepts grant applications for non-point source pollution (NPS) management projects. The main purpose of the grant is to fund NPS reduction and/or

abatement, demonstration, and educational projects within prioritized watersheds. Any non-federal government agency, educational institution, or nonprofit corporation is eligible for funding under this program. This program is funded by US EPA, thus federal agencies and "for profit" groups are not eligible for assistance. SPECIAL REQUIREMENTS: The ANRC requires that section 319(h) grant recipients provide non-federal match in the amount of 43% of the entire project costs. Funds and services used as match shall not be utilized as match for any other federal grant program and shall not in any way be paid by federal funds.

Agency: Arkansas Natural Resources Commission

Program: Water Development Fund
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: Loans (5% interest) deferred loans, grants and joint ventures
Description: On water projects, conditions of assistance are determined by comparison of proposed water rates to median household income. Allowances are made for greater than state average incidence of low income, unemployed or elderly persons. Types of projects: public water supply, irrigation, flood control and/or drainage, erosion and sediment control, stream bank stabilization, recreation and/or fish & wildlife, hydroelectric power, navigation. Eligible entities: cities, towns, counties, public facilities boards, public water authorities, conservation districts, water associations (with co-sponsor), improvement districts, regional water distribution districts, levee and drainage authorities.

Agency: Arkansas Natural Resources Commission

Program: Water Resources Cost Share Revolving Fund
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: Loans (5% interest) deferred loans, grants and joint ventures
Description: This program is typically used to provide local cost-share of large federal projects. Types of projects: construction, replacement, acquisition and ownership of facilities, land and easement procurement, improvements for developing and utilization of water resources, projects to supply quality water to residents, provide water for navigation - provide recreational access to lakes and streams, reclaim, preserve and protect the state's land resources, protect the wealth of the state from disastrous floods. Eligible entities: cities, towns, counties, improvement districts, public facilities boards, public water authorities, regional irrigation water distribution districts, regional development authorities, conservation districts.

Agency: Arkansas Natural Resources Commission

Program: Water, Sewer, and Solid Waste Fund
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: Loans (5% interest) deferred loans, grants and joint ventures
Description: On water and sewer projects, conditions of assistance are determined by comparison of proposed water or sewer rates to median household income. Allowances are made for greater than state average incidence of low income, unemployed or elderly persons. Types of projects: public water supply, sewer systems, solid waste

collection/disposal. Eligible entities: cities, towns, counties, water associations, improvement districts, public facilities boards, public water authorities, rural development authorities, regional water distribution districts, regional solid waste authorities, regional wastewater treatment districts

Agency: Arkansas Natural Resources Commission
Program: Water, Waste Disposal and Pollution Abatement Facilities General Obligation
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: Bonds up to 30 years or life of project, whichever is less. Current market tax-exempt interest rate of the state's G.O. Bond Issue
Description: Types of projects: water (supply, storage, distribution and irrigation), solid waste landfills, solid waste recycling facilities, wastewater collection systems, wastewater treatment facilities, non-point source reduction. Eligible entities: cities, towns, counties, improvement districts, rural development authorities, regional solid waste authorities, regional water distribution, districts, regional wastewater treatment districts, public facilities boards, public water authorities.

Agency: Arkansas Natural Resources Commission

Program: Tax Credit Incentive Program
Contact: Jon Sweeney, Deputy Director Chief Engineer
501-682-3962, jon.sweeney@arkansas.gov
Award Range: This is a tax credit program, not a direct grant program.
Description: The purpose of this program is to encourage water users to invest in (1) the construction of impoundments to use available surface water, thereby reducing their dependence on groundwater; (2) the conversion from ground water use to surface water use; and (3) land leveling to reduce agricultural irrigation water use. Tax credits may pass through partnerships, corporations, etc.

Agency: Department of Work Force Education
Program: The Department of Defense (DOD) Surplus Property Program
Contact: Laurel Carnes, Internal Services Manager
501-682-1848, laurel.carnes@arkansas.gov
Description: The program assists state and local law enforcement agencies to obtain high-quality, high-value surplus federal property at little or no cost. A wide variety of equipment, vehicles and aircraft suitable for use in counter drug activities can be provided. Law enforcement equipment available: Items range from, but are not limited to: personal defense items (body armor, helmets and protective mask), detection equipment (night vision goggles, drug detection kits and metal & bomb detection equipment), small marine craft (outboard motors, non-powered & powered boats and inflatable boats), powered aircraft (fixed and rotor wing), and weapons & ammunitions (long guns, hand guns and swat team type weapons).

Agency: Arkansas State Police
Program: State and Community Highway Safety Program
Contact: Mark Allen, Captain
501-618-8807,mark.allen.@asp.arkansas.gov
Award Range: Varies based on project activities and scope of work
Description: Funded primarily by Title 23, U.S.C., Section 402, these grant funds are administered by the State Highway Safety Office to fund highway safety projects by

state, local and non-profit agencies that are most effective in reducing traffic fatalities, crashes and injuries. These projects focus primarily on alcohol and other drug countermeasures, occupant protection, police traffic services, speed control, traffic records, emergency medical services, motorcycle safety, pedestrian and bicycle safety, and roadway safety.

Agency: Department of Arkansas Heritage-Arkansas Historic Preservation Program
Program: Certified Local Government Grant
Contact: Joia, Grants Administrator
501-324-9880, joia@arkansasheritage.org
Award Range: No minimum or maximum
Grant to communities participating in or pursuing membership in the Certified Local Government program using federal pass through funds from AHPP's annual federal grant. Funds can be used for surveying historic districts, staff training, conference registration, and building restoration. Fourteen Arkansas cities currently participate in the Certified Local Government program: Conway, El Dorado, Eureka Springs, Fort Smith, Helena-West Helena, Hot Springs, Little Rock, Morrilton, North Little Rock, Osceola, Pine Bluff, Rogers, Texarkana, and Van Buren.

Agency: Department of Arkansas Heritage - Arkansas Historic Preservation Program
Program: Courthouse Restoration Grant
Contact: Joia Burton, Grants Administrator
501-324-9880, joia@arkansasheritage.org
Award Range: No minimum or maximum
Description: Sub grant, funded by a grant from the Arkansas Natural and Cultural Resources Council, using Real Estate Transfer Tax, for restoration of county courthouses and annexes listed on the National Register of Historic Places. Conservation easement is required. Commercial based organization that has money going to different projects.

Agency: Department of Arkansas Heritage - Arkansas Historic Preservation Program
Program: Historic Preservation Restoration Grant
Contact: Joia Burton, Grants Administrator
501-324-9880, joia@arkansasheritage.org
Award Range: Minimum $10,000
Description: Matching grant (2:1), funded by the Real Estate Transfer Tax, for restoration of properties listed on the National Register of Historic Places. Applicant must be a local government (city, county, school district) or 501[c]3, and must give a conservation easement on the property prior to receiving funds.

Agency:Department of Arkansas Heritage - Arkansas Historic Preservation Program
Program: Main Street Model Business Grant
Contact Joia Burton, Grants Administrator
501-324-9880, joia@arkansasheritage.org
Award Range: Minimum $10,000
Description: Grant to participating local Main Street organizations to fund facade improvements, retail design improvements, and business consultation for a local business, which then serves as a model for downtown redevelopment. Funded using Real Estate Transfer Tax.

Agency: Department of Arkansas Heritage - Arkansas Historic Preservation Program
Program: Main Street Downtown Revitalization Grant
Contact: Joia Burton, Grants Administrator
501-324-9880, joia@arkansasheritage.org
Award Range: $5000 to $10,000
Description: Grant to participating local Main Street organizations to fund facade and streetscape improvements in the downtown business district. Awards distributed by formula to all participating Main Street organizations. This was funded using Real Estate Transfer Tax. The Main Street area revitalization efforts seek to rejuvenate older, downtown business districts while retaining the area's traditional and historic character.

Agency: Department of Arkansas Heritage - Arkansas Historic Preservation Program
Program: General Improvement Fund
Contact: Joia Burton, Grants Administrator
501-324-9880, joia@arkansasheritage.org
Award Range: $6000 to $25,000
Description: Loose grant funded project by Legislature and Supreme Court votes. Department of Finance Administration is one of the key sources when funding these projects. The state General Improvement Fund is a pot of money that's divided every year into capital improvement projects, such as new buildings for state colleges and universities.

5.5.3 Federal Government Funding Sources

The United States Federal Government provides significant grant funding to the State of Arkansas through a number of agencies and programs. These federal funding sources are detailed below. For the 2010 revision, each of the programs was researched to confirm its currency and funding status. Federal mitigation programs, activities & initiatives. Programs, activities and initiatives are subdivided into the following categories: Basic & Applied Research/Development, Technical and Planning Assistance, Hazard Identification & Mapping, Project Support, and Financing and Loan Guarantees. Programs currently supporting mitigation activities in the state and those that have the potential to support mitigation activities are indicated.

Program/Activity	Type of Assistance	Agency & Contact	Current Support	Potential Support
Basic & Applied Research/Development				
Center for Integration of Natural Disaster Information	Technical Assistance: Develops and evaluates technology for information integration and dissemination.	Department of Interior (DOI) –US Geological Survey (USGS) The Center for Integration of Natural Hazards Research: (703) 648-6059 hazinfo@usga.gov	**C**	
Hazard Reduction Program	Funding for research and related educational activities on hazards.	National Science Foundation (NSF), Directorate for Engineering, Division of Civil and Mechanical Systems, Hazard Reduction Program: (703) 306-1360		**P**
Decision, Risk, and Management Science Program	Funding for research and related educational activities on risk, perception, communication, and management (primarily technological hazards).	NSF – Directorate for Social, Behavioral and Economic Science, Division of Social Behavioral and Economic Research, Decision, Risk, and Management Science Program (DRMS): (703) 306-1757 www.nsf.gov/sbe/drms/start.htm		**P**
Societal Dimensions of Engineering, Science, and Technology Program	Funding for research and related educational activities on topics such as ethics, values, and the assessment, communication, management and perception of risk	NSF – Directorate for Social, Behavioral and Economic Science, Division of Social, Behavioral and Economic Research, Societal Dimensions of Engineering, Science and Technology Program: (703) 306-1743		**P**
National Earthquake Hazard Reduction Program (NEHRP) in Earth Sciences	Research into basic and applied earth and building sciences.	NSF – Directorate for Geosciences, Division of Earth Sciences: (703) 306-1550		**P**
Technical and Planning Assistance				
Planning Assistance to States	Technical and planning assistance for the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources.	Department of Defense (DOD) US Army Corps of Engineers (USACE) Contact the Floodplain Management Staff in the Appropriate USACE Regional Office North Atlantic: (212) 264-7813 South Atlantic: (404) 331-4441 Great Lakes and Ohio River: (513) 684-6050 Mississippi Valley: (601) 634-5827		**P**

		Northwestern: (503) 808-3853 Southwestern: (214) 767-2613 South Pacific: (415) 977-8164 Pacific Ocean: (808) 438-8863		
Disaster Mitigation Planning and Technical Assistance	Technical and planning assistance grants for capacity building and mitigation project activities focusing on creating disaster resistant jobs. and workplaces.	Department of Commerce (DOC), Economic Development Administration (EDA): (800) 345-1222 EDA's Disaster Recovery Coordinator: (202) 482-6225 www.doc.gov/eda		**P**
Program/Activity	**Type of Assistance**	**Agency & Contact**	**Current Support**	**Potential Support**
Technical and Planning Assistance				
Watershed Surveys and Planning	Surveys and planning studies for appraising water and related resources, and formulating alternative plans for conservation use and development. Grants and advisory/counseling services to assist w/ planning and implementation improvement.	US Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) Watersheds and Wetlands Division: (202) 720-4527 Deputy Chief for Programs: (202) 690-0848 www.nrcs.usda.gov		**P**
National Flood Insurance Program	Formula grants to states to assist communities to comply with NFIP floodplain management requirements (Community Assistance Program).	FEMA	**C**	
Emergency Management/ Mitigation Training	Training in disaster mitigation, preparedness, planning.	FEMA	**C**	
National Dam Safety Program	Technical assistance, training, and grants to help improve state dam safety programs.	FEMA	**C**	
National Earthquake Hazards Reduction Program	Training, planning and technical assistance under grants to states or local jurisdictions.	FEMA; DOI-USGS USGS Earthquake Program Coordinator: (703) 648-6785		**P**
Floodplain Management Services	Technical and planning assistance at the local, regional, or national level needed to support effective floodplain management.	DOD-USACE North Atlantic: (212) 264-7813 South Atlantic: (404) 331-4441 Great Lakes and Ohio River: (513) 684-6050 Mississippi Valley: (601) 634-5827 Northwestern: (503) 808-3853		**P**

		Southwestern: (214-767-2613 South Pacific: (415) 977-8164 Pacific Ocean: (808) 438-8863		
Watershed Protection and Flood Prevention Program	Technical and financial assistance for installing works of improvement to protect, develop, and utilize land or water resources in small watersheds under 250,000 acres.	USDA-NRCS Director, Watersheds and Wetlands Division: (202) 720-3042 (202) 690-4614 www.nrcs.usda.gov	**C**	
Environmental Quality Incentives Program (EQIP)	Technical, educational, and limited financial assistance to encourage environmental enhancement.	USDA-NRSS NRCS County Offices Or NRCS EQUIP Program Manager: (202) 720-1834 www.nrcs.usda.gov		**P**
National Earthquake Hazard Reduction Program	Technical and planning assistance for activities associated with earthquake hazards mitigation.	FEMA, DOI-USGS Earthquake Program Coordinator: (703) 648-6785		**P**
CDC – Bioterrorism Planning Grants	Technical and planning assistance for activities associated with bioterrorism agents, hazards, surveillance and associated preparedness and mitigation strategies.	Centers for Disease Control and Prevention, 1600 Clifton Rd, Atlanta, GA 30333, USA Tel: 404-639-3311 • CDC Contact Center: 800-CDC-INFO• TTY: 888-232-6348	**C**	
USDA APHIS – Animal Disease Planning	Technical and planning assistance for activities associated with animal disease agents, hazards, surveillance and associated preparedness and mitigation strategies.	Arkansas Dr. Ronnie Blair USDA, APHIS, VS 1200 Cherry Brook Dr., Suite 300 Little Rock, AR 72211 (501) 224-9515 Fax (501) 225-5823 Ronnie.E.Blair@usda.gov	**C**	
Hazard Identification & Mapping				
National Flood Insurance Program: Flood Mapping	Flood insurance rate maps and flood plain management maps for all NFIP communities.	FEMA	**C**	
National Flood Insurance Program: Technical Mapping Advisory Council	Technical guidance and advice to coordinate FEMA's map modernization efforts for the National Flood Insurance Program.	DOI-USGS USGS – National Mapping Division: (573) 308-3802	**C**	
National Digital Orthophoto Program	Develops topographic quadrangles for use in mapping of flood and other hazards.	DOI-USGS USGS – National Mapping Division: (573) 308-3802		**P**

Stream Gauging and Flood Monitoring Network	Operation of a network of over 7,000 stream gauging stations that provide data on the flood characteristics of rivers.	DOE-USGS Chief, Office of Surface Water, USGS: (703) 648-5303	**C**	
Mapping Standards Support	Expertise in mapping and digital data standards to support the National Flood Insurance Program.	DOI-USGS USGS – National Mapping Division: (573) 308-3802		**P**
Soil Survey	Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes.	USDA-NRCS NRCS – Deputy Chief for Soil Science and Resource Assessment: (202) 720-4630	**C**	
National Earthquake Hazards Reduction Program	Seismic mapping for U.S.	DOI-USGS USGS Earthquake Program Coordinator: (703) 648-6785		**P**
Program/Activity	**Type of Assistance**	**Agency & Contact**	**Current Support**	**Potential Support**
Project Support				
Aquatic Ecosystem Restoration	Direct support for carrying out aquatic ecosystem restoration projects that will improve the quality of the environment.	DOD-USACE Chief of Planning @ appropriate USACE Regional Office North Atlantic: (212) 264-7111 South Atlantic: (404) 331-44580 Great Lakes and Ohio River Chicago: (312) 886-5468 Cincinnati: (513) 684-3008 Mississippi Valley Division: (601) 634-7880 Northwestern Division Portland: (503) 808-3850 Omaha: (402) 697-2470 Southwestern Division: (214) 767-2314 South Pacific Division: (214) 767-2314 South Pacific Division: (415) 977-8171 Pacific Ocean Division: (808) 438-3850		**P**
Beneficial Uses of Dredged Materials	Direct assistance for projects that protect, restore and create aquatic and ecologically-related habitats, including wetlands, in connection	DOD-USACE Same as above		**P**

	with dredging an authorized federal navigation project.			
Wetlands Protection – Development Grants	Grants to support the development and enhancement of state and tribal wetlands protection programs.	US Environmental Protection Agency (EPA) EPA Wetlands Hotline: (800) 832-7828 Or EPA Headquarters, Office of Water Chief, Wetlands Strategies and State Programs: (202) 260-6045		**P**
Clean Water Act Section 319 Grants	Grants to states to implement non-point source programs, including support for non-structural watershed resource restoration activities.	EPA Office of Water Chief, Non-Point Source Control Branch: (202) 260-7088, 7100		**P**
Community Development Block Grant (CDBG) State Administered Program	Grants to states to develop viable communities (e.g., housing, a suitable living environment, expanded economic opportunities) in non-entitled areas, for low- and moderate-income persons.	US Department of Housing and Urban Development (HUD) State CDBG Program Manager Or State and Small Cities Division, Office of Block Grant Assistance, HUD Headquarters: (202) 708-3587	**C**	
Community Development Block Grant Entitlement Communities Program	Grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate-income persons.	HUD City and county applicants should call the Community Planning and Development staff of their appropriate HUD field office. As an alternative, they may call the Entitlement Communities Division, Office of Block Grant Assistance, HUD Headquarters: (202) 708-1577, 3587	**C**	
Emergency Watershed Protection Program	Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.	USDA – NRCS National Office – (202) 690-0848 Watersheds and Wetlands Division: (202) 720-3042	**C**	
Rural Development Assistance – Utilities	Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.	USDA-Rural Utilities Service (RUS) Program Support: (202) 720-1382 Northern Regional Division: (202) 720-1402 Electric Staff Division: (202) 720-1900 Power Supply Division: (202) 720-6436		**P**

Rural Development Assistance – Housing	Grants, loans and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster is necessary.	USDA-Rural Housing Service (RHS) Community Programs: (202) 720-1502 Single Family Housing: (202) 720-3773 Multi Family Housing: (202) 720-5177		**P**
Project Impact: Building Disaster Resistant Communities	Funding and technical assistance to communities and States to implement a sustained pre-disaster mitigation program.	FEMA		**P**
Flood Mitigation Assistance	Grants to states and communities for pre-disaster mitigation to help reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program.	FEMA	**C**	
Hazard Mitigation Grant Program	Grants to states and communities for implementing long-term hazard mitigation measures following a major disaster declaration.	FEMA	**C**	
Public Assistance Program (Infrastructure)	Grants to states and communities to repair damaged infrastructure and public facilities, and help restore government or government-related services. Mitigation funding is available for projects related to the damaged components of the eligible building or structure.	FEMA	**C**	
National Flood Insurance Program	Makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements.	FEMA	**C**	
HOME Investments Partnerships Program	Grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons.	HUD Community Planning and Development, Grant Programs, Office of Affordable Housing, HOME Investment Partnership Programs: (202) 708-2685 (202) 708 0614 extension 4594 1-800-998-9999		**P**
Disaster Recovery Initiative	Grants to fund gaps in available recovery assistance after disasters (including mitigation).	HUD Community Planning and Development Divisions in their respective HUD field offices or HUD Community Planning and Development: (202) 708-2605		**P**

Non-Structural Alternatives to Structural Rehabilitation of Damaged Flood Control Works	Direct planning and construction grants for non-structural alternatives to the structural rehabilitation of flood control works damaged in floods or coastal storms. $9 million FY99.	DOD-USACE Emergency Management contact in respective USACE field office: North Atlantic: (718) 491- 8735 South Atlantic: (404) 331-6795 Great Lakes and Ohio River: (513) 684-3086 Mississippi Valley: (601) 634-7304 Northwestern: (503) 808-3903 Southwestern: (214) 767-2425 South Pacific: (415)977-8054 Pacific Ocean: (808) 438-1673		**P**
Partners for Fish and Wildlife	Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats.	Department of Interior (DOI) – Fish and Wildlife Service (FWS) National Coordinator, Ecological Services: (703) 358-2201 A list of state and regional contacts is available from the National Coordinator upon request.		**P**
Project Modifications for Improvement of the Environment	Provides for ecosystem restoration by modifying structures and/or operations or water resources projects constructed by the USACE, or restoring areas where a USACE project contributed to the degradation of an area.	DOD-USACE Chief of Planning @ appropriate USACE Regional Office North Atlantic: (212) 264-7111 South Atlantic: (404) 331-6270 Great Lakes and Ohio River Chicago: (312) 886-5468 Cincinnati: (513) 684-3008 Mississippi Valley Division: (601) 634-5762 Northwestern Division Portland: (503) 808-3850 Omaha: (402) 697-2470 Southwestern Division: (214) 767-2310 South Pacific Division: (415) 977-8171 Pacific Ocean Division: (808) 438-8880		**P**
Post-Disaster Economic Recovery Grants and Assistance	Grant funding to assist with the long-term economic recovery of communities, industries, and firms adversely impacted by disasters.	Department of Commerce (DOC) – Economic Development Administration (EDA) EDA Headquarters Disaster Recovery Coordinator: (202) 482-6225		**P**
Public Housing Modernization Reserve for Disasters and Emergencies	Funding to public housing agencies for modernization needs resulting from natural disasters (including elevation, flood proofing, and retrofit).	HUD Director, Office of Capital Improvements: (202) 708-1640		**P**

Indian Housing Assistance (Housing Improvement Program)	Project grants and technical assistance to substantially eliminate sub-standard Indian housing.	Department of Interior (DOI)-Bureau of Indian Affairs (BIA) Division of Housing Assistance, Office of Tribal Services: (202) 208-5427		**P**
Land Protection	Technical assistance for run-off retardation and soil erosion prevention to reduce hazards to life and property.	USDA-NRCS Applicants should contact the National NRCS office: (202) 720-4527		**P**
North American Wetland Conservation Fund	Cost-share grants to stimulate public/private partnerships for the protection, restoration and management of wetland habitats.	DOI-FWS North American Waterfowl and Wetlands Office: (703) 358-1784		**P**
Land Acquisition	Acquires or purchases easements on high-quality lands and waters for inclusion into the National Wildlife Refuge System.	DOI-FWS Division of Realty, National Coordinator: (703) 358-1713		**P**

Program/Activity	**Type of Assistance**	**Agency & Contact**	**Current Support**	**Potential Support**
Project Support				
Federal Land Transfer/Federal Land to Parks Program	Identifies, assesses, and transfers available federal real property for acquisition for state and local parks and recreation, such as open space.	DOI-NPS General Services Administration Offices Fort Worth, TX: (817) 334-2331 Boston, MA: (617) 835-5700 Or Federal Lands to Parks Leader NPS National Office: (202) 565-1184		**P**
Wetlands Reserve Program	Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.	USDA-NRCS National Policy Coordinator NRCS Watersheds and Wetlands Division: (202) 720-3042		**P**
Transfers of Inventory Farm Properties to Federal and State Agencies for Conservation Purposes	Transfers title of certain inventory farm properties owned by FSA to federal and state agencies for conservation purposes (including the restoration of wetlands and floodplain areas to reduce future flood potential).	US Department of Agriculture (USDA) – Farm Service Agency (FSA) Farm Loan Programs National Office: (202) 720-3467, 1632		**P**
Strategic National Stockpile - CDC	Funding, supplies and technical assistance for the	Centers for Disease Control and Prevention, 1600 Clifton Rd,	**C**	

	management and distribution of the Strategic National Stockpile of pharmaceuticals and vaccines.	Atlanta, GA 30333, USA Tel: 404-639-3311 • CDC Contact Center: 800-CDC-INFO TTY: 888-232-6348		
Buffer Zone Protection Program	Funding and coordination in bringing federal, state and local levels of government, law enforcement and the private sector together to create buffer zone plans to reduce vulnerabilities in areas surrounding critical infrastructure and key resources.	Department of Homeland Security (DHS) U.S. Department of Homeland Security Washington, D.C. 20528 (202)282-8000	**C**	
Emergency Management Performance Grants	Funding used for necessary and essential expenses involved in the development, maintenance, and improvement of state and local emergency management programs.	Department of Homeland Security (DHS) U.S. Department of Homeland Security Washington, D.C. 20528 (202)282-8000	**C**	
Citizen Corps Program	Funding for Citizen Corps Council organizing activities; for organizing, training, equipping, and maintaining CERTs; for defraying the added expense of liability coverage for CERT participants; and for outreach and public education campaigns to promote Citizen Corps and community and family safety measures, to include printing, marketing, advertising, and special events.	Department of Homeland Security (DHS) U.S. Department of Homeland Security Washington, D.C. 20528 (202)282-8000	**C**	
Community Emergency Response Teams	Funding for organizing, training, equipping, and maintaining CERTs.	Department of Homeland Security (DHS) U.S. Department of Homeland Security Washington, D.C. 20528 (202)282-8000	**C**	
Homeland Security Grant Program	Funding provided to enhance homeland security and emergency operations planning; the purchase of specialized equipment to enhance the capability of state and local agencies to prevent, respond to, and mitigate incidents of terrorism involving the use of CBRNE weapons and cyber attacks; for costs related to the design,	Department of Homeland Security (DHS) U.S. Department of Homeland Security Washington, D.C. 20528 (202)282-8000	**C**	

	development, and conduct of a state CBRNE and cyber security training programs and attendance at CBRNE training courses; for costs related to the design, development, conduct, and evaluation of CBRNE and cyber security exercises; and for costs associated with implementing State Homeland Security Assessments and Strategies (SHSAS).			
State and Local Domestic Preparedness Exercise Support	Funding used to provide support for planning and conducting exercises at the national, state, and local levels to enhance the capacity of state and local first responders to respond to a weapon of mass destruction (WMD) terrorism incident involving chemical, biological, radiological, nuclear, and explosive devices.	Department of Homeland Security (DHS) U.S. Department of Homeland Security Washington, D.C. 20528 (202)282-8000	**C**	
Physical Disaster Loans and Economic Injury Disaster Loans	Disaster loans to non-farm, private sector owners of disaster damaged property for uninsured losses. Loans can be increased by up to 20 percent for mitigation purposes.	Small Business Administration (SBA) National Headquarters Associate Administrator for Disaster Assistance: (202) 205-6734	**C**	
Conservation Contracts	Debt reduction for delinquent and non-delinquent borrowers in exchange for conservation contracts placed on environmentally sensitive real property that secures FSA loans.	USDA-FSA Farm Loan Programs FSA National Office: (202) 720-3467, 1632 or local FSA office		**P**
Clean Water State Revolving Funds	Loans at actual or below-market interest rates to help build, repair, relocate, or replace wastewater treatment plants.	EPA EPA Office of Water State Revolving Fund Branch Branch Chief: (202) 260-7359 List of Regional Offices available upon request		**P**
Section 108 Loan Guarantee Program	Loan guarantees to public entities for community and economic development (including mitigation measures).	HUD Community Planning and Development staff at appropriate HUD field office, or the Section 108 Office in HUD Headquarters: (202) 708-1871		**P**
Section 504 Loans for	Repair loans, grants and	US Department of Agriculture		**P**

Housing	technical assistance to very low-income senior homeowners living in rural areas to repair their homes and remove health and safety hazards.	(USDA) – Rural Housing Service (RHS) Contact local RHS Field Office, or RHS Headquarters, Director, Single Family Housing Direct Loan Division: (202) 720-1474		
Section 502 Loan and Guaranteed Loan Program	Provides loans, loan guarantees, and technical assistance to very low and low-income applicants to purchase, build, or rehabilitate a home in a rural area.	USDA-RHS Contact the local RHS Field Office, or the Director, Single Family Housing Guaranteed Loan Division, RHS: (202) 720-1452		**P**
Rural Development Assistance -- Utilities	Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.	USDA-Rural Utility Service (RUS) Contact Rural Development Field Offices, or RHS, Deputy Administrator, Community Programs Division: (202) 720-1490		**P**
Farm Ownership Loans	Direct loans, guaranteed/insured loans, and technical assistance to farmers so that they may develop, construct, improve, or repair farm homes, farms, and service buildings, and to make other necessary improvements.	USDA-FSA Director, Farm Programs Loan Making Division, FSA: (202) 720-1632		**P**

5.6 Local Funding and Technical Assistance

Local Funding and Technical Assistance	
IFR REQUIREMENT 201.4(c)(4)(i):	[The section on the Coordination of Local Mitigation Planning must include a] description of the State process to support, through funding and technical assistance, the development of local mitigation plans.
Explanation:	With a new requirement for local mitigation plans in DMA 2000, many communities will require additional assistance, particularly small communities without adequate resources to develop a plan. Therefore, the State **must** describe the process it has developed or will develop to provide funding and technical assistance to local jurisdictions to prepare mitigation plans. Funding sources may be Federal, State, or private (see page 1-47 of the Mitigation Strategies section). The description *should* include the departments or staff responsible for providing funds, plan development assistance, and technical assistance for developing risk assessments. This description could be included as part of the goals, objectives, and actions in the Mitigation Strategy section.

In 2004, the Arkansas Department of Emergency Management received two Pre-Disaster Mitigation-Competitive (PDM-C) grants in the amount of $650,000 from FEMA to provide funding and technical support for 62 of the 77 emergency management jurisdictions statewide. During the 2007 update process, the HMP Sub-Committee determined that two additional county planning grants were awarded in PDM 2005 bringing the total to 64 of the 77 counties. The Marmaduke school district also received a planning grant from HMPG. Mitigation planning for one jurisdiction was funded through FMA funds. One PDM-C grant was awarded in September of 2003 to support 21 jurisdictions and the second was awarded in April of 2004 to support 41 jurisdictions. Each jurisdiction was provided $10,000 to assist in the mitigation planning process. The 14 jurisdictions not participating were not in the NFIP and therefore not eligible for funding. A timeframe for completion of local mitigation plans is discussed in *Section 5.7: Local Plan Integration*. As of January 2010, 62 jurisdictions within Arkansas had local plans completed and approved by FEMA and adopted, with one additional plan (Phillips County) approved pending adoption by the jurisdiction.

ADEM supports the development of local mitigation plans with planning workshops, technical assistance, site visits, and FEMA grant awards. ADEM has been proactive on assisting communities and contractors when they are preparing to submit grant project applications. ADEM meets with each applicant before they submit an application to the state and FEMA. This is to help ensure that the correct information and format is used and each applicant understands the required guidelines for the grant program they are requesting funding from. The department has found that this effort at the beginning has reduced the amount of problems when applications are submitted and has gained a higher success rating when applications are sent to FEMA for approval to be funded. The state intends on continuing this practice in assisting applicants in the future. The Arkansas Department of Emergency Management has been actively supporting the local governments, communities, and contractors by providing various forms of training:

- G-318 Mitigation Planning Workshops for Local Governments July 7-9, 2009
- BCA Course September 16-17, 2009
- BCA Course January 26-27, 2010
- Application Development Course March 22-23, 2010
- Assist individual applicants with FEMA software system E-Grants systems.

FEMA-State Mitigation Planning Meeting February 10-11, 2010

In addition to the workshops, funding, and software, the ADEM staff is a primary resource for all mitigation planning offering a range of support services.

- Review and comment on plan drafts prior to FEMA submission
- Guidance and technical assistance for planning via telephone, email and on-site meetings.
- Assistance with funding grants and grant management.

2010 Update: for Grant Funding

The following information illustrates some of the funding applications sent to ADEM. A complete, more detailed list is available through ADEM.

PDM 07:
- PDMC-PJ-06-AR-2007-002 – Greenwood SD, Wells / East Hills
- PDMC-PJ-06-AR-2007-003 – Greenwood SD, High School / North Main
- PDMC-PJ-06-AR-2007-001 – Fort Smith SD, Howard Elementary
- PDMC-PJ-06-AR-2007-004 – Magazine SD, Elementary

PDM 08:
- PDMC-PJ-06-AR-2008-005 – Van Buren SD, Butterfrield Jr. High

PDM 09:
- PDMC-PJ-06-AR-2009-005 – Van Buren SD, Kng Elementary

Anticipated PDM 10 Award:
- Russellville XD, Russellville Jr. High School

DR-1804 HMGP APPLICATIONS				
Applicant	**Total Cost Estimate**	**Federal Share**	**Local Share**	**Type**
Federal Funding		**$312,746.00**		
City of Mulberry SR	$411,000.00	$308,250.00	$102,750.00	safe room
		$0.00	$0.00	
Totals	**$411,000.00**	**$308,250.00**	**$102,750.00**	

Declared October 22,2008
Applications due to ADEM January 1, 2010
Applications due to FEMA January 22, 2010

1819 HMGP APPLICATIONS				
Applicant	**Gross Square Footage**	**Total Cost Estimate**	**Federal Share**	**Local Share**
Due to ADEM Dec 18, 2009		**$40,262,250.67**	**$30,196,688.00**	
Atkins H.S.	2,958.82	$532,588.24	$399,441.18	$133,147.06
Fountain Lake SD	7,654.12	$1,377,741.18	$1,033,305.88	$344,435.29
Lonoke MS/Elem	5,911.76	$1,064,117.65	$798,088.24	$266,029.41
Dumas Elem	2,364.71	$425,647.06	$319,235.29	$106,411.76
Quitman SR	3,782.35	$680,823.53	$510,617.65	$170,205.88
Dover Elem	2,517.65	$453,176.47	$339,882.35	$113,294.12
Dover High	2,958.82	$532,588.24	$399,441.18	$133,147.06
Van Buren Coleman	4,964.71	$893,647.06	$670,235.29	$223,411.76
Cabot Drainage	N/A	$90,128.00	$67,596.00	$22,532.00
Mid South CC	6,617.65	$1,045,346.00	$784,009.50	$261,336.50
Alma Primary Sch	4,952.94	$891,529.41	$668,647.06	$222,882.35
Ozark Sch SR	5,911.76	$1,064,117.65	$798,088.24	$266,029.41
Lonoke HS	4,135.29	$829,910.00	$622,432.50	$207,477.50
Mena School District SR (3 loc.)	11,294.12	$2,032,941.18	$1,524,705.88	$508,235.29
SCCSD Mid School	4,141.18	$775,520.00	$581,640.00	$193,880.00
Mississippi Cnty Plan Rev	N/A	$50,000.00	$37,500.00	$12,500.00
Carlisle, City SR	2,364.71	$425,647.06	$319,235.29	$106,411.76
Lamar Sch SR	8,276.47	$1,489,764.71	$1,117,323.53	$372,441.18
Russellville High SR	8,276.47	$1,489,764.71	$1,117,323.53	$372,441.18
Jacksonville, Fire SR	3,782.35	$680,823.53	$510,617.65	$170,205.88
Marion Cnty Plan	N/A	$30,000.00	$22,500.00	$7,500.00
Baxter Cnty Plan	N/A	$50,000.00	$37,500.00	$12,500.00
Westside Elem	2,235.29	$411,980.00	$308,985.00	$102,995.00
Yell Cnty Plan	N/A	$40,000.00	$30,000.00	$10,000.00
Fort Smith Ramsey	5,911.76	$1,064,117.65	$798,088.24	$266,029.41
Fort Smith Darby	5,911.76	$1,064,117.65	$798,088.24	$266,029.41
Fort Smith Kimmons	5,911.76	$1,064,117.65	$798,088.24	$266,029.41
Fort Smith Chaffin	5,911.76	$1,102,040.00	$826,530.00	$275,510.00
Pulaski Cnty Revison	N/A	$40,000.00	$30,000.00	$10,000.00
Viola SD	3,252.94	$585,529.41	$439,147.06	$146,382.35
Kirby Schools	3,076.47	$553,764.71	$415,323.53	$138,441.18
Due to ADEM February 26, 2010				
Pottsville Elem/Middle SR		$1,064,117.65	$798,088.24	$266,029.41

	5,911.76			
Cleveland Cnty Sch (Kingsland)	1,476.47	$265,764.71	$199,323.53	$66,441.18
Lake Hamilton Primary Sch	4,258.82	$766,588.24	$574,941.18	$191,647.06
Jessieville Sch	5,911.76	$1,064,117.65	$798,088.24	$266,029.41
Lakeside Sch	20,300.00	$3,654,000.00	$2,740,500.00	$913,500.00
Booneville Sch	4,729.41	$851,294.12	$638,470.59	$212,823.53

Declared 2/06/2009
Applications due to ADEM by December 18, 2009
Applications due to FEMA by February 6, 2010

NOI waiting list
Bauxite Schools (2)
Sebastian County (2)
Nettleton Schools (4)
Mayflower SD
Van Buren, City of
Cedarville SD
Malvern SD
Hot Springs SD (multiple)

1751 HMGP APPLICATIONS				
Applicant	**Total Cost Estimate**	**Federal Share**	**State Share**	**Local Share**
Oakland Heights Elem	$914,616.70	$685,963	$114,327.09	$114,327.09
Dwight Elem	$597,412.16	$448,059	$74,676.52	$74,676.52
Sequoyah Elem	$865,014.95	$648,761	$108,126.87	$108,126.87
Wonderview SD	$661,960.00	$496,470	$82,745.00	$82,745.00
Conway County	$113,136.00	$84,852	$14,142.00	$14,142.00
Crawford Elem	$724,032.00	$543,024	$90,504.00	$90,504.00
Hampton SD	$679,000.00	$509,250	$84,875.00	$84,875.00
Beebe Plan App	$17,250.00	$12,938	$2,156.25	$2,156.25
Pea Ridge	$906,000.00	$679,500	$113,250.00	$113,250.00
Hackett SD	$956,757.00	$717,568	$119,594.63	$119,594.63
Mulberry/Pleasant View	$718,574.00	$538,931	$89,821.75	$89,821.75
State HM Plan Revision	$150,000.00	$112,500		$37,500.00
Polk County HM Plan	$60,000.00	$45,000		$15,000.00
Russellville Middle	$630,885.00	$473,164	$78,860.63	$78,860.63
Russellville Upper Elem	$999,854.04	$749,891	$124,981.76	$124,981.76
Sebastian County HM Plan	$46,655.00	$34,991		$11,663.75
Alma Middle School Safe Rm	$988,432.60	$741,324		$247,108.15
AR Safe Shelter Program	$2,879,540.53	$2,159,655.40	$0.00	$719,885.13
Totals	**$10,029,579.45**	**$7,522,184.59**	**$1,098,061.48**	**$1,409,333.38**
Remaining Federal Share		**$112,514.41**		

Replacement Apps				
Removed App				
Bryant SD	$811,250.00	$608,437.50	$101,406.25	$101,406.25

1754 HMGP Applications

Applicant	Total Cost Estimate	Federal Share	State Share	Local Share
Federal Funding		**$1,778,459.00**		
Atkins SD	$1,179,349.50	$884,512.13	$147,418.69	$147,418.69
London Elem	$289,220.80	$216,915.60	$36,152.60	$36,152.60
Center Valley Elem	$880,346.00	$660,259.50	$110,043.25	$110,043.25
Totals	**$1,179,349.50**	**$1,761,687.23**	**$147,418.69**	**$147,418.69**
Remaining Share	**$368,834.00**	**$16,771.77**	**$46,104.00**	
Total State Share Commitment			**$193,522.69**	

DR-1758 HMGP APPLICATIONS			
Applicant	**Total Cost Estimate**	**Federal Share**	**Local Share**
Federal Funding		**$786,895.00**	
White County Schools Plan	$43,000.00	$32,250.00	$10,750.00
U of A Morrilton	$77,590.00	$58,192.50	$19,397.50
Centerpoint SD	$598,462.00	$448,846.50	$149,615.50
Totals	**$719,052.00**	**$539,289.00**	**$179,763.00**
Remaining Share		**$247,606.00**	

DR-1793 HMGP APPLICATIONS			
Applicant	**Total Cost Estimate**	**Federal Share**	**Local Share**
Federal Funding		**$605,482.00**	
Clarksville Jr High	$815,229.00	$605,482.00	$209,747.00
Totals	**$815,229.00**	**$605,482.00**	**$209,747.00**
Remaining Share	**$0.00**	**$0.00**	

DR-1834 HMGP APPLICATIONS		
Applicant	**Federal Share**	**Local Share**
Federal Funding	**$1,264,670.00**	

DR-1845 HMGP APPLICATIONS		
Applicant	**Federal Share**	**Local Share**
Federal Funding	**$851,685.00**	

2010 Update
The following table shows the updates to the 2007 plan funding and status:

Jurisdiction	County	Status	Funding Source	Plan Type	No. of Juris.	Included Jurisdictions
State of Arkansas	N/A	Approved	AR 2005 PDM	Standard	N/A	
Arkansas County	Arkansas	Approved	FY03 PDMC	Multi	10	Arkansas County, Almyra, DeWitt, Gillett, Humphrey, St. Charles, Stuttgart, Stuttgart Schools, DeWitt Schools, Phillips Community College
Ashley County	Ashley	Approved	FY03 PDMC	Multi	10	Ashley County, Crossett, Fountain Hill, Hamburg, Montrose, Parkdale, Portland, Wilmot, Hamburg School District, Crossett School District
Benton County	Benton	Approved	FY03 PDMC	Multi	28	Benton County, Bentonville, Garfield, Gateway, Pea Ridge, Lowell, Avoca, Highfill, Cave Springs, Siloam Springs, Gravette, Decatur, Bella Vista, Sulfur Springs, Bethel Heights, Rogers, Gentry, Centerton, Little Flock, Springtown, Bentonville SD, Decatur SD, Gentry SD, Gravette SD, Pea Ridge SD, Rogers SD, Siloam Springs SD, North West Arkansas Community College.
Bradley County	Bradley	Approved	FY03 PDM Plan	Multi	6	Bradley County, Warren, Hermitage, Banks, Warren School District, Hermitage School District
Calhoun County	Calhoun	Approved	FY03 PDMC	Multi	6	Calhoun County, Hampton, Harrell, Thornton, Tinsman, Hampton School District
Chicot County	Chicot	Approved	FY03 PDM Plan	Multi	7	Chicot County, Lake Village, Dermott, Eudora, Lakeside School District, Dermott School District, Eudora School District
Clark County	Clark	Approved	FY03 PDM Plan	Multi	14	Clark County, Amity, Arkadelphia, Caddo Valley, Gum Springs, Gurdon, Okolona, Whelen Spring, Arkadelphia School District, Gurdon School District, Henderson School District, Ouachita Baptist University
Clay County	Clay	Approved	FY03 PDM Plan	Multi	16	Clay County, Corning, Datto, Greenway, Knobel, McDougal, Nimmons, Peach Orchard, Piggott, Pollard, Rector, St. Francis, Success, Corning School District, Piggott School District, Rector School District

Cleburne County	Cleburne	Approved	FY03 PDMC	Multi	4	Cleburne County, Heber Springs, Quitman, Quitman School District
Cleveland County	Cleveland	Approved	FY03 PDMC	Multi	5	Cleveland County, Rison, Kingsland, Cleveland County School District, Woodlawn School District
Columbia County	Columbia	Approved	FY03 PDMC	Multi	5	Columbia County, Emerson, Magnolia, McNeil, Taylor, Waldo
Conway County	Conway	Approved	FY03 PDM Plan	Multi	8	Conway County, Menifee, Morrilton, Oppelo, Plumerville, Nemo Vista School District, Woodview School District, South Conway County School District
Craighead County	Craighead	Approved	FY03 PDM Plan	Multi	23	Craighead County, Bay, Black Oak, Bono, Brookland, Caraway, Cash, Lake City, Egypt, Jonesboro, Monette, Bay Schools, Blessed Sacrement Schools, Brookland Schools, Buffalo Island Central Schools, Concordia Christian Schools, East Side Baptist Schools, Jonesboro Schools, Nettleton Schools, Ridgefield Schools, Riverside Schools, Valley View Schools, Westside Consolidated Schools
Crawford County	Crawford	Approved	FY03 PDM Plan	Multi	15	Crawford County, Alma, Cedarville, Chester, Dyer, Kibler, Mountainburg, Mulberry, Ruby, Van Buren, Alma School District, Cedarville School District, Mountainburg School District, Mulberry School District, Van Buren School District
Crittenden County	Crittenden	Approved	FY03 PDM Plan	Multi	7	Crittenden County, Earle, Horseshoe Lake, Marion, Turrell, West Memphis, Marion School District, West Memphis School District, Mid-South Community College
Cross County	Cross	Approved	FY03 PDMC	Multi	3	Cross County, Cherry Valley, Cross County School District (including Cherry Valley and Vanndale)
Dallas County	Dallas	Approved	FY03 PDMC	Multi	5	Dallas County, Fordyce, Carthage, Sparkman, Fordyce School District
Desha County	Desha	Approved	FY03 PDMC	Multi	10	Desha County, Arkansas City, Dumas, McGehee, Mitchellville, Reed, Tillar, Watson, Dumas School District, McGhee School District
Drew County	Drew	Approved	FY03 PDM Plan	Multi	9	Drew County, Jerome, Monticello, Tillar, Wilmar, Winchester, Drew Central School District, Monticello School District, University of Arkansas at Monticello

Faulkner County	Faulkner	Approved	FY03 PDM Plan	Multi	20	Faulkner County, Conway, Damascus, Enola, Greenbrier, Guy, Holland, Mayflower, Mt. Vernon, Twin Groves, Vilonia, Wooster, Conway School District, Guy-Perkins School District, Greenbrier School District, Mayflower School District, Vilonia School District, University of Central Arkansas, Central Baptist College, Hendrix University
Foreman (city)	Little River	Approved	FY03 PDMC	Multi	2	Foreman, Foreman School District
Franklin County	Franklin	Approved	FY03 PDMC	Multi	9	Franklin County, Atlus, Branch. Charleston, Denning, Ozark, Wiederkehr Village, Charleston School District, Ozark School District
Fulton County	Fulton	Approved	FY03 PDMC	Multi	5	Fulton County, Mammoth Spring, Salem, Viola, Viola School District
Garland County	Garland	Approved	FY02 FMA	Multi	12	Garland County, Lonsdale, Mountain Pine, Fountain Lake, Hot Springs, Jessieville School District, Lakeside School District, Fountain Lake School District, Mountain Pine School District, Lake Hamilton School District, Hot Springs School District, Cutter Morning Star School District
Grant County	Grant	Approved	FY03 PDMC	Multi	8	Grant County, Leola, Poyen, Prattsville, Sheridan, Tull, Poyen School District, Sheridan School District
Hempstead County	Hempstead	Approved	FY03 PDM Plan	Multi	11	Hempstead County, Blevins, Fulton, Hope, McNab, Patmos, Washington, Blevins School District, Hope School District, Saratoga School District, Spring Hill School District
Hot Spring County	Hot Spring	Approved	FY03 PDM Plan	Multi	12	Hot Spring County, Donaldson, Friendship, Malvern, Magnet Cove, Midway, Perla, Rockport, School District of Bismark, School District of Glen Rose, School District of Magnet Cove, School District of Malvern, School District of Ouachita
Howard County	Howard	Approved	FY03 PDMC	Multi	8	Howard County, Dierks, Mineral Springs, Tollette, Nashville, Nashville School District, Dierks School District, Mineral Springs School District
Independence County	Independence	Approved	FY03 PDM Plan	Multi	10	Independence County, Batesville, Magness, Pleasant Plains, Oil Trough, Sulpher Rock, Newark, Cushman, Batesville School District, Cedar Ridge School District
Jackson County	Jackson	Approved	FY03 PDM Plan	Multi	14	Jackson County, Amagon, Beedville, Campbell Station, Diaz, Grubbs, Jackson Port, Newport, Swifton, Tuckerman, Tupelo, Weldon, Jackson School District, Newport School District

Jefferson County	Jefferson	Approved	FY03 PDM Plan	Multi	9	Jefferson County, Altheimer, Humphrey, Pine Bluff, Redfield, Sherrill, Wabbaseka, White Hall, Pine Bluff School District
Johnson County	Johnson	Approved	FY05 PDM	Multi	11	Johnson County, Clarksville, Coal Hill, Hartman, Knoxville, Lamar, Clarksville School District, Jasper School District, Lamar School District, Westside School District, University of Ozarks
Lafayette County	Lafayette	Approved	FY03 PDMC	Multi	7	Lafayette County, Bradley, Buckner, Lewisville, Stamps, Bradley School District, Lafayette School District
Lawrence County	Lawrence	Approved	FY03 PDMC	Multi	13	Lawrence County, Alicia, Black Rock, College City, Hoxie, Imboden, Ravenden, Smithville, Strawberry, Walnut Ridge, Hoxie School District, Lawrence County School District, Sloan-Hendrix School District
Lincoln County	Lincoln	Approved	FY03 PDM Plan	Multi	2	Lincoln County, Star City
Little Rock / North Little Rock(city)	Pulaski	Approved	FY03 PDMC	Multi	2	Little Rock, North Little Rock
Logan County	Logan	Approved	FY03 PDMC	Multi	15	Logan County, Blue Mountain, Booneville, Caulksville, Magazine, Paris, Morrison Bluff, Ratcliff, Scranton, Subiaco, Booneville School District, County Line School District, Magazine School District, Paris School District, Scranton School District
Lonoke County	Lonoke	Approved	FY03 PDM Plan	Multi	15	Lonoke County, Allport, Austin, Cabot, Carlisle, Coy, England, Humnoke, Keo, Lonoke, Ward, Cabot School District, Carlisle School District, England School District, Lonoke School District
Marmaduke School-ISD	Greene	Approved	HMGP	Local	1	Marmaduke School District
Mena (city)	Polk	Approved	FY03 PDMC	Multi	2	Mena, Mena School District
Miller County	Miller	Approved	FY03 PDM Plan	Multi	7	Miller County, Fouke, Garland, Texarkana, Fouke School District, Genoa Central School District, Texarkana School District
Mississippi County	Mississippi	Approved	FY02 PDM	Multi	16	Mississippi County, Blytheville, Dell, Dyess, Etowah, Gosnell, Keiser, Leachville, Luxora, Manila, Marie, Osceola, Wilson, Gosnell School District, Manila School District, South Mississippi County School District
Monroe County	Monroe	Approved	FY03 PDM Plan	Multi	8	Monroe County, Brinkley, Clarendon, Fargo, Holly Grove, Roe, Brinkley School District, Clarendon School District

Montgomery County	Montgomery	Approved	FY03 PDMC	Multi	8	Montgomery County, Black Springs, Mount Ida, Norman, Oden, Caddo Hills School District, Mount Ida School District, Ouachita River School District
Mountain View (city)	Stone	Approved	FY03 PDMC	Multi	3	Mountain View, Stone County, Mountain View School District
Ouachita County	Ouachita	Approved	Deobligated FY03 PDMC	Multi	12	Ouachita County, Bearden, Camden, Chidester, East Camden, Louann, Reader, Stephens, Bearden School District, Camden Fairview School District, Harmony Grove School District, Stephens School District
Perry County	Perry	Approved	FY03 PDMC	Multi	11	Perry County, Adona, Bigelow, Casa, Houston, Perry, Perryville, East End School District, Two Rivers School District, Perryville School District, Perry County Day Service Center
Pike County	Pike	Approved	FY03 PDMC	Multi	10	Pike County, Antoine, Daisy, Delight, Glenwood, Murfreesboro, Delight School District, Centerpoint School District, Kirby School District, Murfreesboro School District
Pope County	Pope	Approved	FY05 PDM	Multi	13	Pope County, Atkins, Dover, Hector, London, Pottsville, Russellville, Atkins School District, Dover School District, Hector School District, London School District, Pottsville School District, Russellville School District
Poinsett County	Poinsett	Approved	Deobligated FY03 PDMC	Multi	14	Poinsett County, Fisher, Harrisburg, Lepanto, Marked Tree, Trumann, Tyronza, Waldenburg, Weiner, East Poinsett County School District, Harrisburg School District, Marked Tree School District, Trumann School District, Weiner School District
Prairie County	Prairie	Approved	FY03 PDM Plan	Multi	9	Prairie County, Biscoe, Des Arc, DeValls Bluff, Hazen, Ulm, Des Arc School District, DeValls Bluff School District, Hazen School District
Pulaski County	Pulaski	Approved	HMGP	Multi	7	Pulaski County, Alexander, Cammack Village, Jacksonville, Maumelle, Sherwood, Wrightsville
Saline County	Saline	Approved	FY03 PDMC	Multi	12	Saline County, Alenxander, Bauxite, Benton, Bryant, Haskell, Shannon Hills, Traskwood, Bauxite School District, Benton School District, Bryant School District, Harmony Grove School District
Scott County	Scott	Approved	FY03 PDMC	Multi	3	Scott County, Walden, Walden School District

Sebastian County	Sebastian	Approved	FY03 PDM Plan	Multi	18	Sebastian County, Barling, Bonanza, Central City, Fort Smith, Greenwood, Hackett, Hartford, Huntington, Manfield, Midland, Lavaca, Fort Smith School District, Greenwood School District, Hackett School District, Hartford School District, Mansfield School District, Lavaca School District
Sevier County	Sevier	Approved	FY03 PDMC	Multi	9	Sevier County, Ben Lomond, DeQueen, Gillham, Horatio, Lockesburg, Horatio School District, DeQueen-Lockesburg School District, Cossatot Community College
Sharp County	Sharp	Approved	FY03 PDMC	Multi	9	Sharp County, Hardy, Ash Flat, Cave City, Cherokee Village, Highland, Evening Shade, Sidney, Williford
St. Francis County	St. Francis	Approved	FY03 PDMC	Multi	13	Saint Francis County, Caldwell, Colt, Forrest City, Hughes, Madison, Paelstine, Wheatley, Widener, Forrest City School District, Hughes School District, Palestine-Wheatley School District, Crowley's Ridge Technical Institute
Union County	Union	Approved	FY03 PDMC	Multi	11	Union County, Calion, El Dorado, Felsenthal, Huttig, Junction City, Smackover, Junction City School District, Norphlet School District, Smackover School District, Parkers Chapel School District
Washington County	Washington	Approved	FY03 PDMC	Multi	23	Washington County, Elkins, Elm Springs, Farmington, Fayetteville, Goshen, Greenland, Johnson, Lincoln, Prairie Grove, Springdale, Tontitown, West Fork, Winslow, Elkins School District, Farmington School District, Fayetteville School District, Greenland School District, Lincoln School District, Prairie Grove School District, Springdale School District, West Fork School District
White County	White	Approved	FY03 PDMC	Local	1	White County
Woodruff County	Woodruff	Approved	FY03 PDMC	Multi	7	Woodruff County, Augusta, Cotton Plant, Hunter, McCrory, Paterson, Augusta School District
Phillips County	Phillips	Pending Adoption	FY03 PDMC	Multi	9	Phillips County, Helena-West Helena, Lexa, Elaine, Elaine Schools (Marvell Schools merged), Lake View, Marvell, Barton-Lexa Schools, Helena-West Helena Schools

Baxter County	Baxter	Never Received				Baxter County, Big Flat, Briarcliff, Clarkridge, Cotter, East Cotter, Gamaliel, Gassville, Harriet, Hendersdon, Lake View, Lakeview, Midway, Monkey Run, Mountain Home, Norfork, Salesville, Whiteville
Beebe School District	White	Never Received	HMGP	Local	1	Beebe School District
Marion County	Marion	Never Received				Marion County, Bull Shoals, Everton, Flippin, Oakland, Peel, Pyatt, Rea Valley, Summit, Yellville
Polk County	Polk	Never Received	HMGP	Multi	5	Polk County, Wickes, Ouachita School District, Van Cove School District, Wickes School District
White County Edu Cooperative	White	Never Received	HMGP	Multi	5	White County Central School District, River School District, Pangburn School District, Bald Knob School District, Bradford School District
Yell County	Yell	Never Received				Yell County, Belleville, Bluffton, Briggsville, Centerville, Corinth, Danville, Dardanelle, Gravelly, Ola, Plainview, Rover, Waveland
No Known Plan						
Boone County	Boone	No Known Plan				Boone County, Alpena, Bellefonte, Bergman, Bruno, Carrollton, Diamond City, Everton, Harrison, Lead Hill, Omaha, South Lead Hill, Valley Springs, Zinc
Carroll County	Carroll	No Known Plan				Carroll County, Beaver, Berryville, Blue Eye, Busch , Elk Ranch, Eureka, Eureka Springs, Grandview, Green Forest, Holiday Island, Metalton, Oak Grove, Osage, Rudd, Rule, Urbanette
Greene County	Greene	No Known Plan				Greene County, Beech Grove, Delaplaine, Lafe, Light, Marmaduke, Oak Grove, Heights, Paragould, Walcott
Izard County	Izard	No Known Plan				Izard County, Boswell, Brockwell, Calico Rock, Dolph, Franklin, Forty Four, Guion, Horseshoe Bend, Jordan, LaCrosse, Melbourne, Mount Pleasant, Oxford, Pineville, Sage, Violet Hill, Wideman, Wiseman, Zion
Lee County	Lee	No Known Plan				Lee County, Aubrey, Brickeys, Haynes, LaGrange, Marianna, Moro, Rondo
Little River County	Little River	No Known Plan				Little River County, Ashdown, Alleene, Ogden, Wilton, Winthrop
Madison County	Madison	No Known Plan				Madison County, Combs, Hindsville, Huntsville, Kingston, Pettigrew, St. Paul, St. Paull, Wesley, Witter
Nevada County	Nevada	No Known Plan				Nevada County, Bluff City, Bodcaw, Cale, Emmet, Laneburg, Rosston, Willisville

Newton County	Newton	No Known Plan				Newton County, Bass, Compton, Deer, Dogpatch, Erbie, Hasty, Jasper, Limestone, Low Gap, Marble Falls, Mossville, Mount Hersey, Mount Judea, Mount Sherman, Nail, Parthenon, Pelsor, Piercetown, Ponca, Pruitt, Vendor, Wayton, Western Grove, Yardelle
Randolph County	Randolph	No Known Plan				Randolph County, Biggers, Dalton, Maynard, O'Kean, Pocahontas, Ravendale Springs, Reyno, Warm Springs
Searcy County	Searcy	No Known Plan				Searcy County, Canaan, Chimes, Cozahome, Dongola, Flag, Gilbert, Harriet, Landis, Leslie, Marshall, Oxley, Pindall, Rumley, St. Joe, Witts Springs
Van Buren County	Van Buren	No Known Plan				Van Buren County, Alread, Bee Branch, Botkinburg, Choctaw, Clinton, Crabtree, Culpeper, Dennard, Eglantine, Fairfield Bay, Formosa, Koch Ridge, Lexington, Plant, Rex, Rupert, Rushing, Scotland, Shirley, Walnut Grove
Deobligated Plans						
Ashdown (city)	Little River	Deobligated	FY03 PDMC			
Madison County	Madison	Deobligated	FY03 PDMC			
Mountain Home (city)	Baxter	Deobligated	FY03 PDMC			
Norfolk (city)	Baxter	Deobligated	FY03 PDMC			

As local plan drafts are developed, ADEM staff review each plan using the FEMA crosswalk to determine compliance. Each section of each plan is given a thorough review by ADEM and comments are supplied back to the plan development team. Once the plans meet the ADEM review requirements, they are submitted to FEMA for official review. As of July 2010, the plans listed as Pending Adoption in the table on pages 109-116 are expected to have been promulgated by the local authorities

5.7 Local Plan Integration

Local Plan Integration	
IFR REQUIREMENT 201.4(c)(4)(ii):	[The section on the Coordination of Local Mitigation Planning must include a] description of the State process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan.
Explanation:	The plan **must** include a description, as well as a timeline, of the State's approach for reviewing, coordinating, and integrating Local Plans into the statewide mitigation plan. An established process will streamline the review and approval of Local Plans, coordinate local and State planning efforts, and create a common knowledge base. While not required by the Rule, FEMA recommends listing the offices or departments responsible for these activities.

The Arkansas Department of Emergency Management is responsible for initial local plan review. The State Hazard Mitigation Staff completed mitigation plan review training in February of 2009 and is reviewing all local plans using the FEMA crosswalk tool. Once submitted to the state, plan drafts are reviewed and, if deficiencies are found, returned to jurisdictions within 30 days. Once all deficiencies are corrected, the plan drafts will be submitted to FEMA for review. During the review, the State makes sure the local plans meet the objectives of the State's plan. The timeline for completion of mitigation plans for jurisdictions funded through FEMA grants discussed above in *Section 5.6: Local Funding and Technical Assistance* is shown in Table 5.7-1. ADEM keeps the hazard mitigation plans on file at the ADEM office and the goals, objectives, and mitigation items are reassessed when applications are submitted to the state for funding. Currently, the plans are integrated into the State plan during the update processes.

Table 5.7-1: Timelines for mitigation planning

Plan drafts due to ADEM	Plan drafts due to FEMA	Final draft due to ADEM	Final plan drafts due to FEMA	Extension request due to ADEM
8 months after funding approval	30 days after received and state approved	30 days after FEMA approval	30 days after FEMA approval	90 days before end of obligation

Table 5.7-2: Planning Grant Prioritization criteria for 2010 update

Planning Grant Ranking	Point Value	Total Points
Existing Plan Revision	10	
New Plan	10	
Multi-Jurisdiction	10	
Single Jurisdiction	5	
School/University	5	
Private Non-Profit	5	
NFIP Participation	5	
CRS Participation	5	
TOTAL POINTS		

The Arkansas State Admin Plan dated January 6, 2010, illustrates that Table 5.7-2 is the most up to date information available for the 2010 update plan.

As part of the 2010 HMP revision process, local mitigation plans are being incorporated into this state plan. At the time of the 2010 revision, most of the local plans have been completed and received by ADEM. ADEM has reviewed these plans for compliance with the FEMA DMA 2000 crosswalk, and they have been submitted to FEMA for final review. Data from these plans was considered by the HMP Sub-Committee as part of the 2010 update process. The results of this research were included in this overarching state plan. Specifically, local loss estimates and mitigation projects are being integrated into this State Hazard Mitigation Plan.

5.8 Prioritizing Local Assistance

Prioritizing Local Assistance	
IFR REQUIREMENT 201.4(c)(3)(iv):	[The section on the Coordination of Local Mitigation Planning must include] criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs which should include: Consideration for communities with the highest risks, Repetitive loss properties, and Most intense development pressures. Further that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs.
Explanation:	The plan **shall** describe the criteria the State has developed for prioritizing local jurisdictions to receive planning and project grant assistance. Prioritization will assist the State in targeting the most at risk communities. The criteria for selecting communities *should* include those communities that are at highest risk, have repetitive loss properties, or are facing intense development pressure. The description can also include how assisting communities with their mitigation projects will achieve the plan's goals and objectives. For project grants, States **shall** explain how they will use benefit-cost reviews to determine which projects maximize benefits relative to their costs. These projects would have the highest priority for available funding.

The HMP Sub-Committee found the m The State Hazard Mitigation Advisory Committee serves as the Review and Selection Panel for Hazard Mitigation grants in Arkansas. Each application is reviewed for eligibility in accordance with the criteria listed below. It is the function of the committee to review, prioritize, and select projects to be submitted to FEMA for funding. The State Hazard Mitigation Officer serves as the coordinator of the panel. The State Hazard Mitigation Advisory Committee and Arkansas Planning and Development Districts also serve, if necessary, as technical advisors.

If it is necessary to select from a range of projects, due to funding or other constraints, the State Hazard Mitigation Advisory Committee assigns priorities for funding to all eligible projects. For federal grants, this ranking is in accordance with the criteria in 44 CFR Section 206.434 and a point system described below. The HMP Sub-Committee found this methodology conforms to the 2010 State plan update process.

Eligibility for grants, as described in 44 CFR Sec. 206.434, is as follows:

(a) Applicants. The following are eligible to apply for the Hazard Mitigation Program Grant:

(1) State and local governments;

(2) Private non-profit organizations or institutions that own or operate a private non-profit facility as defined in Sec. 206.221(e);

(3) Indian tribes or authorized tribal organizations and Alaska native villages or organizations, but not Alaska native corporations with ownership vested in private individuals.

(b) Plan requirement.

(1) For all disasters declared on or after November 1, 2004, local and tribal government applicants for sub-grants must have an approved local mitigation plan in accordance with 44 CFR 201.6 prior to receipt of HMGP sub-grant funding. Until November 1, 2004, local mitigation plans may be developed concurrent with the implementation of sub-grants.

(2) Regional directors may grant an exception to this requirement in extraordinary circumstances, such as in a small and impoverished community when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after notice of the grant's termination will not be reimbursed by FEMA.

(c) Minimum project criteria. To be eligible for the Hazard Mitigation Grant Program, a project must:

(1) Be in conformance with the State Mitigation Plan and Local Mitigation Plan approved under 44 CFR part 201;

(2) Have a beneficial impact upon the designated disaster area, whether or not located in the designated area;

(3) Be in conformance with 44 CFR part 9, Floodplain Management and Protection of Wetlands, and 44 CFR part 10, Environmental Considerations;

(4) Solve a problem independently or constitute a functional portion of a solution where there is assurance that the project as a whole will be completed. Projects that merely identify or analyze hazards or problems are not eligible;

(5) Be cost-effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster. The grantee must demonstrate this by documenting that the project:

(i) Addresses a problem that has been repetitive, or a problem that poses a significant risk to public health and safety if left unsolved,

(ii) Will not cost more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur. Both costs and benefits will be computed on a net present value basis,

(iii) Has been determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options,

(iv) Contributes, to the extent practicable, to a long-term solution to the problem it is intended to address,

(v) Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.

(d) Eligible activities:

(1) Planning. Up to 7% of the state's HMGP grant may be used to develop state, tribal and/or local mitigation plans to meet the planning criteria outlined in 44 CFR part 201.

(2) Types of projects. Projects may be of any nature that will result in protection to public or private property. Eligible projects include, but are not limited to:

(i) Structural hazard control or protection projects;

(ii) Construction activities that will result in protection from hazards;
(iii) Retrofitting of facilities;
(iv) Property acquisition or relocation, as defined in paragraph (e) of this section;
(v) Development of state or local mitigation standards;
(vi) Development of comprehensive mitigation programs with implementation as an essential component;

In addition to Sec. 206.434 eligibility, the following point system will be used to rank proposals:

A benefit/cost review is required for all projects with the exceptions of planning and safe rooms, which are categorically and programmatically excluded. Benefit/Cost ratios in excess of 1:1 are required for funding consideration. Communities must also participate in the National Flood Insurance Program and have a FEMA approved Hazard Mitigation Plan to be considered for mitigation funding.

Points for ranking mitigation grant proposals are as follows:

Mitigation Project Ranking Criteria	**Point Values**	**Points**
Project is highest priority in community mitigation plan	No = 0 pts. Yes = 5 pts.	
Project mitigates a Repetitive Loss Structure	No = 0 pts. Yes = 5 pts.	
Date of Project Notice of Intent	Latest = 0 pts. Earliest = 5 pts.	
Project is in the floodplain	No = 5 pts. Yes = 0 pts.	
Project Cost/Benefit Ratio (<1 = Disqualifier)	1.0 to 1.25 = 1 pt 1.26 to 1.5 = 2pts. 1.51 to 1.75 = 3pts. 1.76 to 2.0 = 4pts. 2 and over = 5pts.	
Mitigation Project Total Sub Score		

Local Jurisdiction Ranking Criteria	**Point Values**	**Points**
Community is in a high risk area for the hazard being mitigated (as indicated in the risk assessment)	No = 0 pts. Yes = 5 pts.	
Community is exhibiting intense development pressure (as indicated in demographic section or using other data)	No = 0 pts. Yes = 5 pts.	

Community is in a FEMA-Declared County	No = 0 pts. Yes = 5 pts.	
Community participates in the Community Rating System (CRS)	No = 0 pts. Yes = 1 pts.	
Community is a Fire Wise Community / USA	No = 0 pts. Yes = 1 pts.	
Community is a National Weather Service StormReady Community	No = 0 pts. Yes = 2 pts.	
Community is a FEMA CTP (Cooperating Technical Partner)	No = 0 pts. Yes = 1 pts.	
Community has received previous mitigation grant awards (see above)	0 Awards = 5 pts 1 Award. = 4 pts 2 Awards = 3 pts 3 Awards = 2 pts 4 Awards = 1 pts	
Local Jurisdiction Total Sub Score		

Total Score (Project + Local Jurisdiction score; 50 points highest possible score)	

Acquisition/Relocation Projects will be further prioritized per State Administrative Plan.

The acquisition/relocation of properties in flood prone areas, prioritized accordingly.

a. Structures in the floodway with >50% damage;
b. Structures in the floodplain with >50% damage;
c. Structures in the floodway with <50% damage;
d. Structures in the floodplain with <50% damage;
e. Vacant lots in the floodway;
f. Vacant lots in the floodplain;
g. Priority of structures will be as follows:
    (1) Primary Residence
    (2) Secondary/Rental Property
    (3) Commercial Property

Mitigation Project Priorities

The vulnerability analysis conducted by the Arkansas Hazard Mitigation Planning Sub-Committee was used to develop the state funding priorities. Hazards profiled include natural occurring as well as man-made hazards. Hazard rankings were collated from local FEMA approved risk assessments from 10 Arkansas jurisdictions. Below is a list of funding priorities for mitigation projects across the state. These priorities will be addressed and updated as needed as part of the on-going planning process.

Mitigation Project Funding Priorities for the State of Arkansas 2010
1. Acquisition/relocation of severe repetitive loss structures.
2. Acquisition/relocation of repetitive loss structures.
3. Acquisition/Relocation Projects will be further prioritized as follows:
a. Two repetitive losses totaling at least $20,000;
b. Structures in the floodway with >50% damage;
c. Structures in the floodplain with >50% damage;
d. Structures in the floodway with <50% damage;
e. Structures in the floodplain with <50% damage;
f. Vacant lots in the floodway;
g. Vacant lots in the floodplain;
h. Priority of structures will be as follows:
(1)Primary Residence
(2)Secondary/Rental Property
(3)Commercial Property
4. Structural flood control measures.
5. Structural retrofit of public critical facilities to resist high wind and seismic effects.
6. Community safe rooms.
7. Retrofitting, such as wet and dry flood proofing.
8. Non-structural retrofit for seismic effects.
9. Window film, Gas Shutoff valves, and NOAA weather radios.
10. Wild land fire suppression measures.
11. Legislation to include mitigation actions in all new construction.
12. GIS/spatial data related activities to support mitigation.
13. Mapping projects to assist in planning.
14. Mitigation planning activities.
15. Support Mitigation in Public Education activities.
16. Support all activities related to NFIP

Section 6: Plan Maintenance

6.1 Monitoring, Evaluating, and Updating the Plan

Monitoring, Evaluating, and Updating the Plan	
IFR REQUIREMENT 201.4(c)(5)(i):	[The Standard State Plan Maintenance Process must include an] established method and schedule for monitoring, evaluating, and updating the plan.
Explanation:	The plan maintenance process provides a framework for gauging progress and adjusting to new conditions, such as new policies, Federal requirements, and new initiatives. The State **must** describe how, when, and by whom the plan will be **monitored**. For example, its monitoring system may consist of the submittal of periodic reports by agencies involved in implementing projects or actions; site visits, phone calls, and meetings conducted by the person responsible for overseeing the plan; and the preparation of an annual report that captures the highlights of the previously mentioned activities. The State plan **must** also include a description of how, when, and by whom it will be **evaluated**. The description *should* include the criteria used to evaluate the plan, such as whether: The goals and objectives still address current and expected conditions. The nature and magnitude of hazard problems and/or development have changed. The current resources are appropriate for implementing the plan. There are implementation problems, such as technical, political, legal, or coordination with other agencies. The outcomes of actions have been as expected. The agencies participated as originally proposed. Ideally, the plan *should* be evaluated on an annual basis to determine the effectiveness of programs, policies, and projects, as well as to reflect changes in priorities and regulations. The plan **must** describe how, when, and by whom it will be **updated**. FEMA recommends identifying the interested parties to be included in the process.

The Arkansas Hazard Mitigation Plan is a document that is monitored, evaluated, and updated by state officials and submitted to the Federal Emergency Management Agency for approval every three years. To ensure broad participation and input during the continuing planning process, the Arkansas Department of Emergency Management and planners schedule and attend the Arkansas Pre-Disaster Mitigation Advisory Council meetings. These meetings are designed to hold organized discussions on the hazards that affect Arkansas and the mitigation measures to combat these hazards. The Arkansas Hazard Mitigation Planning Sub-Committee of the Governor's Pre-Disaster Mitigation Advisory Council will evaluate the State Hazard Mitigation Plan at its semi-annual meetings. The committee consists of state and local government officials, agency representatives, non-profit officials, and emergency response personnel. The committee

will evaluate whether; 1) the goals and objectives still address current and expected conditions; 2) the nature and magnitude of hazard problems and/or development have changed; 3) the current resources are appropriate for implementing the plan; 4) there are implementation problems, such as technical, political, legal, or coordination with other agencies; 5) the outcomes of actions have been as expected. The committee will create a list of recommendations to deliver to the State Hazard Mitigation Officer to assist in monitoring plan implementation.

The State Hazard Mitigation Officer will be responsible for monitoring all aspects of the plan including progress in implementing mitigation measures and projects resulting from the list of prioritized mitigation actions, and adjustment to new conditions in funding or regulations. Local Emergency Planning Committees will submit annual reports on progress in local jurisdictions on local planning initiatives to the Hazard Mitigation Branch. Annual reports from responsible agencies will be submitted on state-wide mitigation initiatives. The State Hazard Mitigation Officer will be responsible for monitoring mitigation funding opportunities and producing an annual report on funding opportunities. The director of ADEM will be responsible for maintaining adequate funding and up-to-date resources for completion of mitigation projects for which the Hazard Mitigation Branch is responsible.

Based on the recommendations of the Hazard Mitigation Planning Sub-Committee and the initiatives suggested and projects initiated by Local Emergency Planning Committees, the ADEM Mitigation Branch will make the required plan updates. These updates will be made as needed during each 3-year period (such as following a major disaster), or as an updated plan at the end of each 3-year period. FEMA will be notified of any significant changes to the plan, or will be given a justification of why no changes are deemed necessary.

The HMP Sub-Committee has been meeting and actively developing the state plan for over 18 months from early 2009 through April 2010. This active plan development has ensured that the plan remains current and properly maintained. The original 2004 plan's method and schedule for maintaining the plan was successful and worked well. The HMP Sub-Committee proactively enhanced the maintenance processes by constantly working on the plan rather than initiating periodic updates. This led to a more continual maintenance schedule.

2010 Revision – Version 4

The State of Arkansas initiated a project in 2010 to improve and update the All Hazard Mitigation Plan in order to meet the requirements from FEMA for a three-year update and review. The HMP Sub-Committee maintained the plan in a continuous manner with regular meetings and on-going correspondence with the team members. This revision (Version 4) focused on the following elements:

- Updating natural hazard profiles with data from 2007-2010.
- Review of overall statewide mitigation strategy and capabilities.
- Incorporate severe repetitive loss information for the State, this will include types and numbers of repetitive loss properties.

Future Revision – Version 5

The State of Arkansas will continue to update the All Hazard Mitigation plan to meet FEMA requirements. The state will continue to meet the three-year update cycle as cited in 44 CFR. The State of Arkansas has a goal to submit an updated mitigation plan to FEMA within the 3 year timeframe. The planning process will begin 18 months prior to the submittal date. The plan revision will center on the following timeline:

Date	Planning Process Milestone	Lead Agency
January 2012	All hazard mitigation plan meeting to prioritize version 5 goals and objectives	Arkansas Pre-Disaster Mitigation Advisory Council
March 2012	Collect and verify latest GIS data sets for vulnerability analysis	ADEM, Arkansas Geographic Information Office.
June 2012	Presentation and review meeting detailing plan progress	Arkansas Pre-Disaster Mitigation Advisory Council
September 2012	Collate data from current approved local mitigation plans to implement into overall risk assessment	Hazard Mitigation Planning Team
December 2012	Presentation and review meeting of plan updates	Arkansas Pre-Disaster Mitigation Advisory Council
February 2013	Perform detailed state capability assessment update	Hazard Mitigation Planning Team
April 2013	Perform detailed mitigation action item update	Hazard Mitigation Planning Team
May 2013	Final presentation and review of plan	Arkansas Pre-Disaster Mitigation Advisory Council
June 2013	Submittal to FEMA	ADEM

6.2 Monitoring Progress of Mitigation Activities

Monitoring Progress of Mitigation Activities	
IFR REQUIREMENT 201.4(c)(5)(ii) and (iii):	[The Standard State Plan Maintenance Process must include a] System for monitoring implementation of mitigation measures and project closeouts. System for reviewing progress on achieving goals as well as activities and projects in the Mitigation Strategy.
Explanation:	The plan **must** describe the State's monitoring system for tracking the initiation and status of projects as well as project closeouts, indicating who will be responsible for implementing and maintaining this system. This is important because without regular monitoring, mitigation actions may not be implemented as planned. The plan **must** also describe how the State reviews the progress made on actions and projects and how well these contribute to achieving the plan's goals. The description **must** also include who is involved in the review and what the timeframe is for carrying out the review.

The staff from the Mitigation Branch of the Arkansas Department of Emergency Management is responsible for monitoring the progress of mitigation activities and projects throughout the state. The Mitigation Branch Manager has assigned staff members to monitor and track the progress of state and federally-funded mitigation projects on a quarterly basis. The requirements for monitoring state and federal projects are the same. As part of the 2010 update process, the HMP Sub-Committee reviewed the existing system for tracking mitigation activities. The system for monitoring the initiation, status and completion of actions is described below. This mitigation activity monitoring system has not changed since the original FEMA approved mitigation plan.

The staff members request quarterly reports from all project applicants to monitor the estimated completion date, the total funds expended, the progress summary of the project, and any problems or assistance needed. When quarterly reports are received, the information is entered into E-Grants and the National Emergency Management Information System (NEMIS). Site visits and follow up visits are also scheduled and conducted to track the various stages of the project, to observe that the mitigation activity is following the approved work schedule, and to assist in resolving any problems identified during review of quarterly reports.

When project tracking indicates that all funds are expended, a letter is sent to the applicant indicating that the closeout package is due. Project closeouts follow the requirements of 44 CFR 13.50 (Closeouts), 44 CFR 13.23 (Period of availability of funds), and 44 CFR 13.52 (Collection of amounts due). The following documents are required upon project completion and closeout:

1) Certification on applicant's letterhead

2) Hazard Mitigation Close-out Certification

3) Pictures of the completed project

4) Materials, labor and equipment forms if required

5) Summary of Documentation.

The Summary of Documentation compiles all of the expenses incurred for the project. If more than $300,000 in federal funds is spent in a fiscal year, a single or program specific audit must be completed.

Progress on implementing activities and projects of the mitigation strategy is reviewed by the Hazard Mitigation Planning Sub-Committee. Twice a year, the Hazard Mitigation Planning Sub-Committee meets with the Governor's Earthquake Advisory Council (GEAC) and Pre-Disaster Mitigation Advisory Committee (PDMAC) to discuss the progress made toward implementation of the mitigation strategy. The Hazard Mitigation Planning Sub-Committee reviews quarterly reports and attends presentations made by applicants on completed mitigation activities including the effectiveness of the projects. Based on this monitoring and review, the Sub-Committee will recommend plan changes and updates to the State Hazard Mitigation Officer who will be responsible for implementing plan changes. This process of monitoring the initiation, status, and completion of mitigation activities has continued to remain unchanged since the previous

versions. This has been verified by representatives from the Arkansas Department of Emergency Management.

As part of the continued support of the Hazard Mitigation Planning Sub-Committee to update the State Mitigation Plan, two meetings were held in October of 2009 and January of 2010. Additional meetings were held through 2008 and the spring of 2009 in support of the plan revision for the FEMA three-year review. At these meetings, all statewide mitigation actions are routinely discussed and analyzed. All progress is noted in comparison to work plans to ensure that actions are implemented as planned. The HMP Sub-Committee and the State of Arkansas remain committed to hazard mitigation and continually monitor the progress of all actions in order to protect the state's citizens and resources. The committee determined in the analysis that the methods and schedule worked well for the last plan; however, the only problem that was encountered of a substantial nature was that the funding was rejected for the 2010 plan update when the State applied for PDM-C funding. The state was able to obtain funding through HMGP funds but it shortened the planning process for the 2010 plan update. The committee determined that for the 2013 and other following updates, that if there is not funding available through HMGP funds at the time, the committee believes that the State should put the plan update as the highest priority for PDM-C funding on the ranking of grant projects. The committee also determined that ADEM should start to seek funding one calendar year after the plan update has been approved by FEMA, due to the uncertainty of funding availability through FEMA grant programs.

Mitigation Action Implementation
Mitigation actions are tracked on a quarterly basis by the State of Arkansas Mitigation Department.

The following mitigation actions have been implemented with the goal of reducing the vulnerability in Arkansas to all hazards and the promotion of sustainable infrastructure and environment. The Sub-Committee has determined that these mitigation action items that have been completed will be continued through the life of the 2010 updated plan. Some action items require additional equipment, funding, or personnel to keep the on going process.

Completed Mitigation Actions listed for Goal 1
The State of Arkansas All Hazards Mitigation Plan includes the listing of 1 **completed** mitigation actions that was implemented with the goal of reducing the vulnerability in Arkansas to all hazards and the promotion of sustainable infrastructure and environment. This mitigation action item has been completed and removed.

There is 1 **completed** mitigation action that carried the following mitigation objectives

GOAL 1: The reduction of vulnerability in Arkansas to all hazards and the promotion of sustainable infrastructure and environment.

Objectives	Completed Actions
1.2 Hold regular meetings to communicate mitigation goals, objectives and actions with state, county and local jurisdictions and stakeholders from the private sector.	1.2.13 Replace existing ANO mechanical warning sirens with electrical warning sirens.

Completed Mitigation Actions listed for Goal 2
The State of Arkansas All Hazards Mitigation Plan includes the listing of 2 **completed** and 1 **removed** mitigation action that was implemented with the goal of identifying mitigation grant opportunities for state and local governments, their sub-jurisdictions and the general public, and providing effective technical support.

There is 1 **completed** and 1 **removed** mitigation action that carried the following mitigation objectives

GOAL 2: Identify mitigation grant opportunities for state and local governments, their sub-jurisdictions and the general public, and provide effective technical support.

Objectives	Removed Actions
Objective 2.4 Provide technical support to any mitigation planners to make use of HAZUS MH to assist in loss estimation and risk assessment.	2.4.1 Use HAZUS MH to estimate losses for entire state due to exposure to riverine flooding hazards**.**

Objectives	Completed Actions
2.1 Provide direct technical assistance to local officials and help local jurisdictions obtain funding for mitigation planning and project activities.	2.1.3 Compile all local mitigation strategies and prioritize them on a statewide basis.

Completed Mitigation Actions listed for Goal 3
The State of Arkansas All Hazards Mitigation Plan includes the listing of 4 **completed** mitigation actions that were implemented with the goal of reducing the vulnerability in Arkansas to all hazards and the promotion of sustainable infrastructure and environment.

These 4 **completed** mitigation actions carry the following mitigation objective:

Objectives	Completed Actions
Objective 3.1 The state will work with local jurisdictions to improve the local hazard mitigation planning process.	3.1.1 Provide hazard mitigation technical assistance for local mitigation planning.
3.1	3.1.4 Fund the full-time emergency planners to act as regional area coordinators to assist local planners with the development of viable plans and to improve response capabilities.
3.1	3.1.9 Identify and train additional state and local resources for veterinarian expertise. These resources would focus on monitoring, testing, and disease surveillance.
3.1	3.1.10 Assist the University of Arkansas County Extension Services to improve training for local responders for animal disease events.

Completed Mitigation Actions listed for Goal 4
The State of Arkansas All Hazards Mitigation Plan includes the listing of 4 **completed** mitigation actions that were implemented with the goal of formulating objectives using state of the art knowledge to reduce vulnerability to all identified hazards.

These 4 **completed** mitigation actions carry the following mitigation objectives:

Objectives	Completed Actions
Objective 4.1 Maximize utilization of best technology	4.1.1 Provide a training workshop to educate local jurisdictions to operate Pre-disaster Mitigation (PDM) Grants E-Grant system.
4.2 Cooperate and coordinate with partners at all government levels in planning and use of best technology	4.2.2 Incorporate a progressive geographic information system (GIS) as the primary tool for spatial data management for hazard mitigation throughout the state.
4.2	4.2.4 Update a structured process whereby strategic state assets such as buildings can be accurately mapped and maintained within electronic databases (latitude-longitude) to assist in assessing vulnerability of state facilities.
4.2	4.2.5 Expand the capabilities of the State Department of Health Emergency Communications Center and the existing laboratory facilities.