PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

FEMA

IEMA
ILLINOIS EMERGENCY MANAGEMENT AGENCY

Meeting 2

October 12, 2021

10:00 AM

Agenda

1. Welcome and Introductions

2. Multi-Hazard Mitigation Planning Updates
   Tyler Carpenter, Environmental Planning Director, Greater Egypt

3. Hazard Ranking Review
   Kelsey Bowe, Environmental Planner, Greater Egypt

4. Perry County Hazard Modeling

5. Introduction to Mitigation Strategies

6. Mitigation Strategies Exercise

7. Adjourn

Multi-hazard Mitigation Planning Updates

Tyler Carpenter, Environmental Planning Director – Greater Egypt

- Timeline

Mitigation Planning Timeline	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
	1	2	3	4	5	6	7	8	9	10	11	12	13
Meetings: Goals and Objectives													
Meetings: Public involvement													
Meetings: Mitigation Activities													
Write Plan													
Review Plan													
Finalize Plan													
Print Plan													
State/ Federal Review													

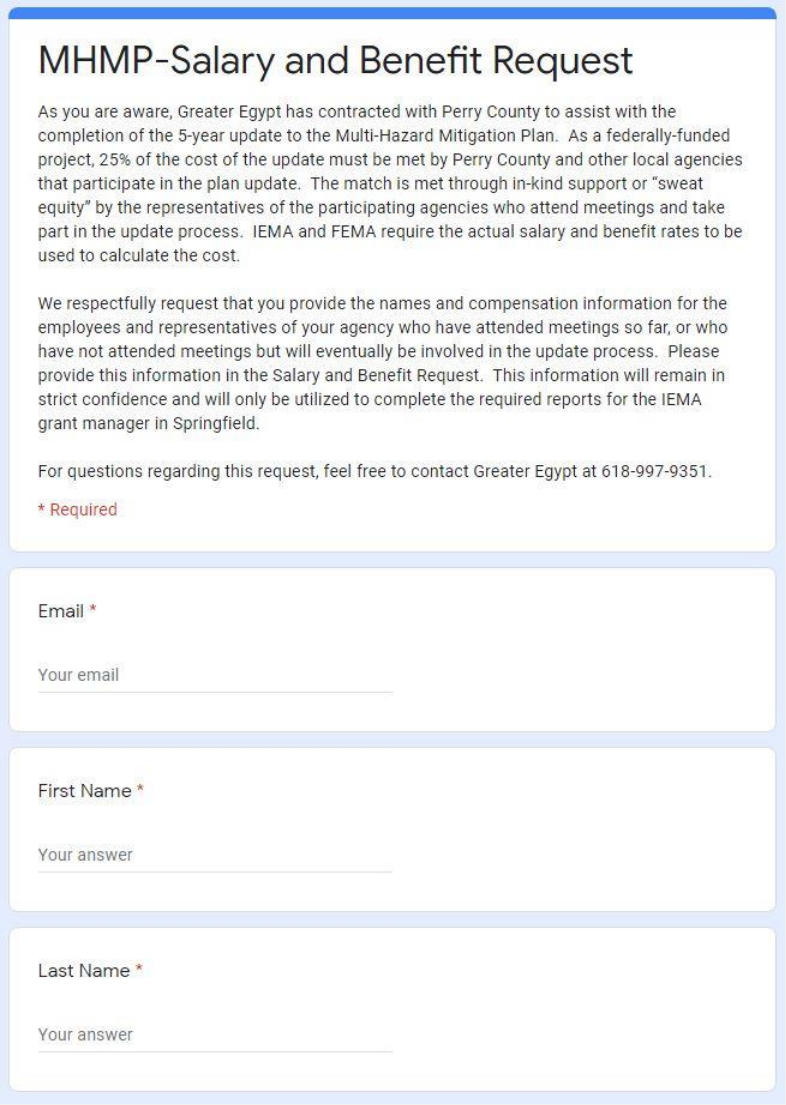
Match Requirements

- 75% Federal Dollars for Planning
- 25% Local Match Needed

- Match is Met by Your Participation
  - Meeting Attendance
  - Outside Work on Plan
  - Travel
  - Other Costs

- Current Match: 34% ($2,808/8,333)

- MHMP Match Survey



MHMP-Salary and Benefit Request

As you are aware, Greater Egypt has contracted with Perry County to assist with the completion of the 5-year update to the Multi-Hazard Mitigation Plan. As a federally-funded project, 25% of the cost of the update must be met by Perry County and other local agencies that participate in the plan update. The match is met through in-kind support or "sweat equity" by the representatives of the participating agencies who attend meetings and take part in the update process. IEMA and FEMA require the actual salary and benefit rates to be used to calculate the cost.

We respectfully request that you provide the names and compensation information for the employees and representatives of your agency who have attended meetings so far, or who have not attended meetings but will eventually be involved in the update process. Please provide this information in the Salary and Benefit Request. This information will remain in strict confidence and will only be utilized to complete the required reports for the IEMA grant manager in Springfield.

For questions regarding this request, feel free to contact Greater Egypt at 618-997-9351.

* Required

Email *

Your email

First Name *

Your answer

Last Name *

Your answer

Responsibilities of Planning Partners

- ~~Represent an authorized jurisdiction in the county~~
- ~~Attend two meetings during planning process~~
- ~~Complete Hazard Ranking exercise for your jurisdiction~~
- Propose two mitigation strategies for each hazard
- Assist with meeting match requirements through participation
- Assist with data collection for hazard modeling

Hazard Ranking Review

Hazard	Avg risk index	# lists included	total lists received	% importance	weighted risk index
earthquake	10.43	14	14	1.00	10.43
Tornado	10.14	14	14	1.00	10.14
epidemic	7.15	13	14	0.93	6.64
hazmat	6.85	13	14	0.93	6.36
Tstorm	6.54	13	14	0.93	6.07
Winter Storm	5.69	13	14	0.93	5.29
ground failure	4.17	12	14	0.86	3.57
terrorism	5.13	8	14	0.57	2.93
cyber attack	8.00	5	14	0.36	2.86
flood	4.50	8	14	0.57	2.57
extreme heat	4.57	7	14	0.50	2.29
meteor	5.00	3	14	0.21	1.07
Wildfire	3.50	4	14	0.29	1.00
dam failure	1.80	5	14	0.36	0.64
infestation	2.00	4	14	0.29	0.57
utility disruption	6.00	1	14	0.07	0.43
invasive spp	1.50	3	14	0.21	0.32
landslide	2.00	1	14	0.07	0.14
levee failure	1.00	1	14	0.07	0.07

Hazard Ranking Review

- Vote on final hazard ranking

- Last chance to add or remove any hazards for the Plan

1. Earthquake
2. Tornado
3. Disease outbreak/epidemics
4. HazMat release
5. Severe Thunderstorm
6. Severe Winter Weather
7. Ground failure (mine subsidence)
8. Terrorism
9. Cyberattack
10. Flooding
11. Drought & Extreme Heat
12. Meteor
13. Wildfire
14. Dam Failure
15. Infestation/ invasive species
16. Utility Disruption/Power Outage
17. Landslide

Hazard Modeling

- Earthquakes: Hazus 5.0 (FEMA software)
  - County can decide magnitude and epicenter location
- Hazardous Material Release: Aloha (EPA software)
  - *Aloha can only model 1 chemical at a time
  - Each county must decide which chemical(s) they want to model
- Tornadoes: ArcGIS
  - Any EF rating and path direction can be modeled
- Floods: Hazus 5.0
  - Floods will be modeled on a case by case basis if the county does not rank the hazard in the top 4
- Heat: Google Earth Engine
  - Land surface temps can be mapped from LandSat8 data for a desired date range

**Greater Egypt will not model pandemics/disease outbreak. Detailed information and maps of positivity rates for Covid19 are widely available from the CDC and Illinois Department of Public Health*

Reminder – Hazus Datasets: Last Chance to Update

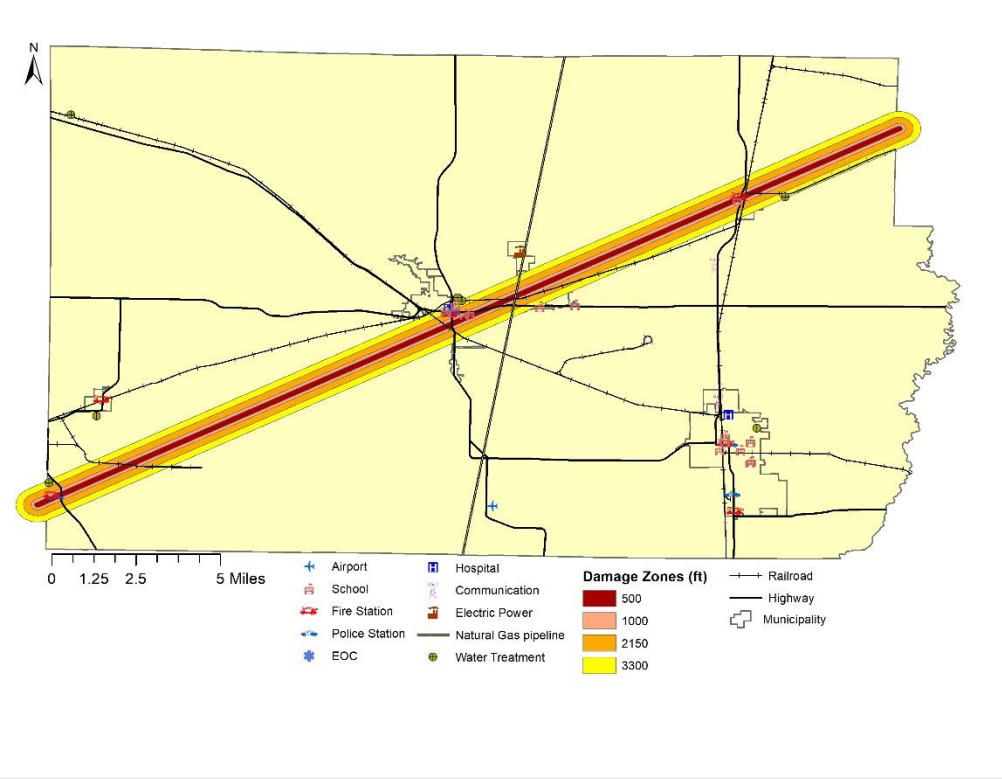
- **Updating is optional**
  - Can make models more accurate
  - May be useful in determining mitigation strategies
  - Anything built after 2010 is likely not included in current datasets

- **Features of the datasets that are *estimated* (from aggregated census and homeland infrastructure data):**
  - Building & foundation type
  - Square footage
  - Replacement value
  - Number of stories

- **Potentially important structures *currently not included in models:***
  - Nursing homes or other live-in care facilities
  - Urgent care clinics
  - City halls, courthouses
  - Dams & levees
  - Military buildings

Example Tornado Path

- Model EF4 tornado
  - Average path length: 32 miles
    - (path on right is 23 miles)
  - Average path width: 3271 feet
  - Based on all U.S. tornadoes reported from 2007-2013
- **Assessor's/parcel data (with building values) required for detailed estimates of damage**
- Planning partners can request other paths and tornado EF ratings



Elsner, James B et al. "Tornado intensity estimated from damage path dimensions." PloS one vol. 9,9 e107571. 17 Sep. 2014, doi:10.1371/journal.pone.0107571

Historic Tornadoes – Perry County

Location	Date	Rating	Deaths	Injuries	Property damage
	12/18/1957	F3	0	1	250000
	12/18/1957	F5	1	6	250000
	9/26/1959	F1	0	0	2500
	12/21/1967	F3	0	0	250000
	5/7/1973	F2	0	0	0
	6/17/1973	F0	0	0	0
	5/29/1982	F3	0	0	250000
	5/29/1982	F3	0	7	250000
OLD DUQUOIN	4/19/1996	F1	0	0	50000
SWANWICK	4/15/1998	F0	0	0	0
PINCKNEYVILLE	5/31/2001	F0	0	0	0
PINCKNEYVILLE	5/30/2004	F1	0	0	250000
CUTLER	3/11/2006	F2	0	2	1200000
SUNFIELD	6/8/2009	EF0	0	0	4000
DU QUOIN	6/8/2009	EF1	0	0	20000
CLINCH	6/19/2011	EF1	0	1	550000
SUNFIELD	6/19/2015	EF0	0	0	0
PINCKNEYVILLE	12/23/2015	EF1	0	0	175000
DU QUOIN	11/18/2017	EF0	0	0	250000
SUNFIELD	3/19/2020	EF1	0	1	300000

- **EF4 and EF5 tornadoes are rare**
  - (average of 8/ year and 1/year for the entire United States) – but devastating when they do occur (Elsner et. al 2014)
  - 24 EF4/EF5 tornadoes in IL since 1950
- **The Marion Tornado of 1982 (Williamson/Perry County) killed 10 and injured nearly 200**
  - Path length 17mi and width 400ft (NOAA Storm events database)

Historic Tornadoes - SoIL

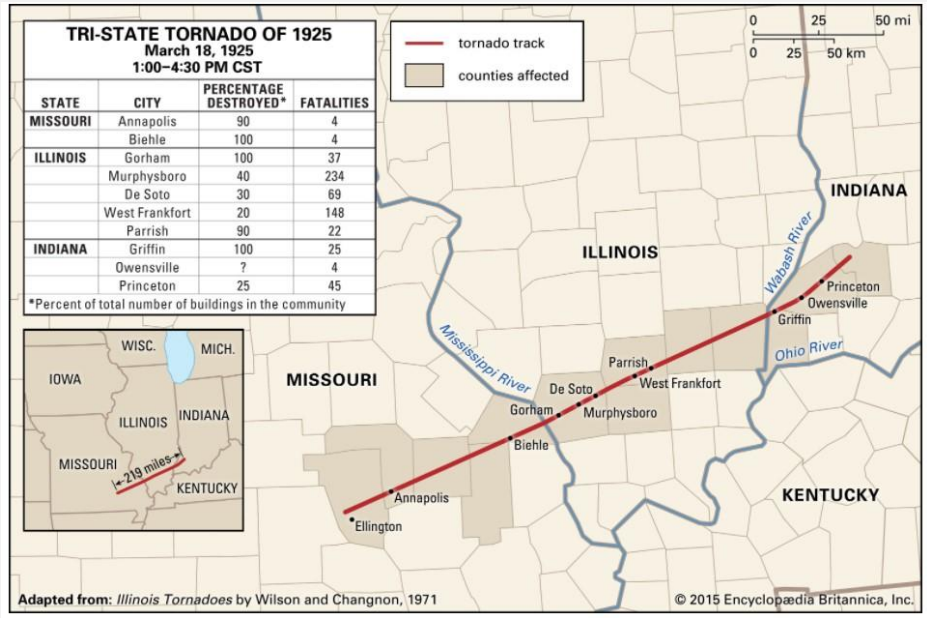
- Tri-State Tornado of 1925
- 625 deaths and 2,000+ injured
- 15,000 homes destroyed

Damage is shown in De Soto after the 1925 Tri-State Tornado.

TRI-STATE TORNADO OF 1925
March 18, 1925
1:00–4:30 PM CST

STATE	CITY	PERCENTAGE DESTROYED*	FATALITIES
MISSOURI	Annapolis	90	4
	Biehle	100	4
ILLINOIS	Gorham	100	37
	Murphysboro	40	234
	De Soto	30	69
	West Frankfort	20	148
	Parrish	90	22
INDIANA	Griffin	100	25
	Owensville	?	4
	Princeton	25	45

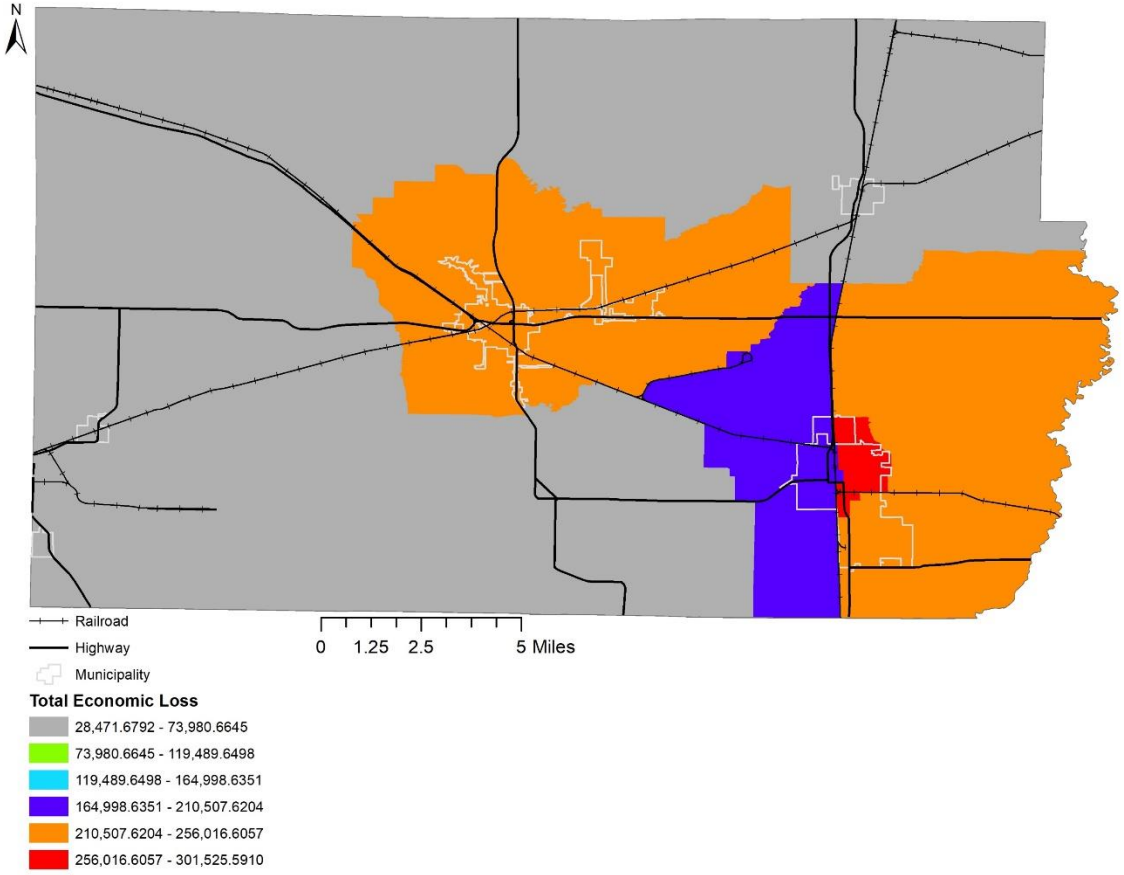
*Percent of total number of buildings in the community

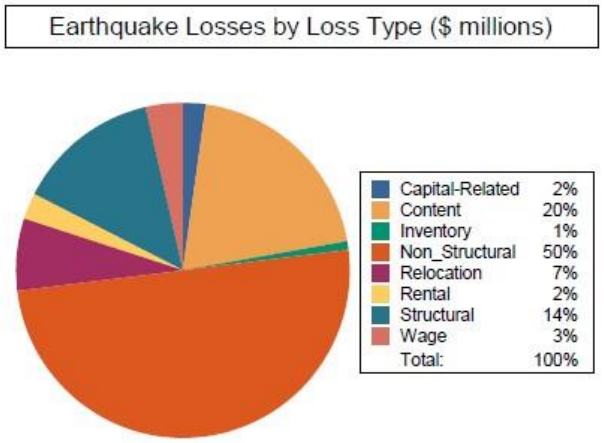


Earthquake Preliminary Models

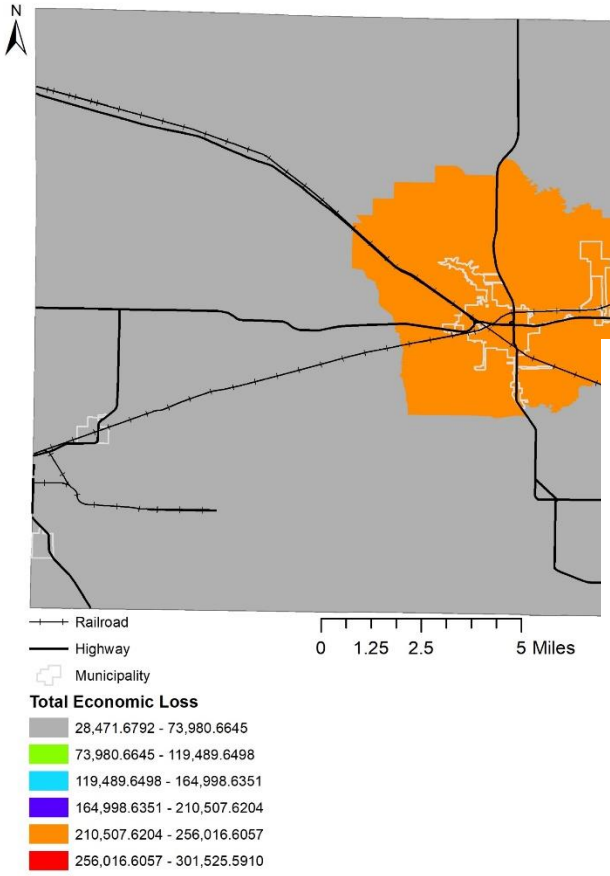
- Arbitrary Earthquake Model (Hazus 5.0)
- Epicenter: Du Quoin, IL
  - Most populous city chosen to estimate damages in a worst case scenario
- Magnitude: 6
  - Any higher magnitudes are extremely unlikely
- Depth: 10km
  - This is the average, or “fixed depth” of earthquakes as determined by USGS
- Attenuation Function: CEUS 2008
  - The rate of loss in energy from the epicenter
  - CEUS 2008 was designed for the Eastern/Central United States

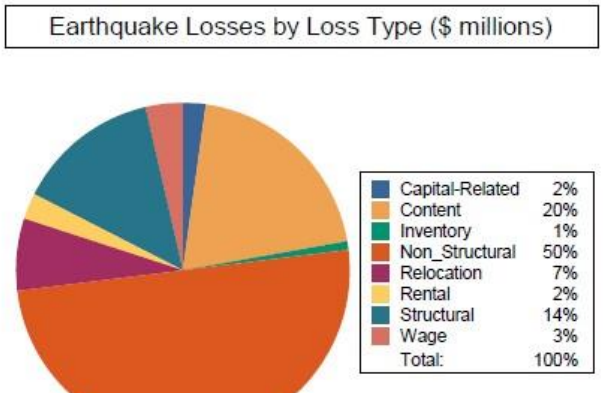
Earthquake Preliminary Models

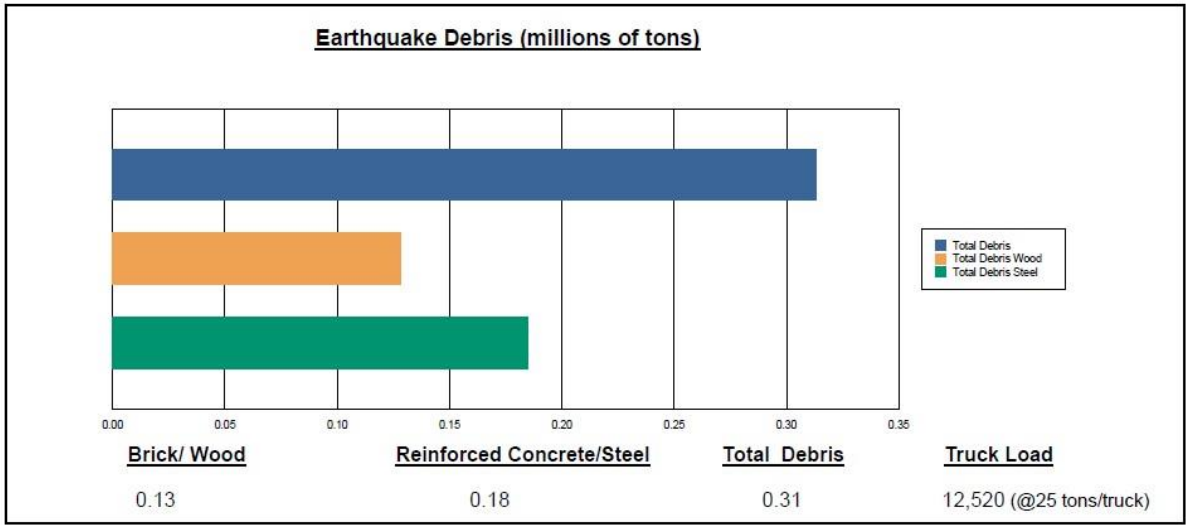




Earthquake Preliminary Models







Damage Categories by General Occupancy Type

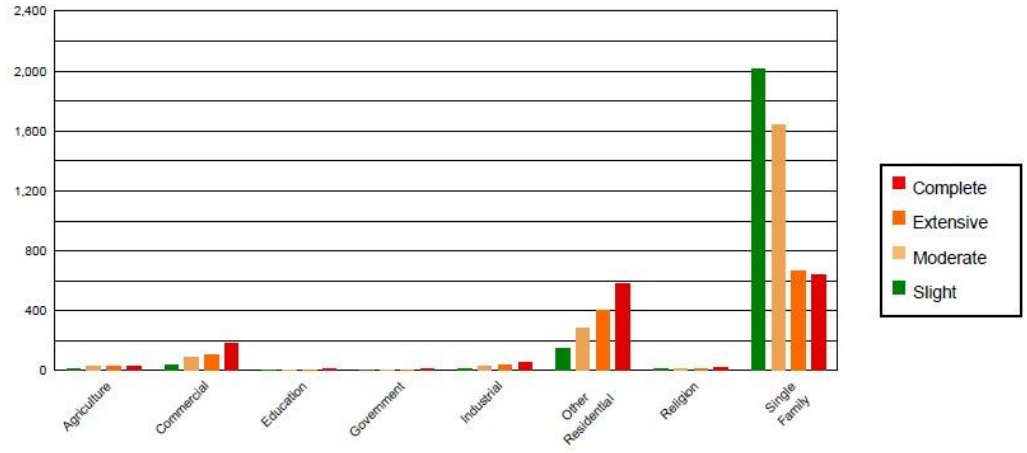
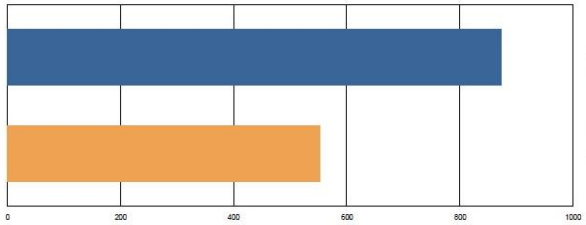


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	13.33	0.53	13.06	0.58	26.67	1.28	27.14	2.16	30.80	2.02
Commercial	23.62	0.94	33.02	1.47	85.84	4.11	105.29	8.37	183.23	12.02
Education	1.72	0.07	1.93	0.09	4.21	0.20	5.01	0.40	8.13	0.53
Government	2.21	0.09	2.71	0.12	6.39	0.31	7.10	0.56	8.59	0.56
Industrial	7.30	0.29	9.68	0.43	25.64	1.23	32.72	2.60	53.66	3.52
Other Residential	113.27	4.50	149.70	6.68	284.16	13.62	404.18	32.12	581.69	38.15
Religion	12.02	0.48	11.53	0.51	14.31	0.69	12.64	1.00	21.50	1.41
Single Family	2342.84	93.11	2017.91	90.10	1639.78	78.57	664.38	52.79	637.10	41.78
Total	2,516		2,240		2,087		1,258		1,525	

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
873	552

Injury Estimations

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	5.49	1.67	0.26	0.51
	Commuting	0.01	0.02	0.03	0.01
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	8.28	2.50	0.38	0.74
	Other-Residential	108.79	29.24	3.23	6.03
	Single Family	219.55	63.30	9.70	19.11
	Total	342	97	14	26
2 PM	Commercial	355.64	107.91	16.95	33.05
	Commuting	0.11	0.22	0.27	0.06
	Educational	148.80	46.24	7.62	14.85
	Hotels	0.00	0.00	0.00	0.00
	Industrial	61.12	18.47	2.81	5.45
	Other-Residential	27.49	7.51	0.89	1.63
	Single Family	58.49	17.27	2.74	5.16
	Total	652	198	31	60
5 PM	Commercial	259.59	78.86	12.46	23.99
	Commuting	1.63	3.50	4.31	0.92
	Educational	13.59	4.24	0.70	1.36
	Hotels	0.00	0.00	0.00	0.00
	Industrial	38.20	11.54	1.76	3.40
	Other-Residential	40.45	11.00	1.27	2.33
	Single Family	88.60	26.27	4.18	7.86
	Total	442	135	25	40

Level 1: Treatable with basic first aid
Level 2: Hospitalization, not life threatening
Level 3: Hospitalization, life threating unless treated quickly
Level 4: killed by earthquake

2 AM: Population at home
2 PM: Population at work/school
5 PM: Population Commuting

*General trends of peak occupancy loads
**This model does not estimate casualties of livestock or pets

Damages to essential and critical facilities

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	2	1	0
Schools	15	15	9	0
EOCs	1	1	0	0
PoliceStations	5	4	2	1
FireStations	7	5	2	2

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	8,335	3,315	2,340	339	0	0
Electric Power		5,384	3,909	2,104	564	6

Total Transportation losses: $37.5million

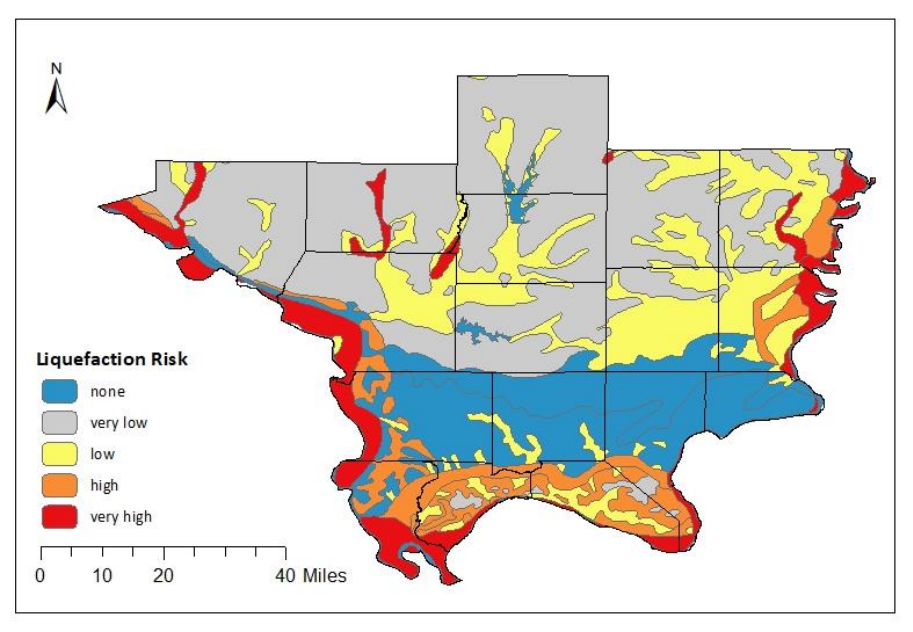
- Damages to highway & rail bridges, Airport damage

Total Utility system losses: $677million

- Most damages to water treatment plants & electric power facilities
- Some damage to distribution lines

Liquefaction Risk

- Occurs when sandy soils behave like a liquid during ground shaking events
- Can cause severe damage to buildings and infrastructure

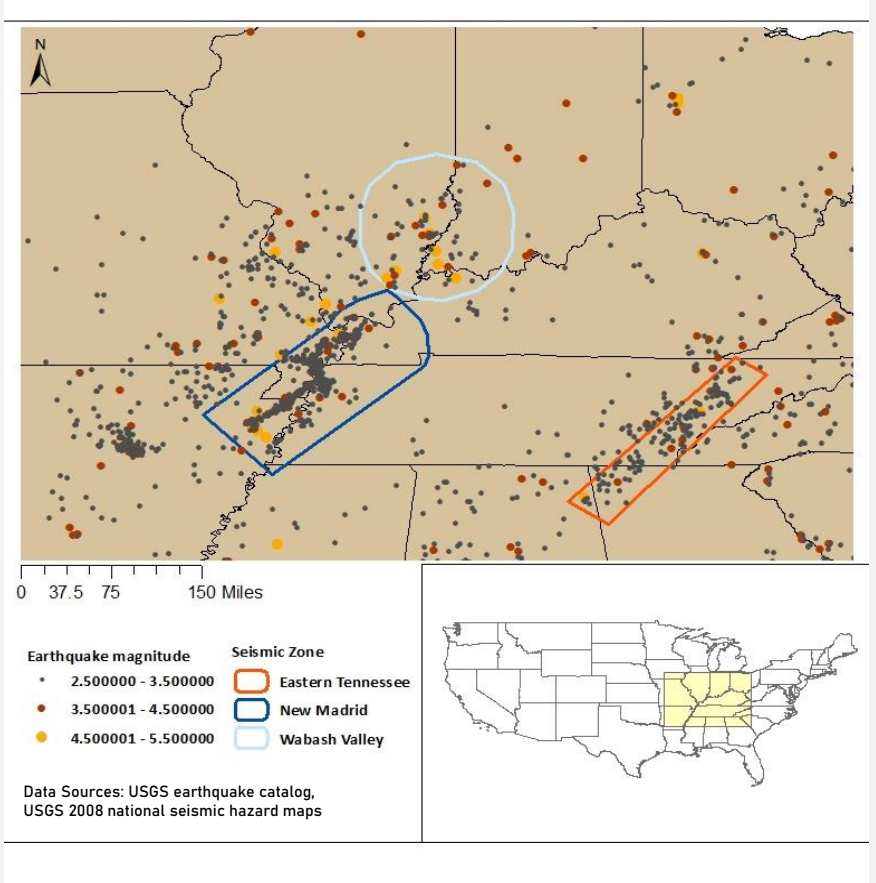


Data source: IL state geological survey

Historic Earthquakes – Perry County

One Magnitude 3 earthquake on 04/06/1991

- Severe earthquakes (magnitude 7 or higher) within the New Madrid or Wabash Valley seismic zones may be felt hundreds of miles away from the epicenters



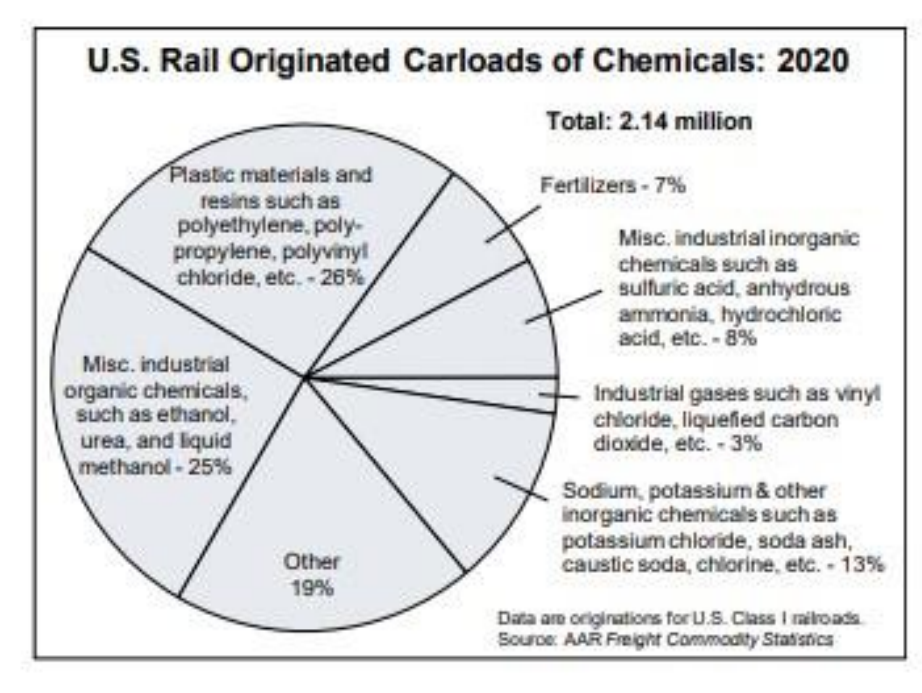
Historic Earthquakes – New Madrid

- December, January, February of 1811-1812
  - 3 large earthquakes, estimated magnitude 7, with hundreds of aftershocks
  - The February earthquake destroyed the town of New Madrid MO
  - Among the 5 worst earthquakes to ever occur in the lower 48 states
  - Earthquakes of this severity are estimated to occur only every ~500 years

Hazardous Materials Model

- ALOHA – Areal Locations of Hazardous Atmospheres
- Models toxic cloud dispersal
- Estimates fires and explosions (depending on scenario)
- 1,000 hazardous chemicals to choose from
  - Cannot be modeled in combinations

- Cannot model further than 6miles from release spot
- Cannot take topography into account



Example 1- ethanol tank explosion

Text Summary

```
SITE DATA:
  Location: DU QUOIN, ILLINOIS
  Building Air Exchanges Per Hour: 0.70 (unsheltered single storied)
  Time: October 8, 2021  1032 hours CDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: ETHANOL
  CAS Number: 64-17-5                    Molecular Weight: 46.07 g/mol
  ERPG-1: 1800 ppm   ERPG-2: 3300 ppm    ERPG-3: N/A
  IDLH: 3300 ppm     LEL: 33000 ppm      UEL: 190000 ppm
  Ambient Boiling Point: 172.2° F
  Vapor Pressure at Ambient Temperature: 0.060 atm
  Ambient Saturation Concentration: 61,213 ppm or 6.12%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 8 miles/hour from 230° true at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 69° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  BLEVE of flammable liquid in horizontal cylindrical tank
  Tank Diameter: 10 feet                 Tank Length: 52 feet
  Tank Volume: 30,551 gallons
  Tank contains liquid
  Internal Storage Temperature: 69° F
  Chemical Mass in Tank: 190000 pounds
  Tank is 94% full
  Percentage of Tank Mass in Fireball: 100%
  Fireball Diameter: 280 yards           Burn Duration: 15 seconds

THREAT ZONE:
  Threat Modeled: Thermal radiation from fireball
  Red    : 472 yards --- (10.0 kW/(sq m) = potentially lethal within 60 sec)
  Orange: 674 yards --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)
  Yellow: 1058 yards --- (2.0 kW/(sq m) = pain within 60 sec)
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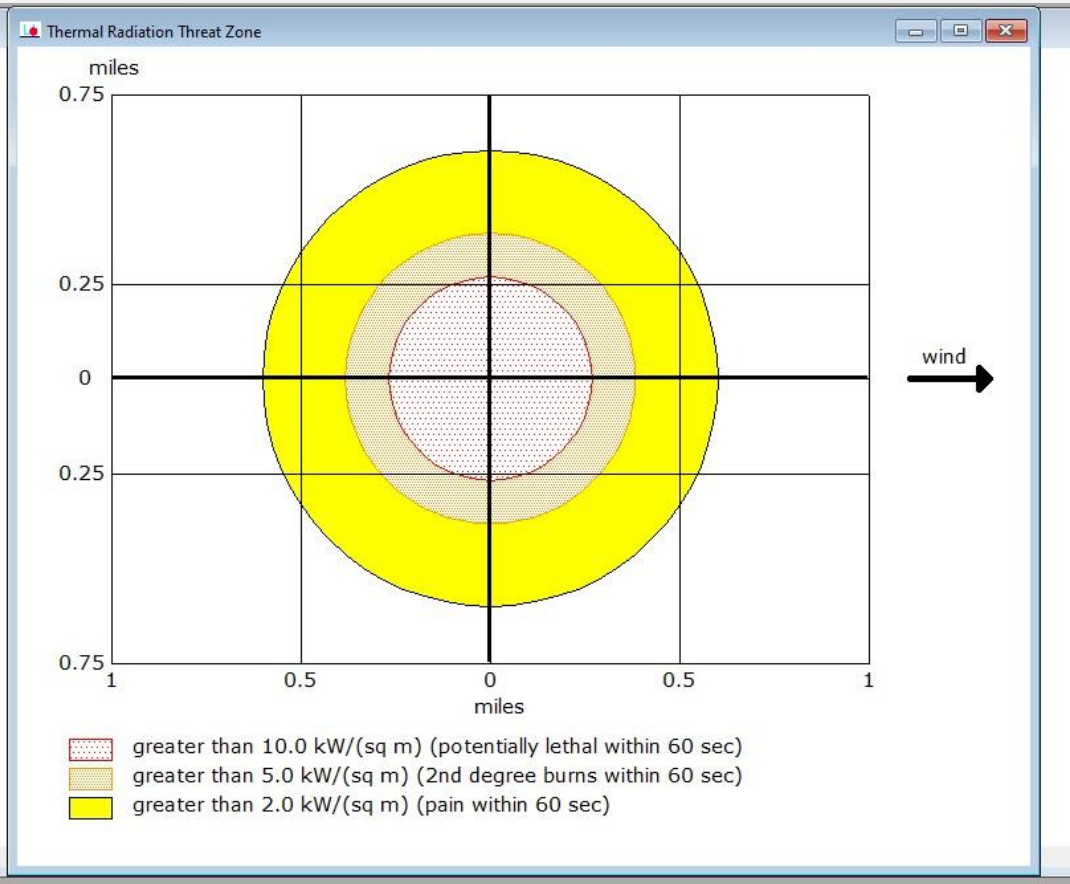

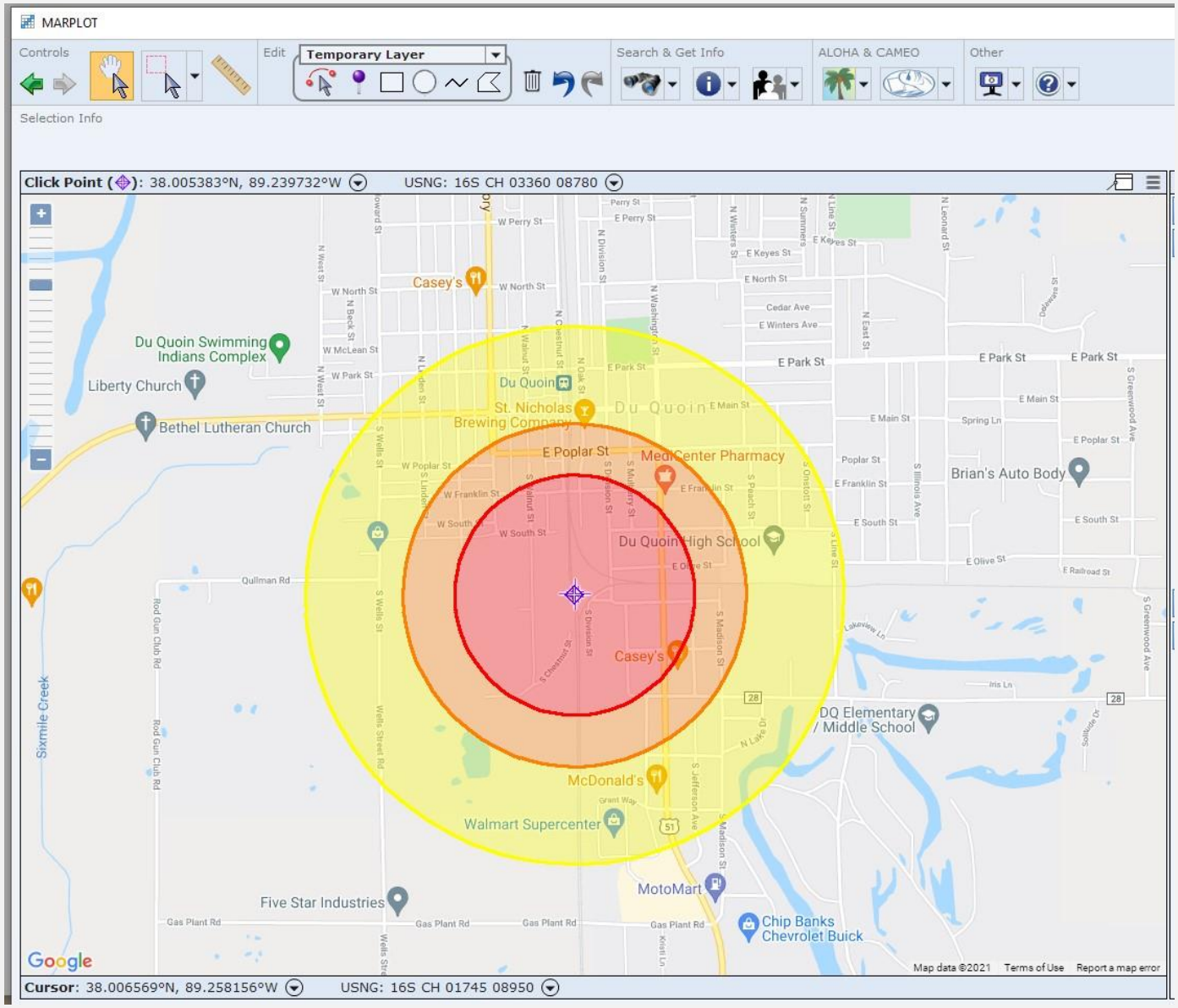
MARPLOT
Controls
Edit
Temporary Layer
Search & Get Info
ALOHA & CAMEO
Other
Selection Info
Click Point (): 38.005383°N, 89.239732°W
USNG: 16S CH 03360 08780
Du Quoin Swimming Indians Complex
Liberty Church
Bethel Lutheran Church
Casey's
Du Quoin
St. Nicholas Brewing Company
MediCenter Pharmacy
Du Quoin High School
Brian's Auto Body
DQ Elementary / Middle School
McDonald's
Walmart Supercenter
MotoMart
Chip Banks Chevrolet Buick
Five Star Industries
Sixmile Creek
W Perry St
E Perry St
W North St
E North St
E Park St
E Main St
E Poplar St
W Poplar St
W Franklin St
E Franklin St
W South St
E South St
E Olive St
Quillman Rd
Gas Plant Rd
Google
Map data ©2021
Terms of Use
Report a map error
Cursor: 38.006569°N, 89.258156°W
USNG: 16S CH 01745 08950

Example 2 – aqueous ammonia spill

Text Summary

```
SITE DATA:
  Location: DU QUOIN, ILLINOIS
  Building Air Exchanges Per Hour: 0.70 (unsheltered single storied)
  Time: October 8, 2021  1032 hours CDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: AQUEOUS AMMONIA
  Solution Strength: 28% (by weight)
  Ambient Boiling Point: 85.1° F
  Partial Pressure at Ambient Temperature: 0.66 atm
  Ambient Saturation Concentration: 674,960 ppm or 67.5%
  Hazardous Component: AMMONIA
  CAS Number: 7664-41-7                  Molecular Weight: 17.03 g/mol
  AEGL-1 (60 min): 30 ppm   AEGL-2 (60 min): 160 ppm   AEGL-3 (60 min): 1100
  IDLH: 300 ppm      LEL: 150000 ppm     UEL: 280000 ppm

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 8 miles/hour from 230° true at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 69° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Evaporating Puddle (Note: chemical is flammable)
  Puddle Diameter: 5 yards               Average Puddle Depth: 2 inches
  Ground Type: Default soil              Ground Temperature: 69° F
  Initial Puddle Temperature: Ground temperature
  Release Duration: ALOHA limited the duration to 1 hour
  Max Average Sustained Release Rate: 19.3 pounds/min
     (averaged over a minute or more)
  Total Amount Hazardous Component Released: 228 pounds

THREAT ZONE:
  Model Run: Gaussian
  Red    : 39 yards --- (1100 ppm = AEGL-3 [60 min])
  Note: Threat zone was not drawn because effects of near-field patchiness
     make dispersion predictions less reliable for short distances.
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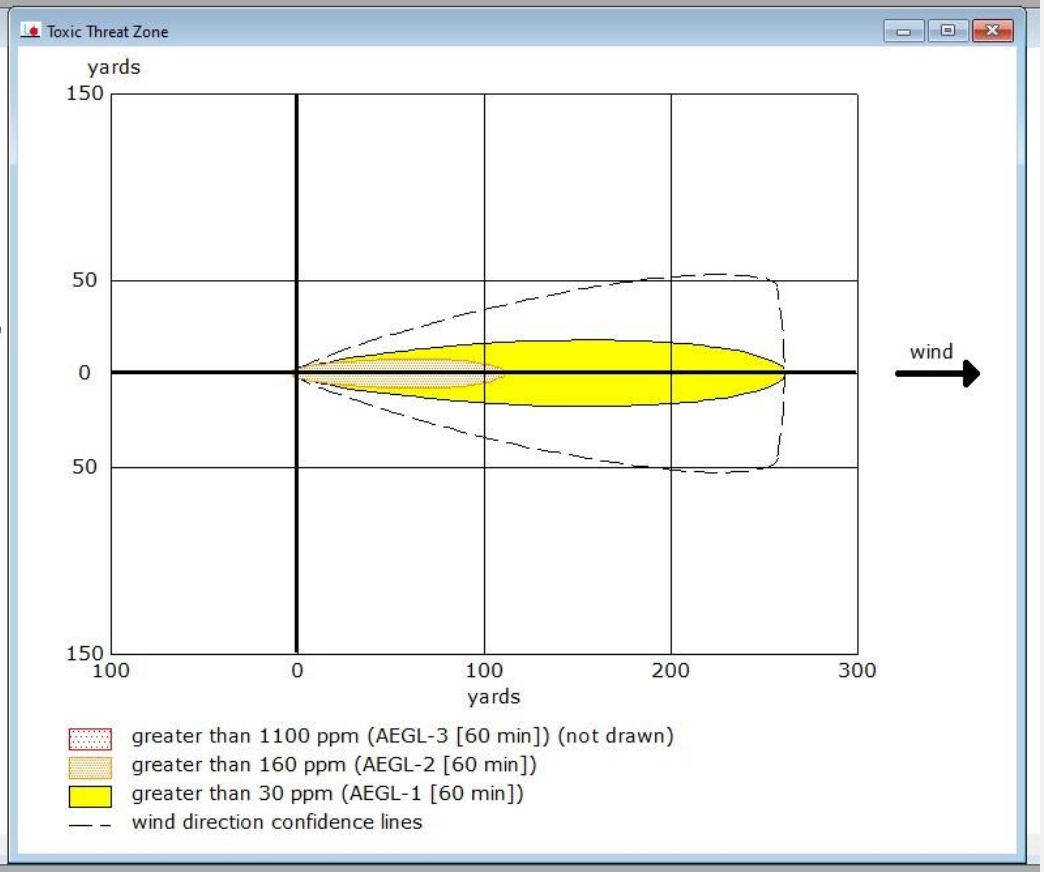

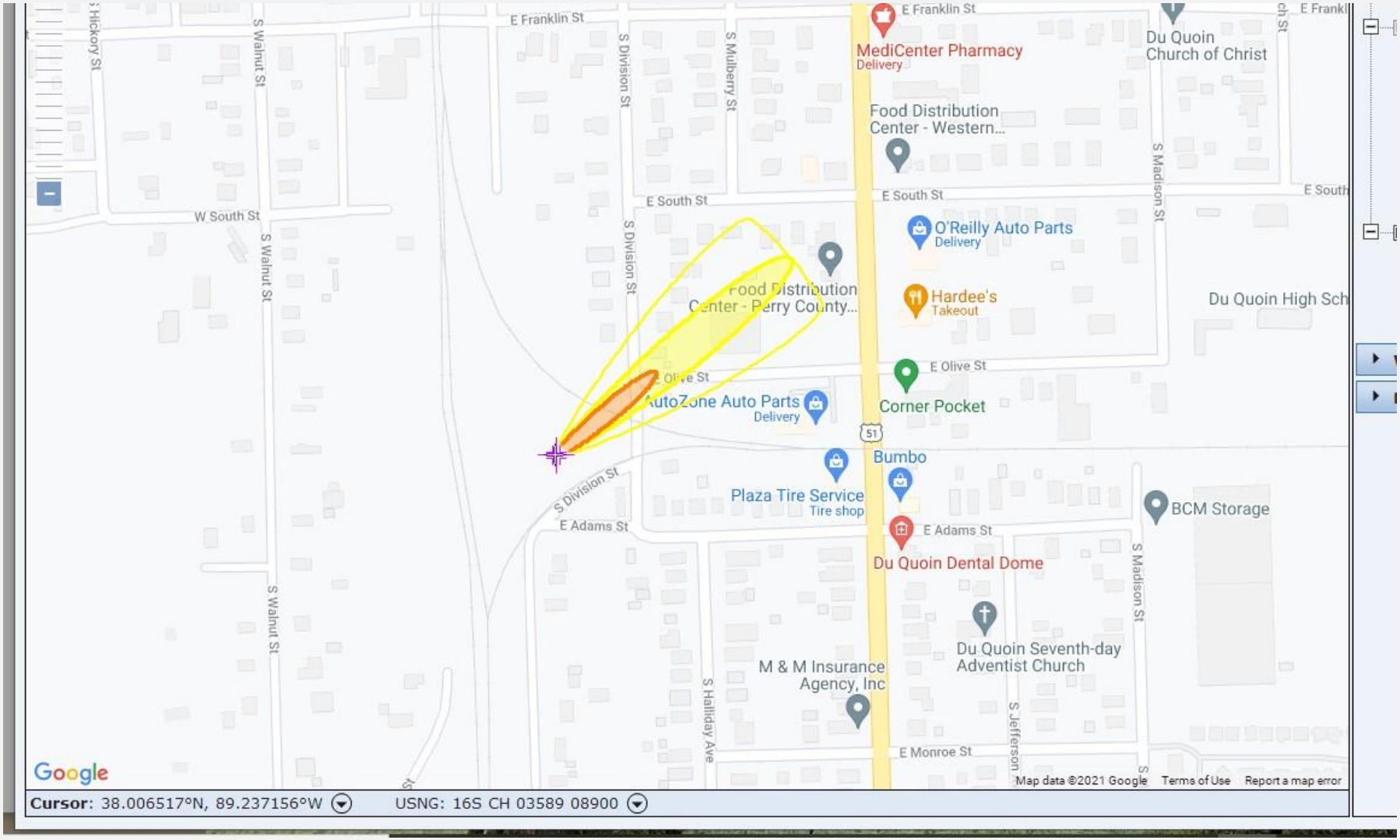
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S Hickory St
S Walnut St
S Division St
S Mulberry St
MediCenter Pharmacy
Delivery
Du Quoin Church of Christ
Food Distribution Center - Western...
S Madison St
E South St
W South St
O'Reilly Auto Parts
Delivery
Food Distribution Center - Perry County...
Hardee's
Takeout
Du Quoin High Sch
E Olive St
AutoZone Auto Parts
Delivery
Corner Pocket
51
Bumbo
Plaza Tire Service
Tire shop
BCM Storage
E Adams St
Du Quoin Dental Dome
Du Quoin Seventh-day Adventist Church
M & M Insurance Agency, Inc
S Halliday Ave
S Jefferson
E Monroe St
Google
Map data ©2021 Google
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Report a map error
Cursor: 38.006517°N, 89.237156°W
USNG: 16S CH 03589 08900

Hazardous Materials Release – Historic Data

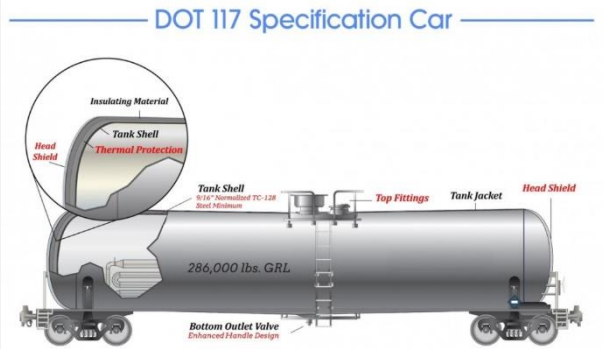
- 4 train derailments in Perry County since 1972
  - Only 1 of which involved hazardous materials
    - 2003: Tamaroa
  - Railway safety has greatly improved over the last decade

- Other risk areas include highways, factories, warehouses, and mines

- 106 total IEMA reported incidents from 1987-2011
  - Majority of incidents were spills/leaks of gasoline, diesel fuel, or crude oil

- Extent and impacts depend on the material and amount released

Transportation.gov



- Thicker head shields
- Thicker steel shell
- Insulation layers to reduce risk of fire
- Better protection of top fittings and bottom valves

The Southern Illinoisian; data.Illinois.gov

Floods

- Currently ranked 10th for Perry county
- Can model upon request by county or census block
- Hazus software cannot model dam failures

Notice! Funding period for BRIC and FMA opens Sept 30th

- Building Resilient Infrastructure, Communities (BRIC)
  - $1 billion available, competitive applications
  - Many projects types supported
  - Preference for underserved or at-risk communities; or those at high risk of climate change related disasters
- Flood Mitigation Assistance (FMA)
  - $160 million available, competitive applications
  - Preference for underserved communities
  - Communities (and specific locations) seeking these funds MUST have current NFIP policies in place

- New application preferences part of President Biden's Justice40 Initiative
- See FEMA.gov or grants.gov for detailed NOFOs
- Contact Greater Egypt for assistance in applications
- Apps due no later than Jan 28, 2022

FEMA

Notice to county and city officials

- We are missing NFIP statistics for each county
- This is a FEMA requirement for Hazard Mitigation Planning
- Data request letter will be sent after meeting

Mitigation Strategies

The purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources. (Stafford Act Title 44, Chapter 1, Part 201).

Mitigation Strategies

Hazard Mitigation is any sustained action taken to reduce or eliminate long-term risk to human life and property from a natural hazardous event.

Hazard Mitigation Planning is a 4 step process that requires community input

- Organize resources
  - Creation of planning team, securing IEMA funds for updating plan (early 2020)
- Assessing risks
  - Review of historical hazards, hazard ranking exercise (meeting 1)
- **Developing a mitigation plan (we are here)**
  - **Final hazard ranking, mitigation strategies worksheet (meeting 2)**
- Implementing the plan and monitoring progress
  - Adoption of Plan by each jurisdiction & count
  - Applying for grants and undergoing projects

Mitigation Strategies

Each Jurisdiction is required to come up with 2 mitigation strategies per hazard

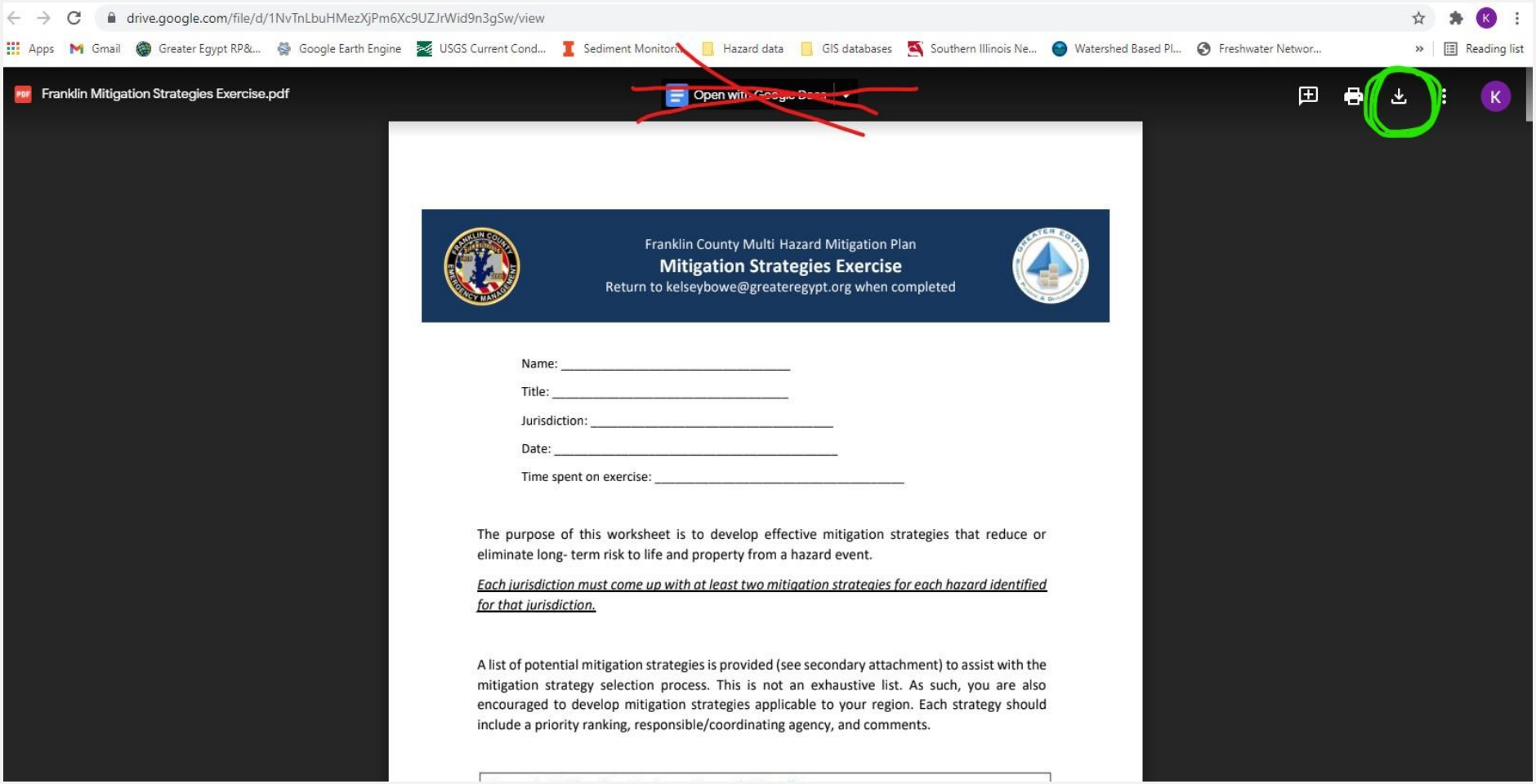
This does not mean you are required to implement them

This is designed to be a brainstorming exercise, and the final list of strategies will be an outline for the County EMA and cities/villages or other jurisdictions to apply for grant funds later.

Any and all ideas are encouraged, the goal is to make Perry County better prepared to endure and respond to hazards, and more resilient after one has occurred.

Mitigation Strategies Exercise

- **Do NOT "open with google docs", click the download icon in top right corner!**



Mitigation Strategies Exercise

Example Mitigation Strategy: Hazard- Flooding

Mitigation Strategy: *Institute a buy-out plan for repetitive loss properties*

Check One:	✔ Proposed	❑ Ongoing		
Priority Ranking:	❑ High	✔ Medium	❑ Low	
Funding Source:	✔ Local	❑ State	✔ Federal	❑ Private
Responsible & Coordinating Agencies:	*Franklin County EMA*			

Comments: *Franklin County will apply for FEMA HMA funds to acquire repetitive loss properties. The properties will be demolished and the land will be deed-restricted to remain as open space. The non-federal share of the grant will be sought from local funds.*

Questions or Comments?

Thank you for attending!

Please remain in the zoom call to complete the exercise if time allows