JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

FEMA

IEMA
ILLINOIS EMERGENCY MANAGEMENT AGENCY

Meeting 2

October 5, 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. Jefferson 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													

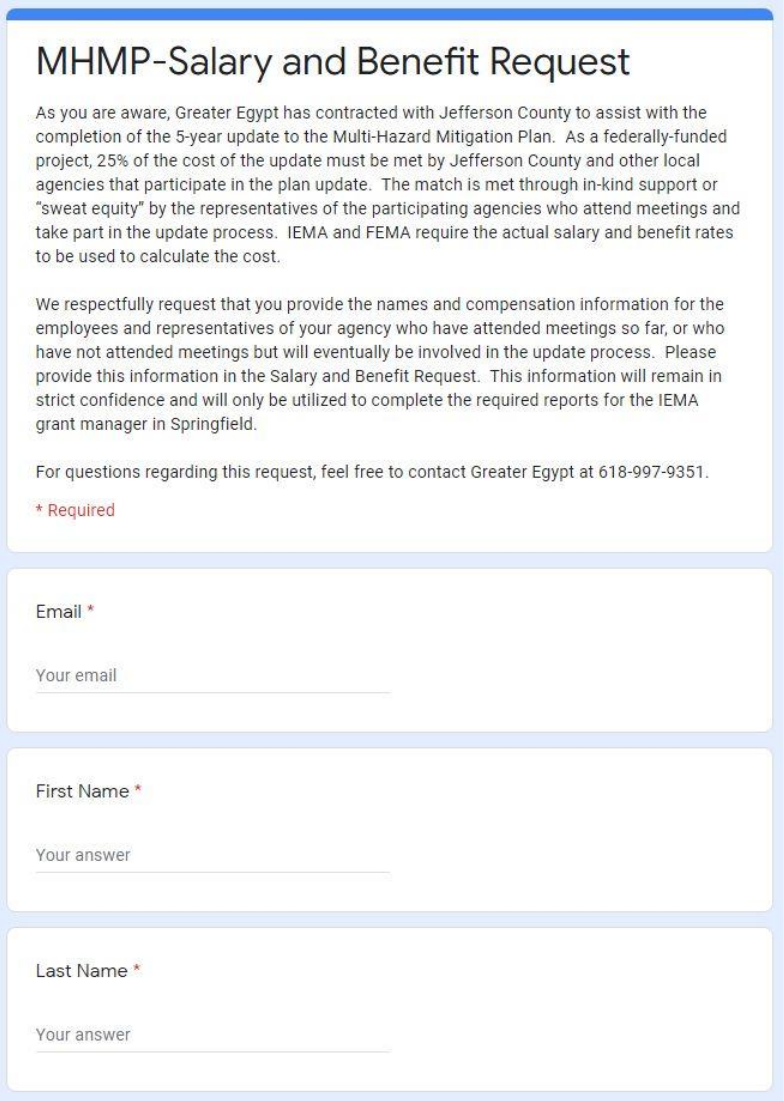
Match Requirements

- 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: 47% ($3,883/8,333)

- MHMP Match Survey



MHMP-Salary and Benefit Request

As you are aware, Greater Egypt has contracted with Jefferson 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 Jefferson 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	% importance	weighted risk index
tornado	15.00	21	21	1.00	15.00
epidemic	7.45	20	21	0.95	7.10
earthquake	7.83	19	21	0.90	7.09
winter storm	7.56	19	21	0.90	6.84
hazmat release	8.44	16	21	0.76	6.43
flooding	6.47	17	21	0.81	5.24
thunderstorm	7.14	15	21	0.71	5.10
extreme heat	4.33	12	21	0.57	2.48
ground failure	3.08	14	21	0.67	2.05

Hazard Ranking Review

terrorism	3.80	10	21	0.48	1.81
dam failure	3.67	9	21	0.43	1.57
cyber attack	12.00	1	21	0.05	0.57
wildfire	1.43	7	21	0.33	0.48
utilty disruption	6.00	1	21	0.05	0.29
infestation	2.50	2	21	0.10	0.24
invasive spp	1.33	3	21	0.14	0.19
landslide	2.00	1	21	0.05	0.10
meteor	1.00	1	21	0.05	0.05

Hazard Ranking Review

- Vote on final hazard ranking

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

1. Tornado
2. Disease outbreak/epidemics
3. Earthquake
4. Severe winter weather
5. HazMat release
6. Flooding
7. Severe thunderstorm
8. Drought/extreme heat
9. Ground failure (mine subsidence)
10. Terrorism
11. Dam failure
12. Cyberattack
13. Wildfire
14. Utility disruption/power outages
15. Infestation/invasive species
16. Landslide
17. Meteor

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

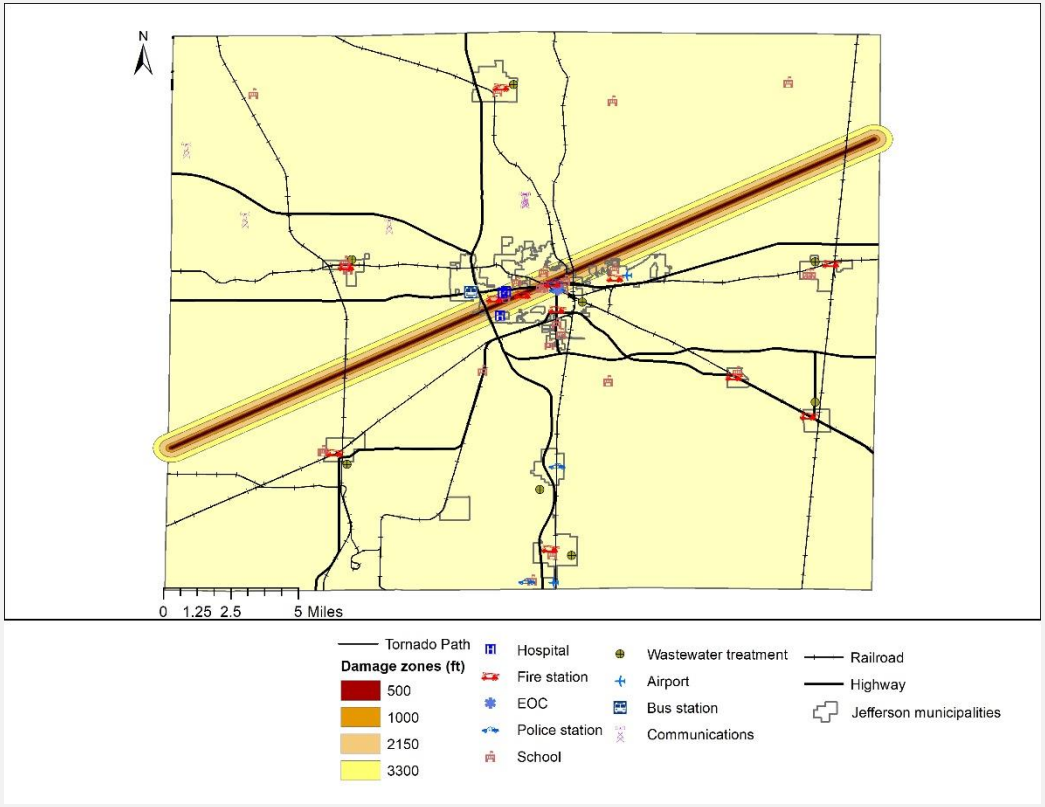
- **Updating is optional**
  - Can make models more accurate
  - May be useful in determining mitigation strategies
  - Anything built after 2010 is likely not included in current datasets

- **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 – Jefferson County

Location	Date	Rating	Deaths	Injuries	Property Damage
	12/18/1957	F4	1	45	2500000
	12/18/1957	F2	0	2	25000
	12/18/1957	F2	0	0	25000
	12/19/1957	F2	0	0	25000
	5/9/1959	F1	0	0	25000
	2/9/1960	F2	0	1	250000
	4/20/1966	F0	0	0	25000
	5/7/1973	F1	0	3	0
	3/30/1982	F2	1	3	2500000
	5/1/1983	F1	0	0	2500000
INA	4/19/1996	F3	0	0	200000
CRAVAT	4/15/1998	F2	0	1	400000
BLUFORD	4/21/2002	F1	0	0	2000
WOODLAWN	5/30/2004	F1	0	0	100000
MT VERNON	6/27/2008	EF0	0	0	5000
TEXICO	3/8/2009	EF1	0	0	60000
STRATTON	3/8/2009	EF0	0	0	12000
SHIRLEY	6/27/2010	EF0	0	0	2000
BLUFORD	4/19/2011	EF1	0	0	90000
MT VERNON	4/19/2011	EF1	0	0	70000
WOODLAWN	5/25/2011	EF2	0	0	4000000
SHIRLEY	3/23/2012	EF2	1	2	150000
OPDYKE	11/17/2013	EF1	0	0	3000
BLUFORD	10/13/2014	EF1	0	0	50000
DIX	10/13/2014	EF1	0	0	10000
BELLE RIVE	3/19/2020	EF0	0	0	3000

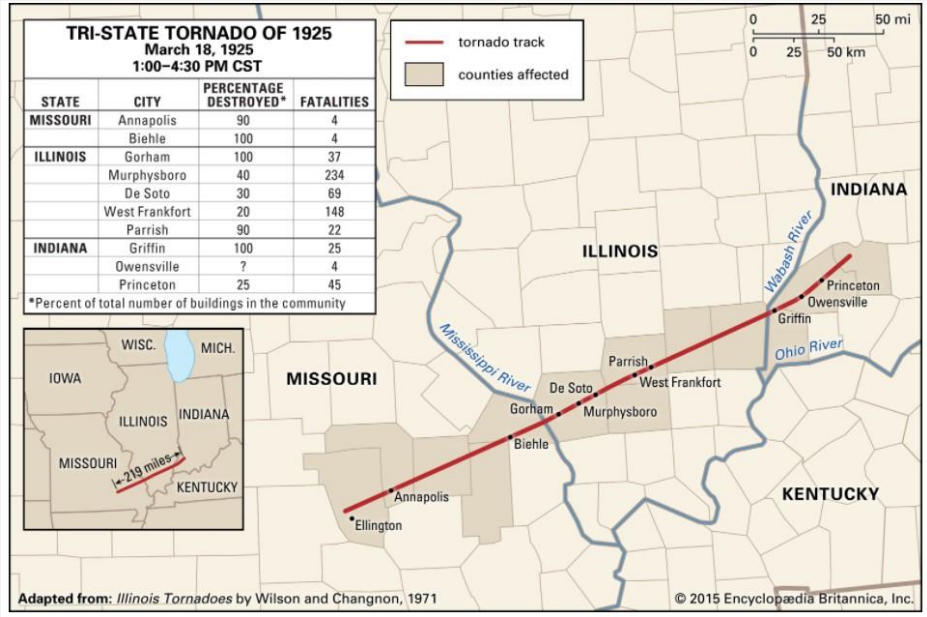
- **EF4 and EF5 tornadoes are rare**
  - (average of 8/ year and 1/year for the entire United States) - but devastating when they do occur (Elsner et. al 2014)
  - 24 EF4/EF5 tornadoes in IL since 1950

- **The Marion Tornado of 1982 (Williamson 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

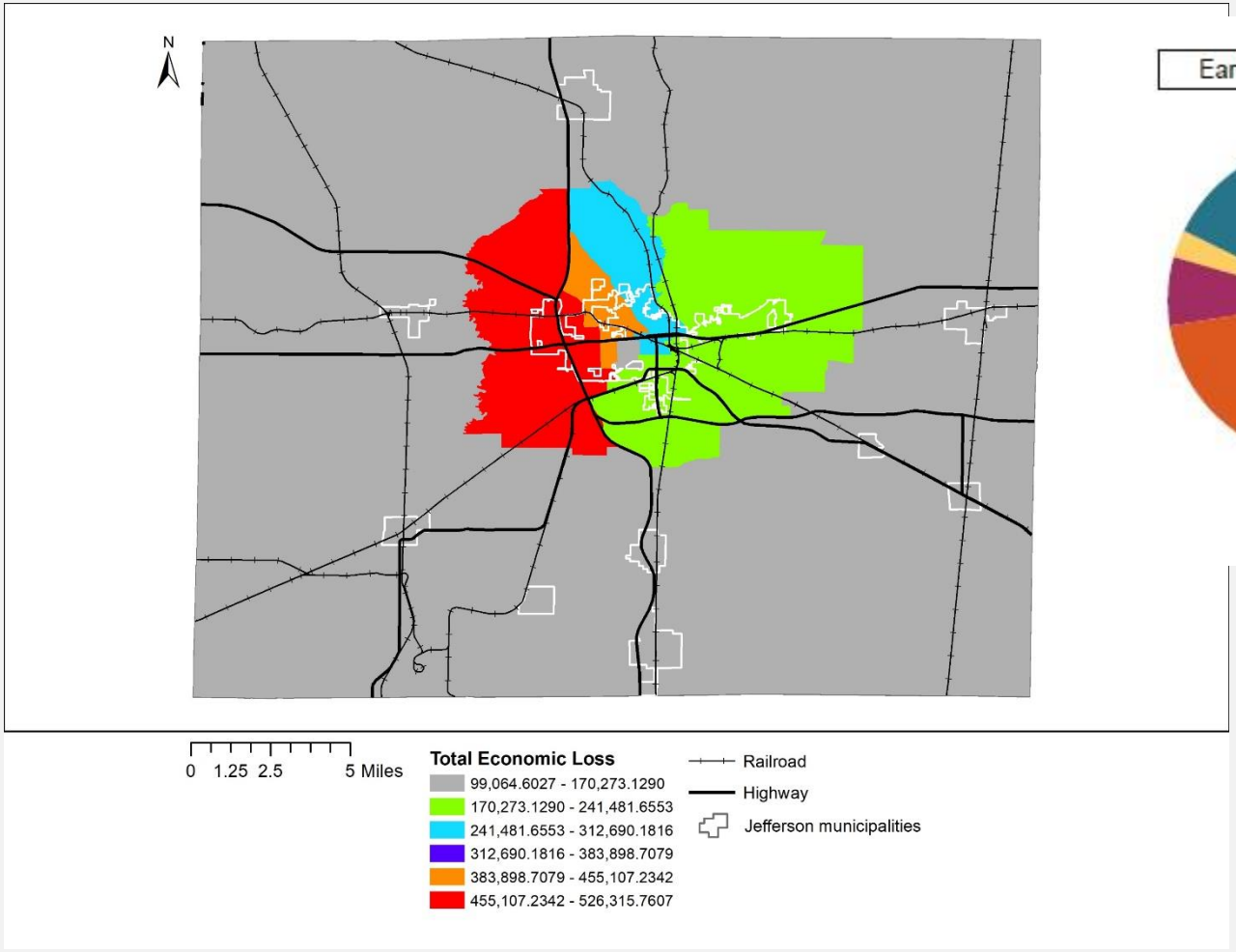
Damage is shown in De Soto after the 1925 Tri-State Tornado.

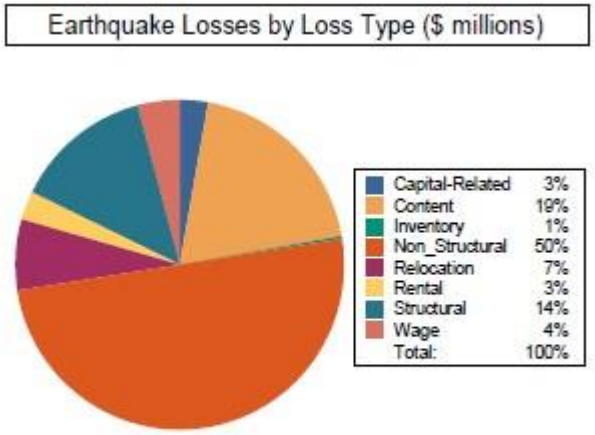


Earthquake Preliminary Models

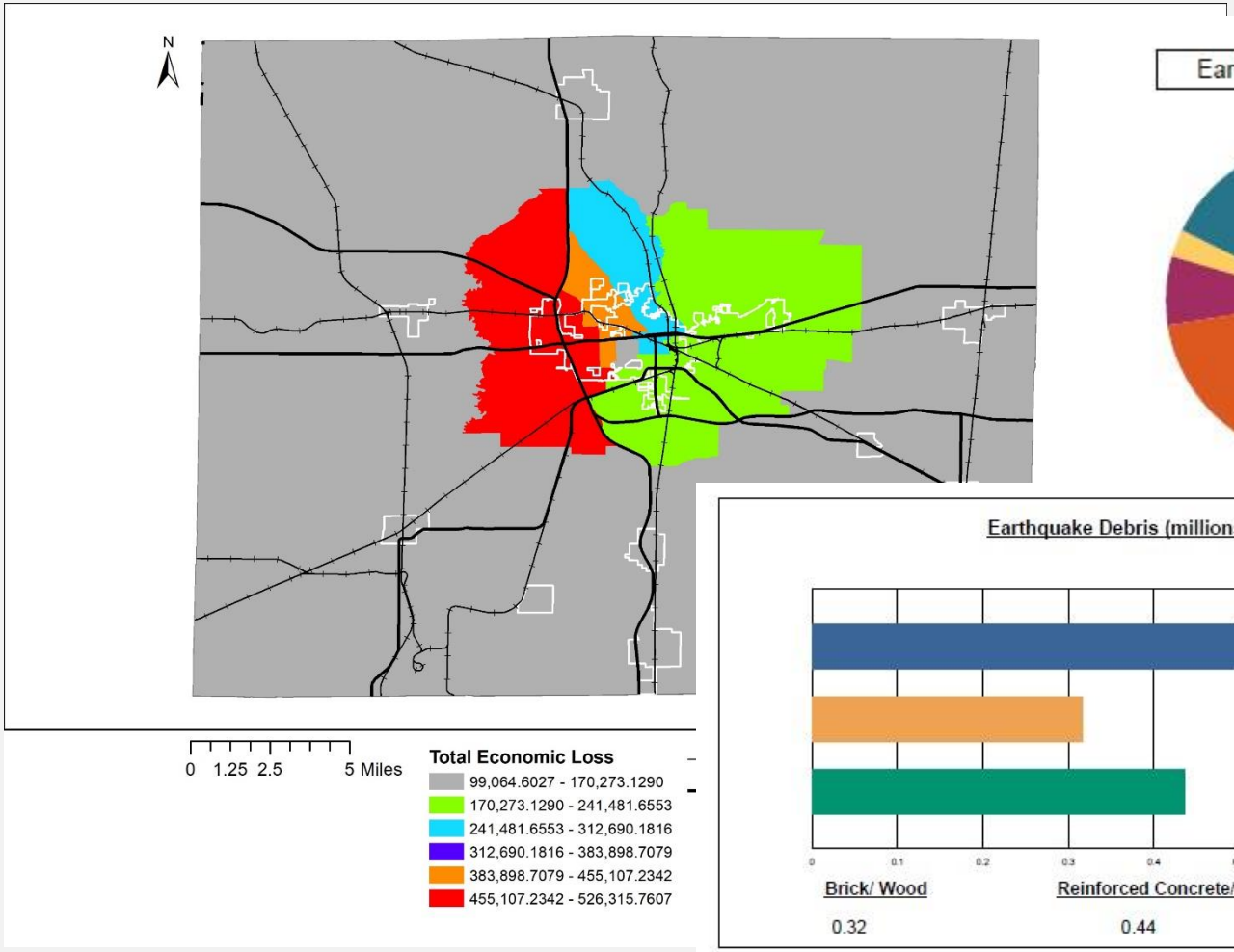
- Arbitrary Earthquake Model (Hazus 5.0)
- Epicenter: Mount Vernon, IL
  - Most populous city chosen to estimate damages in a worst case scenario
- Magnitude: 6
  - Any higher magnitudes are extremely unlikely
- Depth: 10km
  - This is the average, or “fixed depth” of earthquakes as determined by USGS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

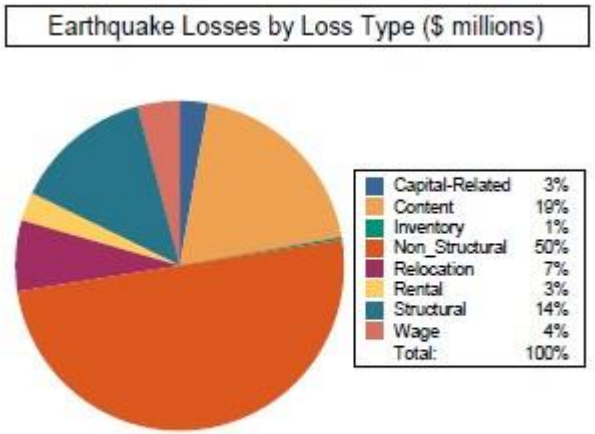
Earthquake Preliminary Models

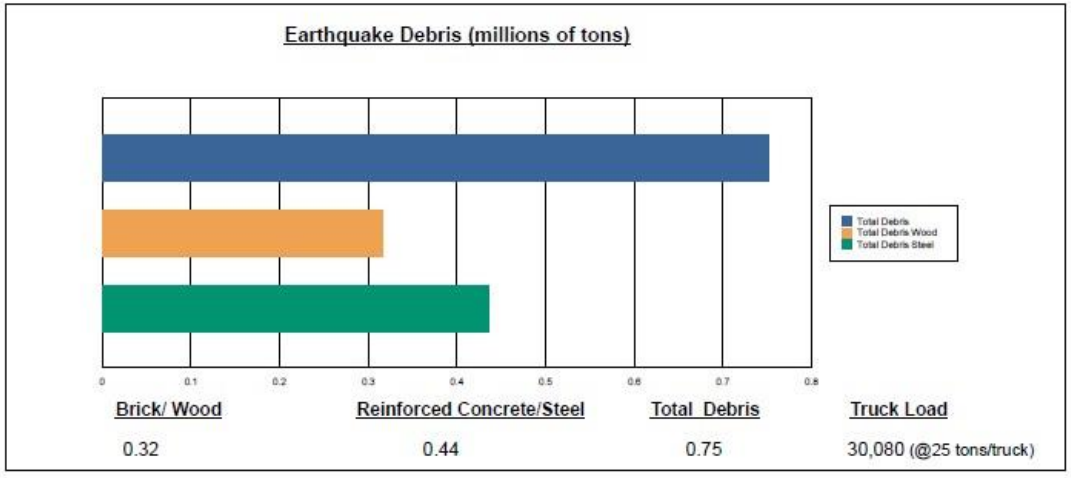




Earthquake Preliminary Models







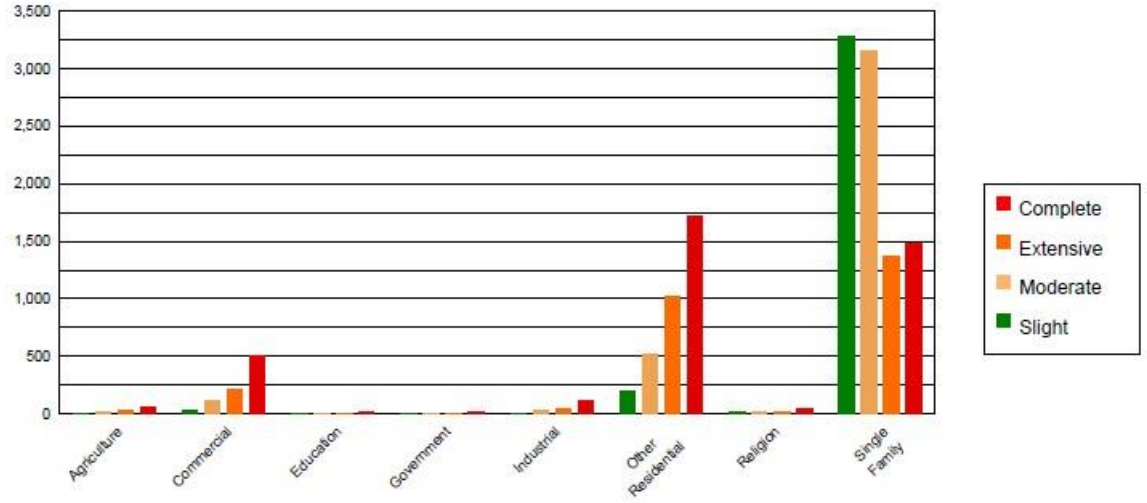
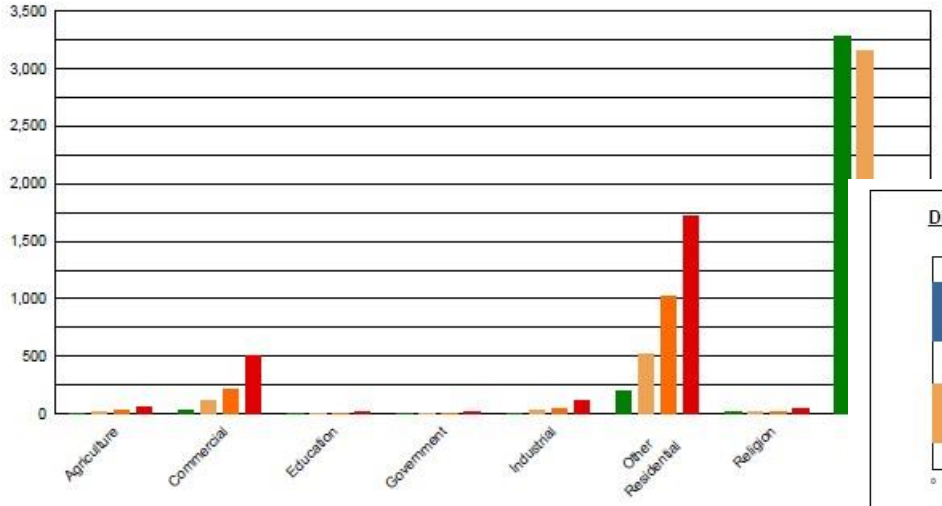
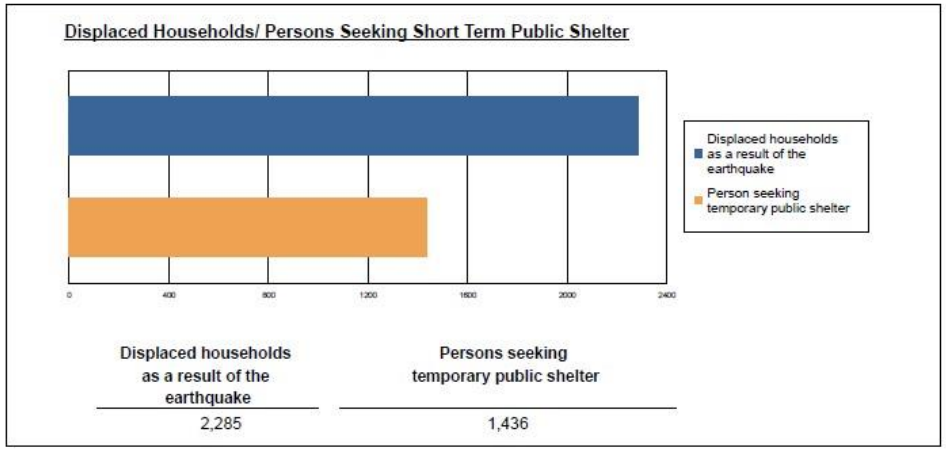


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	4.25	0.17	7.73	0.22	23.95	0.62	35.00	1.28	57.06	1.44
Commercial	9.90	0.40	26.50	0.75	120.00	3.10	213.08	7.81	508.53	12.82
Education	1.09	0.04	2.03	0.06	6.43	0.17	10.32	0.38	20.12	0.51
Government	0.87	0.03	1.64	0.05	5.38	0.14	8.77	0.32	15.35	0.39
Industrial	2.62	0.11	6.31	0.18	26.85	0.69	48.41	1.77	120.82	3.04
Other Residential	80.68	3.25	197.95	5.59	522.32	13.48	1021.92	37.45	1716.14	43.25
Religion	9.02	0.36	13.99	0.40	19.44	0.50	19.55	0.72	45.00	1.13
Single Family	2374.24	95.63	3283.47	92.76	3151.39	81.31	1371.97	50.27	1484.92	37.42
Total	2,483		3,540		3,876		2,729		3,968	





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Injury Estimations

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	16.47	5.07	0.79	1.56
	Commuting	0.04	0.05	0.09	0.02
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	17.67	5.44	0.84	1.64
	Other-Residential	314.70	84.33	8.87	16.41
	Single Family	495.95	145.68	22.50	44.35
	Total	**845**	**241**	**33**	**64**
2 PM	Commercial	992.71	305.40	47.98	93.71
	Commuting	0.37	0.48	0.82	0.16
	Educational	291.49	91.84	15.23	29.69
	Hotels	0.00	0.00	0.00	0.00
	Industrial	130.79	40.26	6.23	12.09
	Other-Residential	74.70	20.40	2.30	4.20
	Single Family	123.39	37.22	5.96	11.22
	Total	**1,613**	**496**	**79**	**151**
5 PM	Commercial	696.76	214.80	34.00	65.55
	Commuting	6.20	8.22	13.94	2.70
	Educational	19.41	6.12	1.01	1.98
	Hotels	0.00	0.00	0.00	0.00
	Industrial	81.74	25.16	3.89	7.56
	Other-Residential	116.95	31.82	3.53	6.41
	Single Family	200.28	60.50	9.70	18.25
	Total	**1,121**	**347**	**66**	**102**

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

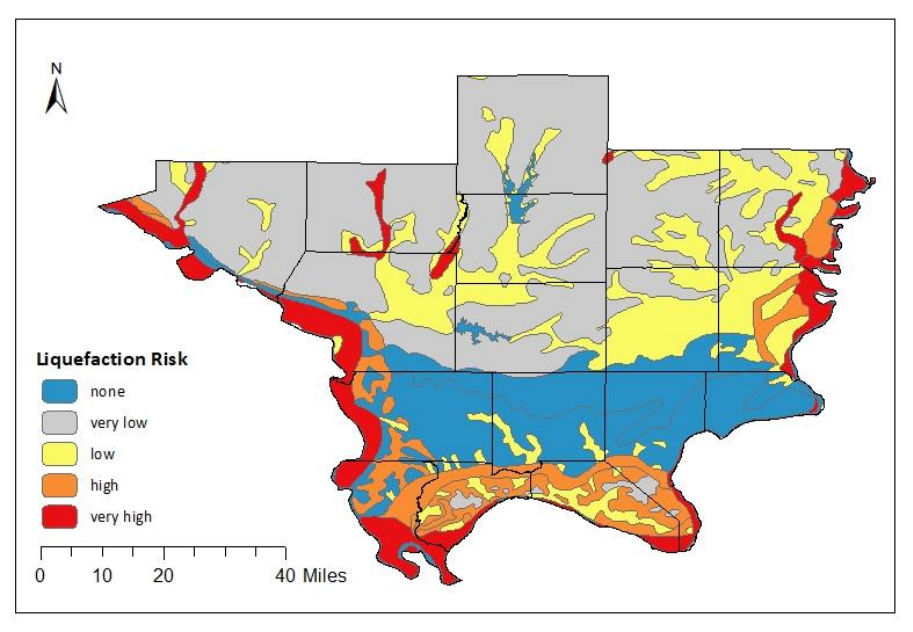
Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	3	3	3	0
Schools	33	28	19	0
EOCs	1	1	1	0
PoliceStations	4	3	2	0
FireStations	12	10	6	0

- Transportation system total losses: $150.8 million
- Utility systems total losses: $859 million
- Estimated 15,365 households without potable water and electricity on day 1

Liquefaction Risk

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

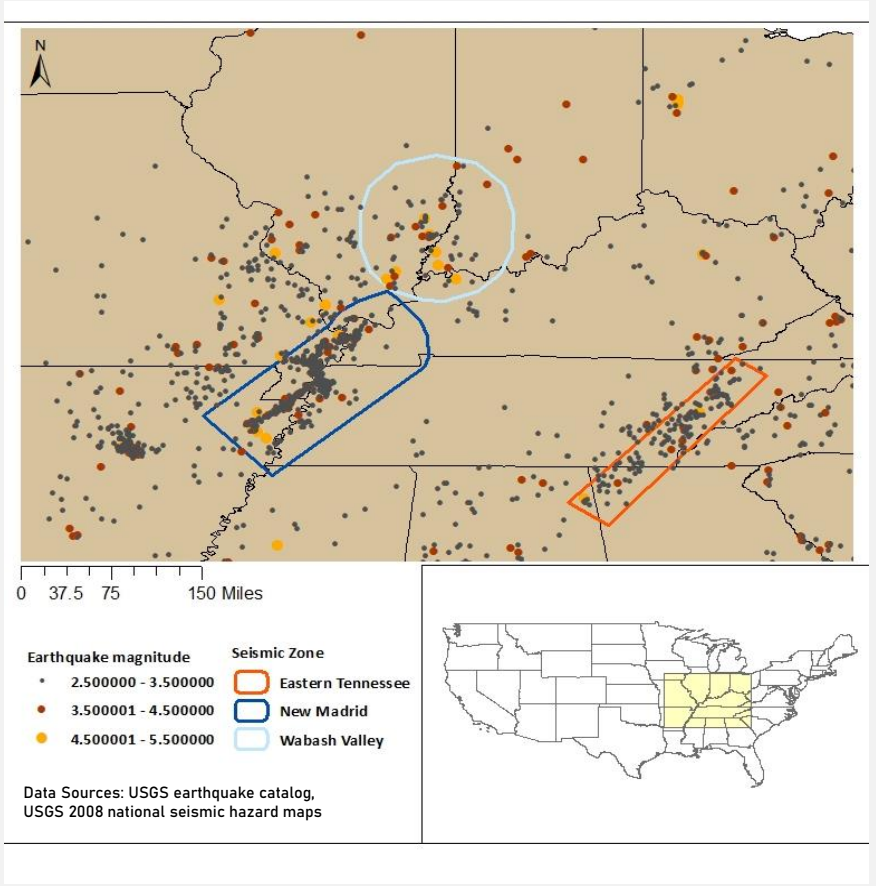


Data source: IL state geological survey

Historic Earthquakes – Jefferson County

Mag 2.7 2/26/1986
Mag 3.0 10/29/1986
Mag 2.8 3/15/1988
Mag 3.2 10/24/1990
Mag 2.9 9/5/1995

- 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



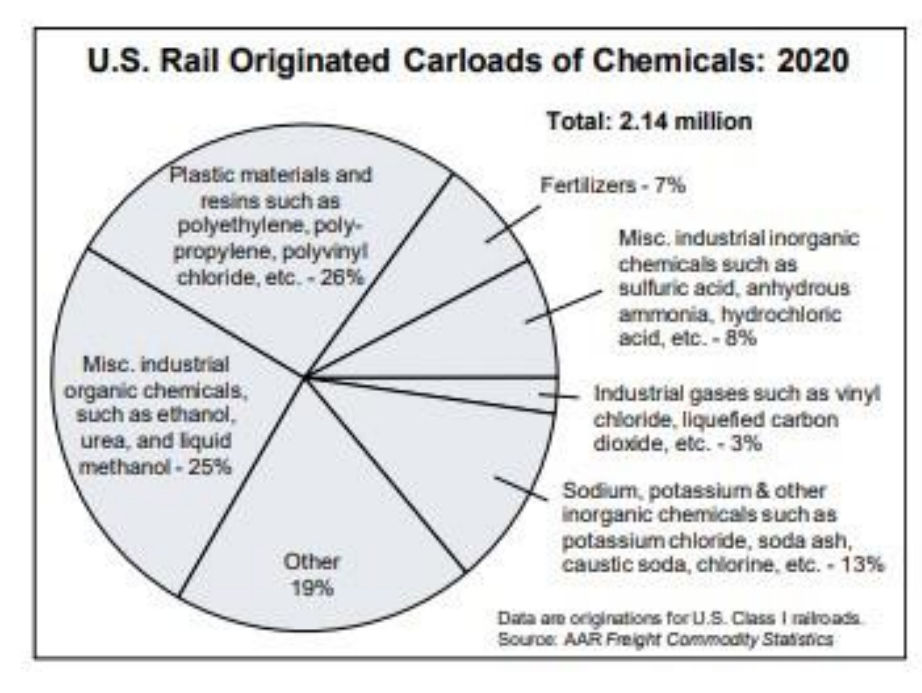
Historic Earthquakes – New Madrid

- 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: MOUNT VERNON, ILLINOIS
  Building Air Exchanges Per Hour: 0.62 (unsheltered single storied)
  Time: October 4, 2021  1024 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: 172.1° F
  Vapor Pressure at Ambient Temperature: 0.060 atm
  Ambient Saturation Concentration: 61,317 ppm or 6.13%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 7 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: 51.9 feet
  Tank Volume: 30,500 gallons
  Tank contains liquid
  Internal Storage Temperature: 69° F
  Chemical Mass in Tank: 190,000 pounds
  Tank is 95% 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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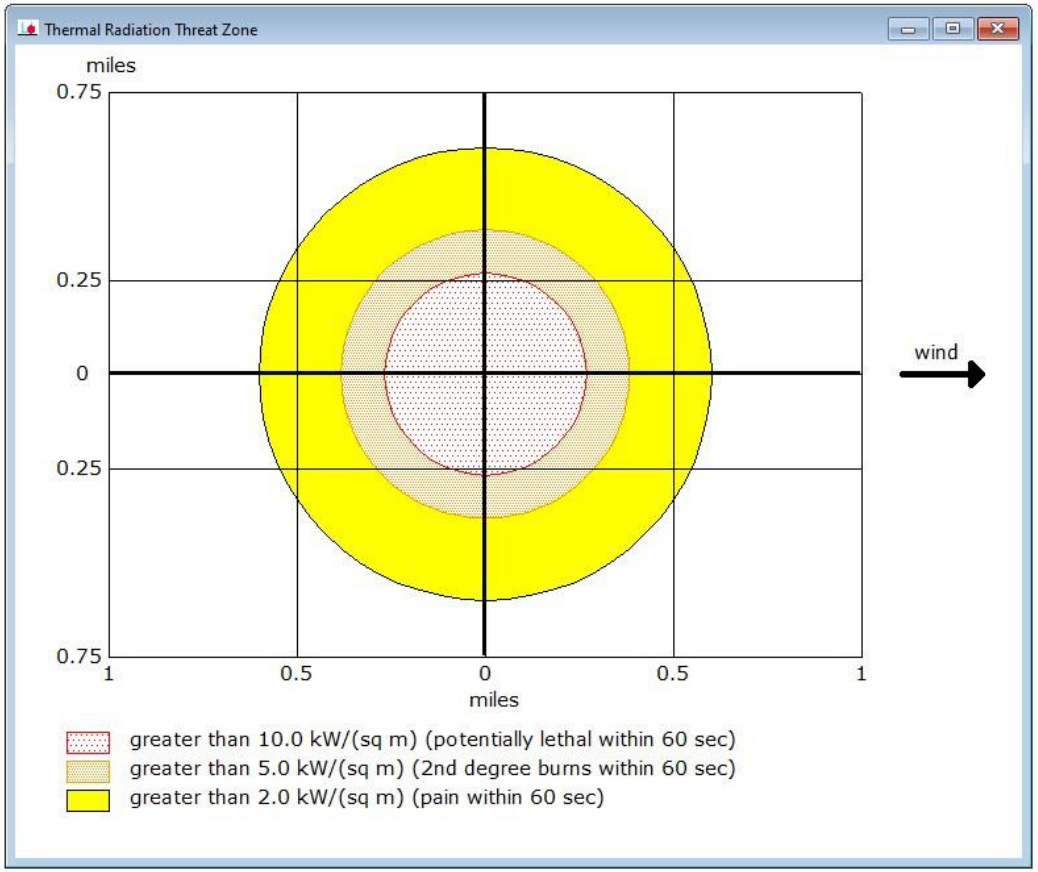

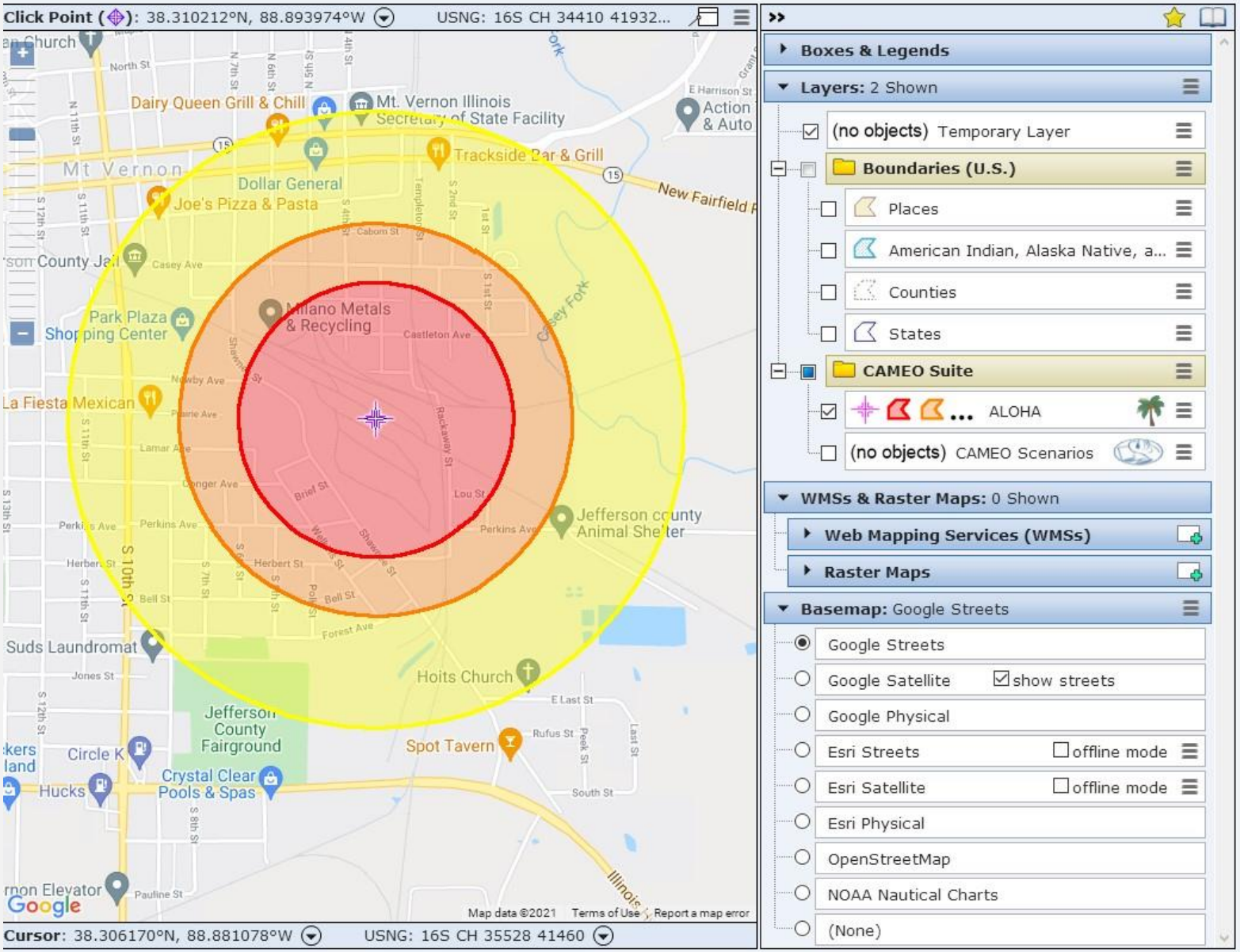
Click Point (): 38.310212°N, 88.893974°W
USNG: 16S CH 34410 41932...
Dairy Queen Grill & Chill
Mt. Vernon Illinois Secretary of State Facility
Trackside Bar & Grill
Mt Vernon
Dollar General
Joe's Pizza & Pasta
New Fairfield
County Jail
Park Plaza Shopping Center
Milano Metals & Recycling
Castleton Ave
Casey Fork
La Fiesta Mexican
Jefferson County Animal Shelter
Suds Laundromat
Hoits Church
Jefferson County Fairground
Spot Tavern
Circle K
Crystal Clear Pools & Spas
Hucks
Google
Map data ©2021
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Report a map error
Cursor: 38.306170°N, 88.881078°W
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Boxes & Legends
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(no objects) Temporary Layer
Boundaries (U.S.)
Places
American Indian, Alaska Native, a...
Counties
States
CAMEO Suite
ALOHA
(no objects) CAMEO Scenarios
WMSs & Raster Maps: 0 Shown
Web Mapping Services (WMSs)
Raster Maps
Basemap: Google Streets
Google Streets
Google Satellite
show streets
Google Physical
Esri Streets
offline mode
Esri Satellite
offline mode
Esri Physical
OpenStreetMap
NOAA Nautical Charts
(None)

Example 2 – aqueous ammonia spill

Text Summary

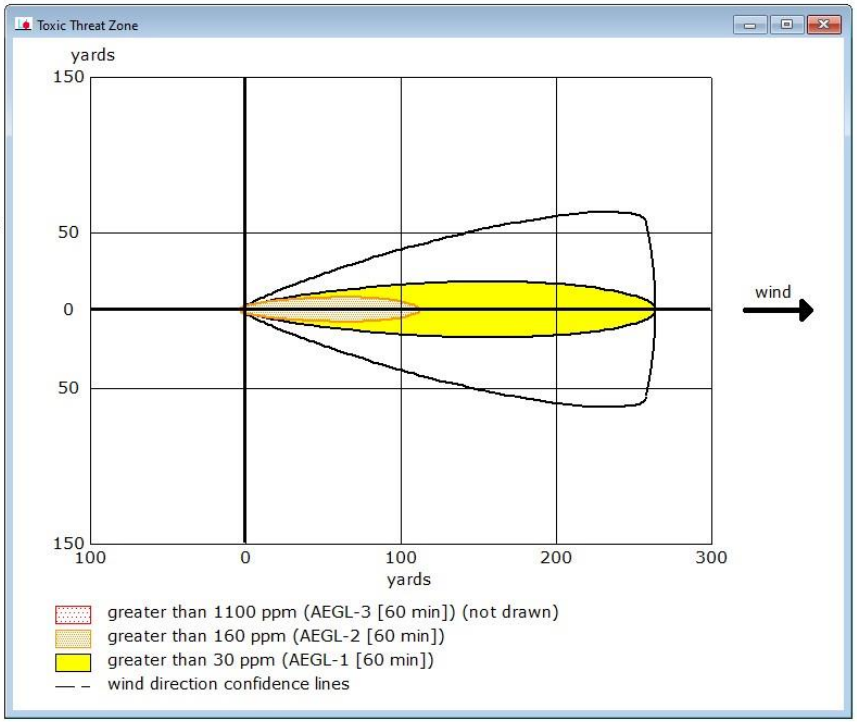
```
SITE DATA:
  Location: MOUNT VERNON, ILLINOIS
  Building Air Exchanges Per Hour: 0.62 (unsheltered single storied)
  Time: October 4, 2021  1317 hours CDT (using computer's clock)

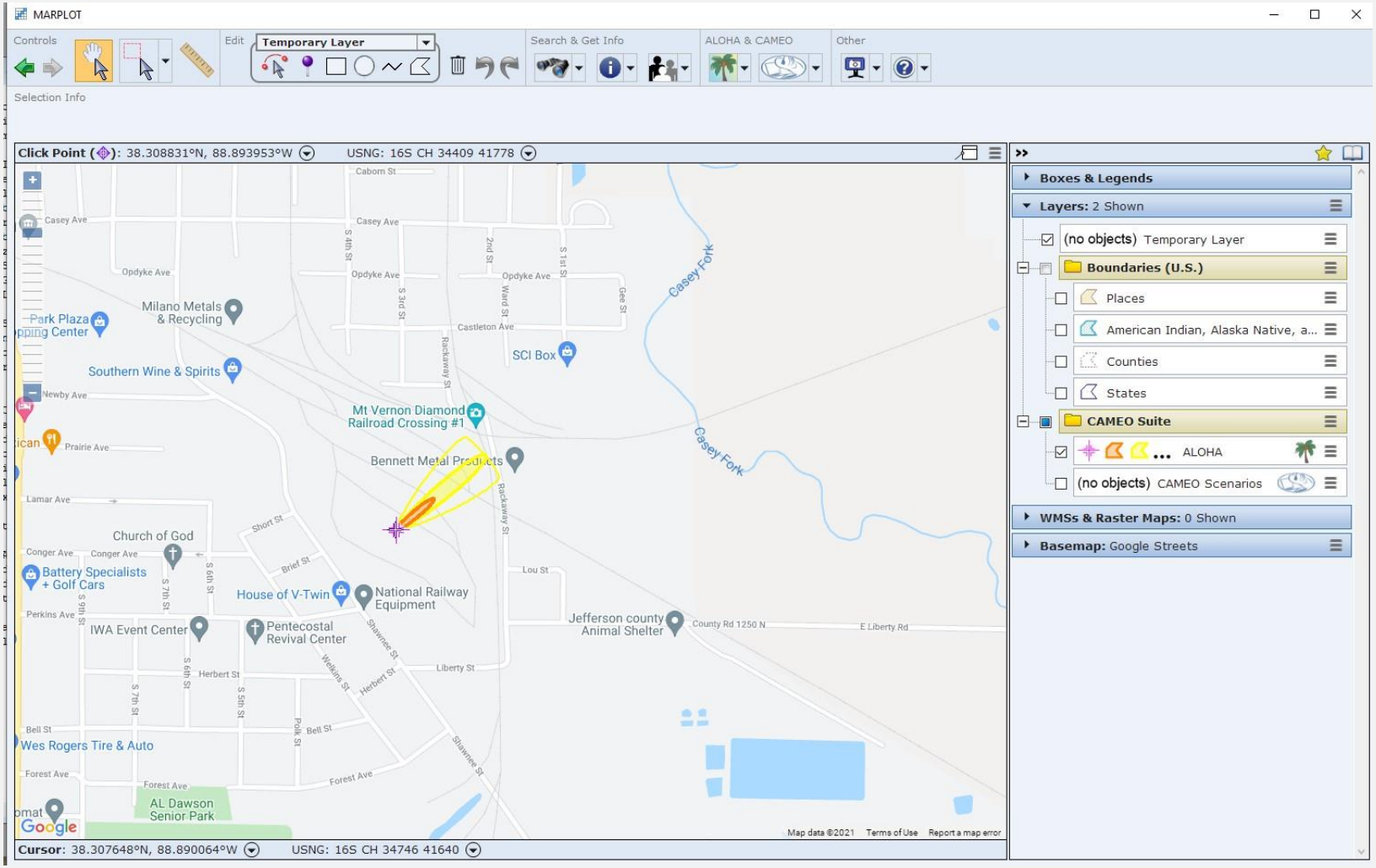
CHEMICAL DATA:
  Chemical Name: AQUEOUS AMMONIA
  Solution Strength: 28% (by weight)
  Ambient Boiling Point: 85.0° F
  Partial Pressure at Ambient Temperature: 0.66 atm
  Ambient Saturation Concentration: 676,111 ppm or 67.6%
  Hazardous Component: AMMONIA
  CAS Number: 7664-41-7                 Molecular Weight: 17.03 g/mol
  AEGL-1 (60 min): 30 ppm   AEGL-2 (60 min): 160 ppm   AEGL-3 (60 min): 1100 ppm
  IDLH: 300 ppm      LEL: 150000 ppm     UEL: 280000 ppm

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 7 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: 17.3 pounds/min
     (averaged over a minute or more)
  Total Amount Hazardous Component Released: 220 pounds

THREAT ZONE:
  Model Run: Gaussian
  Red    : 40 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.
  Orange: 112 yards --- (160 ppm = AEGL-2 [60 min])
  Yellow: 265 yards --- (30 ppm = AEGL-1 [60 min])
```




MARPLOT
Controls
Edit
Temporary Layer
Search & Get Info
ALOHA & CAMEO
Other
Selection Info
Click Point (): 38.308831°N, 88.893953°W
USNG: 16S CH 34409 41778
Boxes & Legends
Layers: 2 Shown
(no objects) Temporary Layer
Boundaries (U.S.)
Places
American Indian, Alaska Native, a...
Counties
States
CAMEO Suite
ALOHA
(no objects) CAMEO Scenarios
WMSs & Raster Maps: 0 Shown
Basemap: Google Streets
Milano Metals & Recycling
Park Plaza
Southern Wine & Spirits
SCI Box
Mt Vernon Diamond Railroad Crossing #1
Bennett Metal Products
Church of God
Battery Specialists + Golf Cars
House of V-Twin
National Railway Equipment
IWA Event Center
Pentecostal Revival Center
Jefferson county Animal Shelter
Wes Rogers Tire & Auto
AL Dawson Senior Park
Casey Fork
Rockaway St
Shawnee St
Liberty St
Herbert St
Forest Ave
Opdyke Ave
Castleton Ave
Lamar Ave
Prairie Ave
Newby Ave
Perkins Ave
Bell St
Lou St
County Rd 1250 N
E Liberty Rd
Google
Map data ©2021
Terms of Use
Report a map error
Cursor: 38.307648°N, 88.890064°W
USNG: 16S CH 34746 41640

Hazardous Materials Release – Historic Data

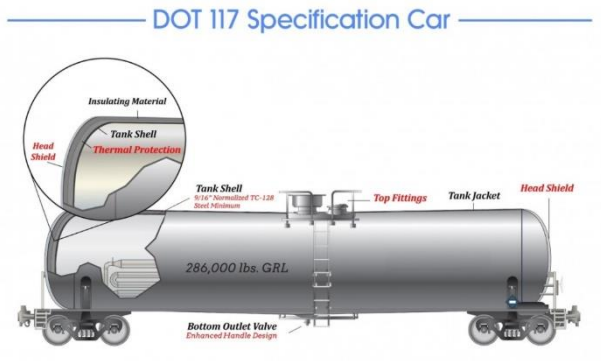
- 1 hazardous train derailment in Jefferson County
  - Dec 2012: ~6,000 gallons of ethanol spilled from a tank car
  - Railway safety has greatly improved over the last decade

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

- 346 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

Sickler, The Southern Illinoisian 8.14.1994; data.Illinois.gov

Floods

- Currently ranked 6th for Jefferson county
- Can model upon request by county or census block
- Hazus software cannot model dam failures

5 minute break

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

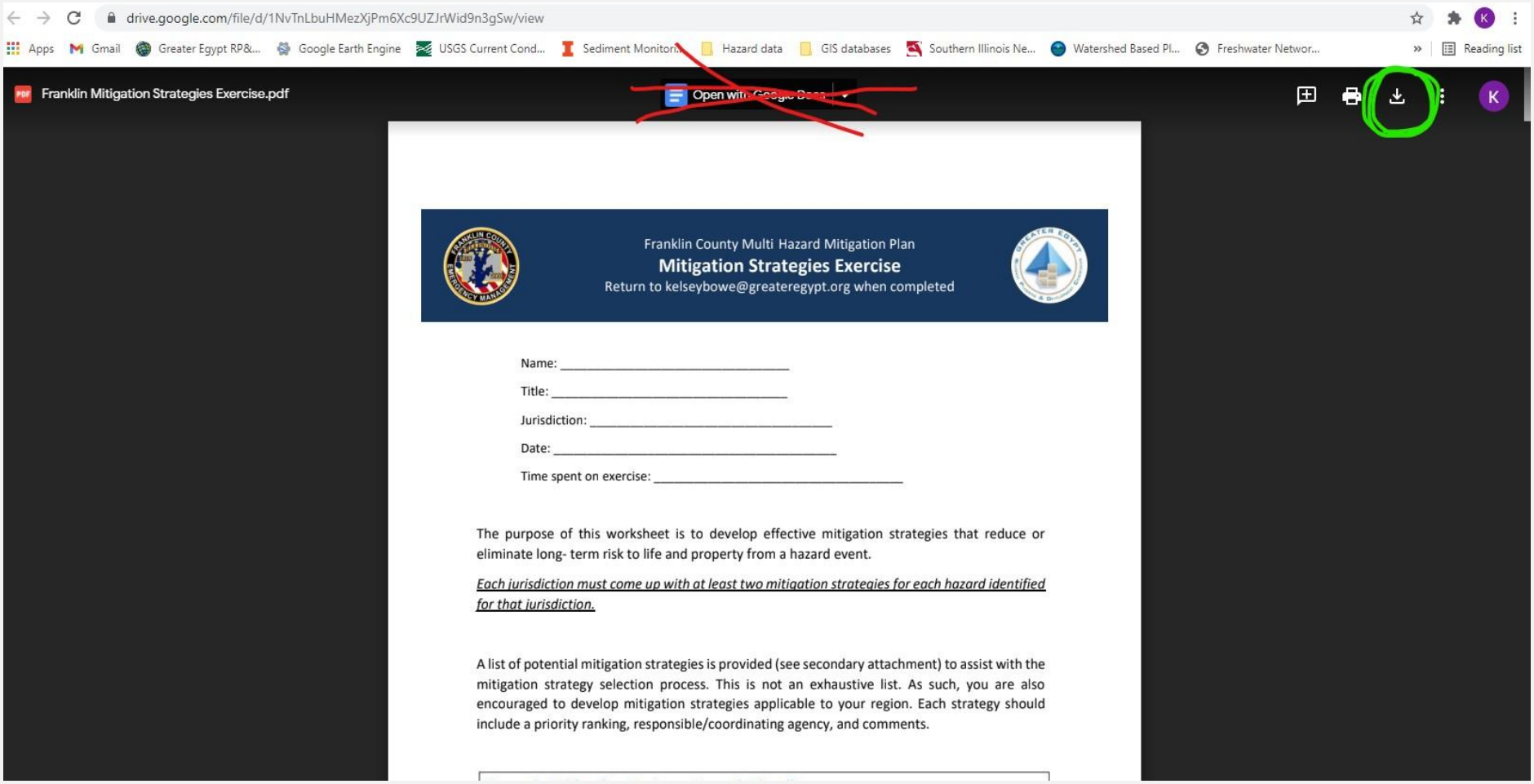
This does not mean you are required to implement them

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 Jefferson 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