US Department of Homeland Security
Federal Emergency Management Agency (DHS/FEMA)

New York Region
Improvised Nuclear Devices (IND) Response Planning

NJVOAD Conference

April 5, 2017

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Today's Briefing

- What is an IND?
- What is FEMA's role?
- What happens when an IND goes off?
- What can you do?
- How can you prepare?

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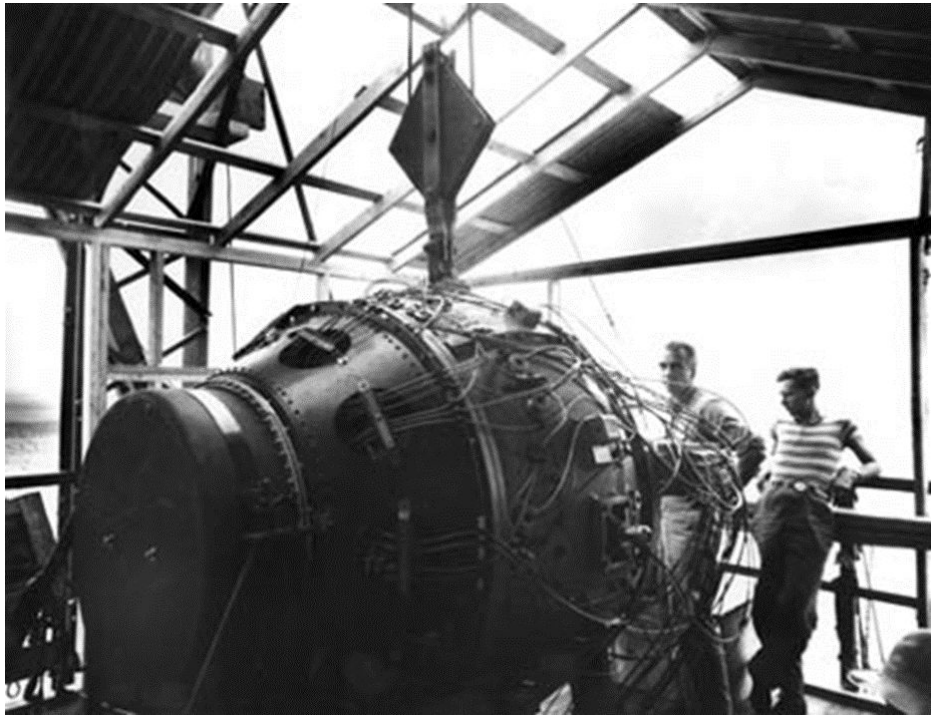
What is an IND?

- Improvised; illegally obtained special nuclear material and assembled in makeshift fashion
- Uses special nuclear material: Uranium-235 or Plutonium-239
- Potential yield of an IND from 1 to 10 KT of TNT



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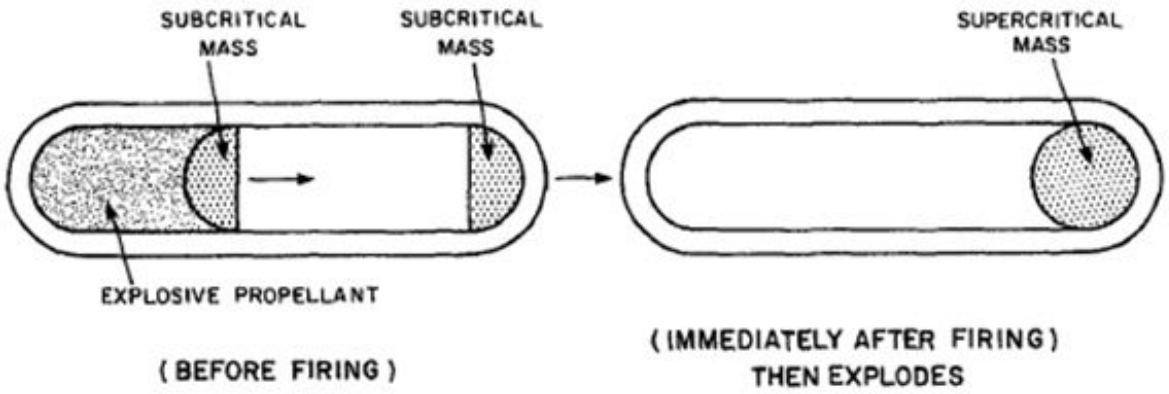
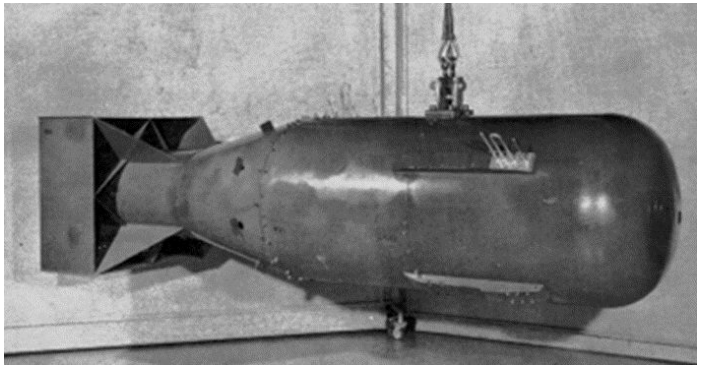
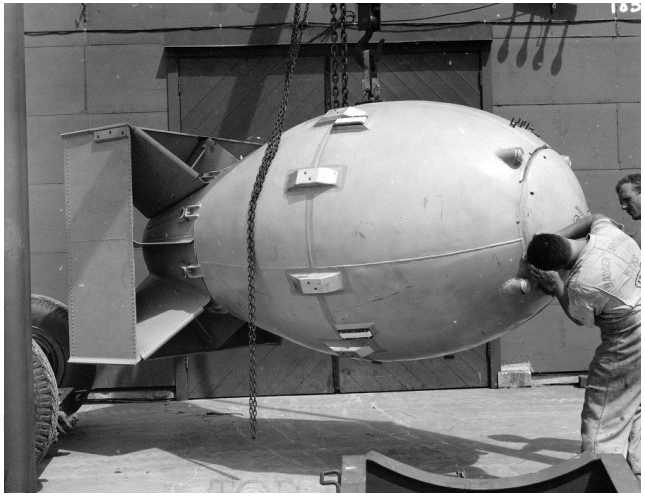
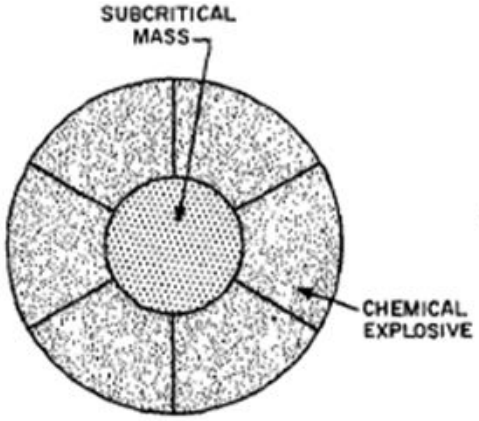
What is an IND?

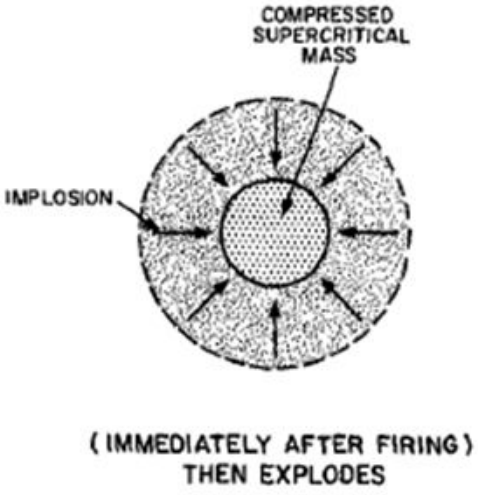
- Gun-Type vs. Implosion Detonation



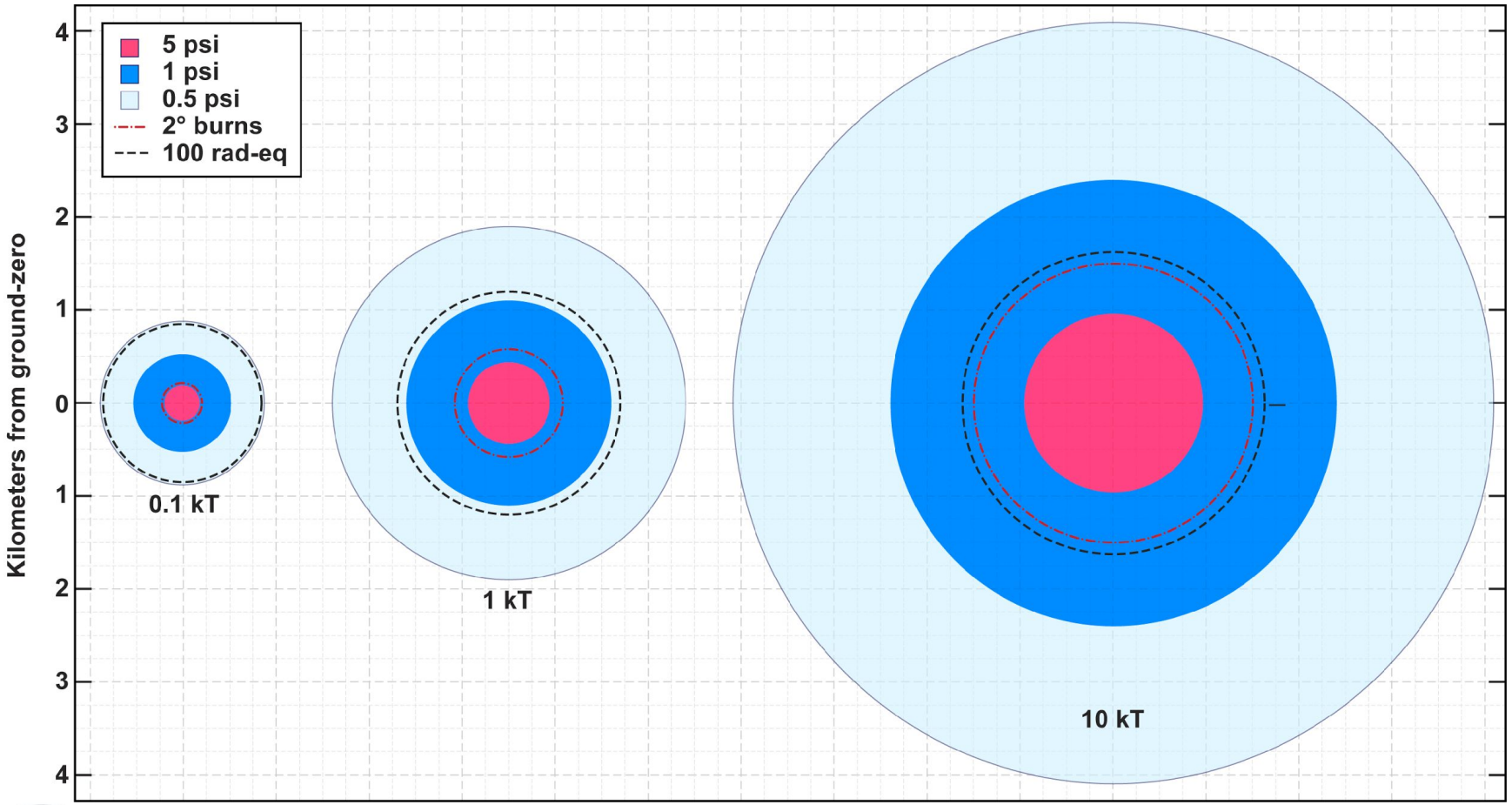








What is an IND?



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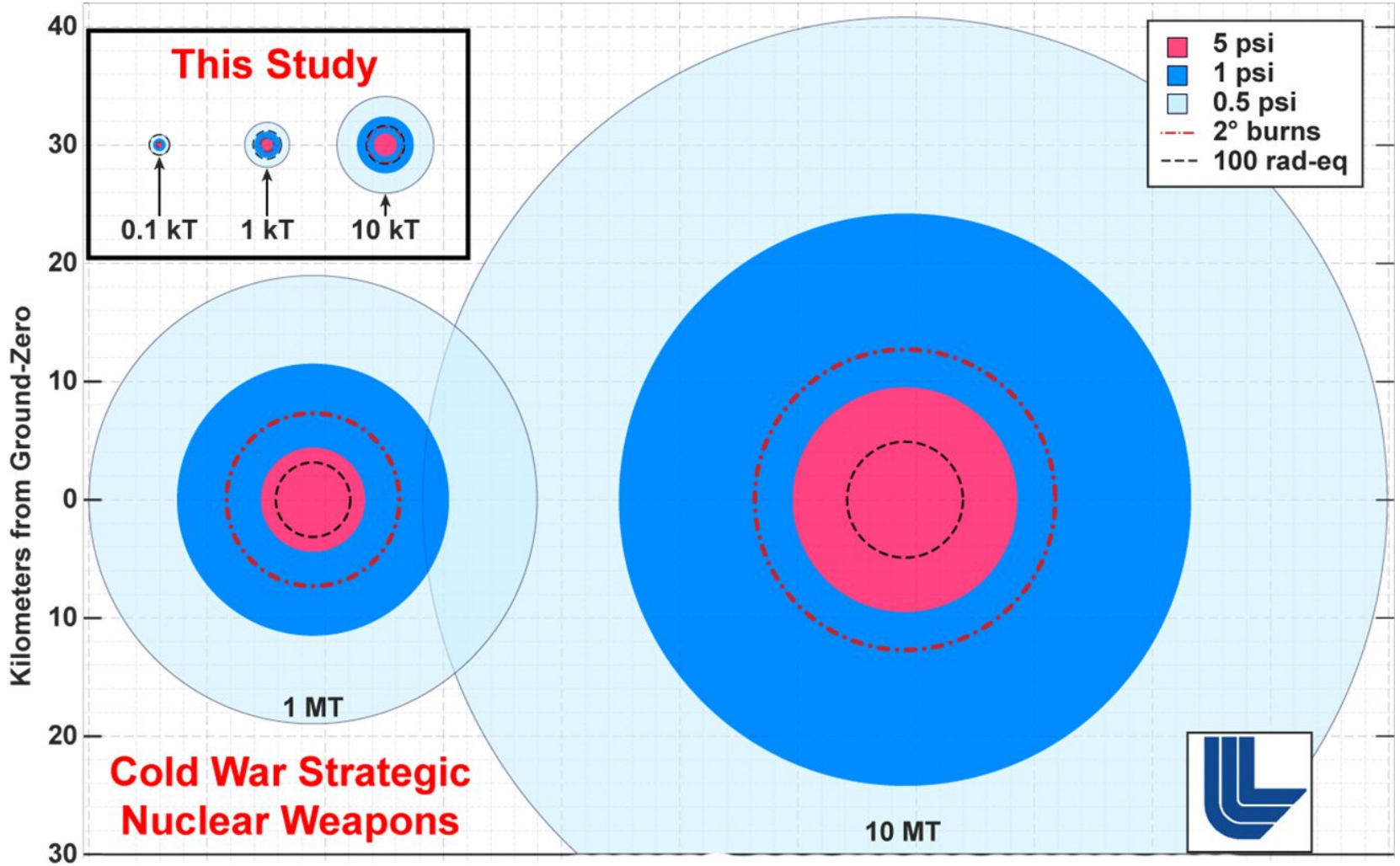
Not an IND anymore….



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What is FEMA's Role?

- Prepares state and local responders to address many scenarios including nuclear detonation
- Coordinates federal interagency consequence management; FBI has the primary responsibility for crisis management
- Provides direct federal assistance to State and local governments via Presidentially-declared emergency or major disaster
- Understand the prompt and cascading effects of an IND on potential target population centers in the United States.

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What Happens When An IND Goes Off?

- Prompt Effects

Flash Blindness (Flash of Light)

A brilliant flash of light, which can cause temporary blindness and last from several seconds to a few minutes.

Blast Effects (Overpressure / Shockwave)

Observable damage from the IND detonation across the SDZ, the MDZ, and the LDZ. Each Zone will have a different degree of destruction.

Heat (Thermal Pulse)

An intense heat produced by the detonation, which can start fires.

Prompt Radiation

Fatal levels of penetrating radiation.

Source Region Electromagnetic Pulse (SREMP)

Widespread damage and destruction to electrical infrastructure from ionizing radiation.

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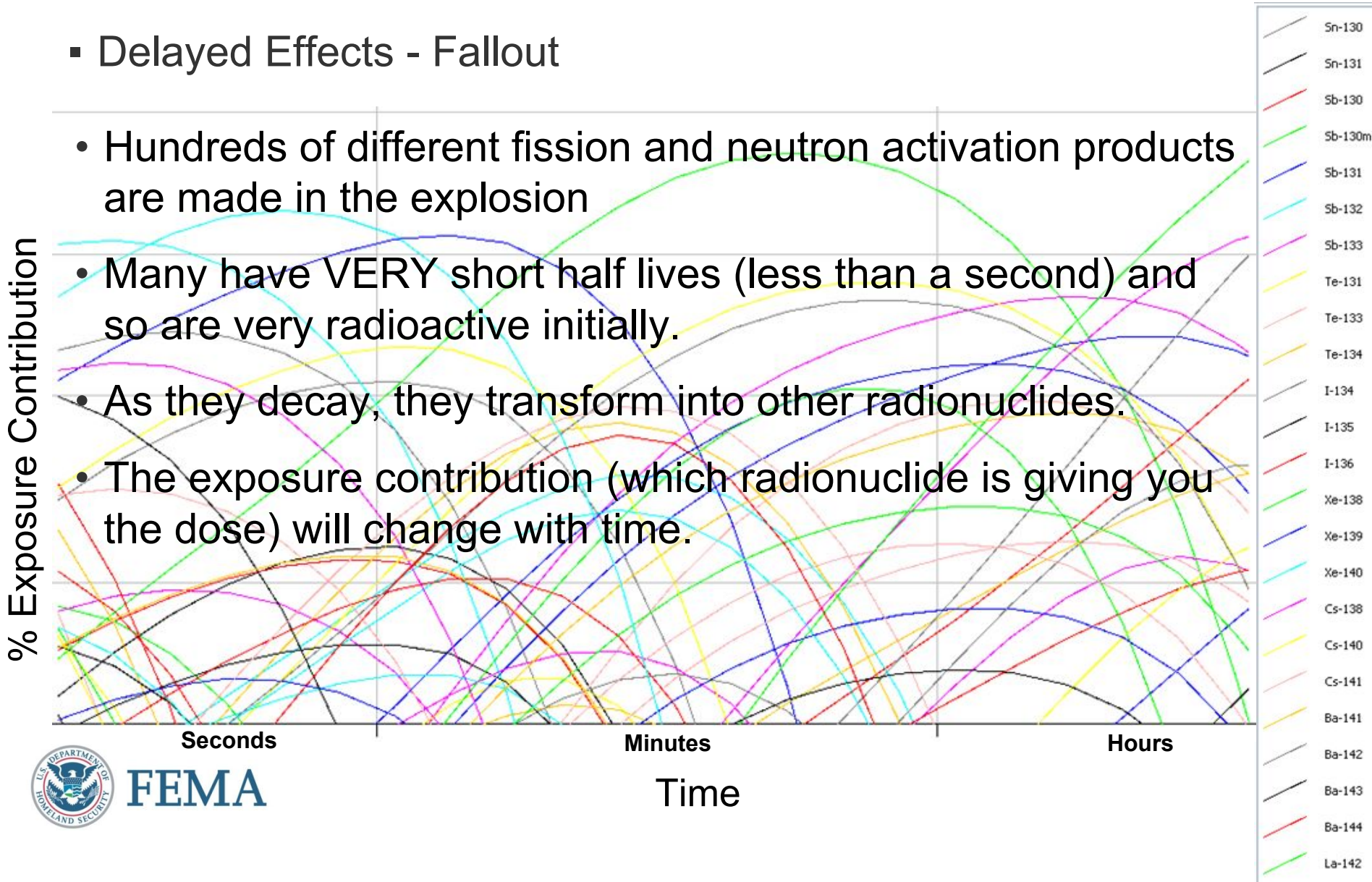
What Happens When An IND Goes Off?

- Delayed Effects - Fallout

- Hundreds of different fission and neutron activation products are made in the explosion
- Many have VERY short half lives (less than a second) and so are very radioactive initially.
- As they decay, they transform into other radionuclides.
- The exposure contribution (which radionuclide is giving you the dose) will change with time.



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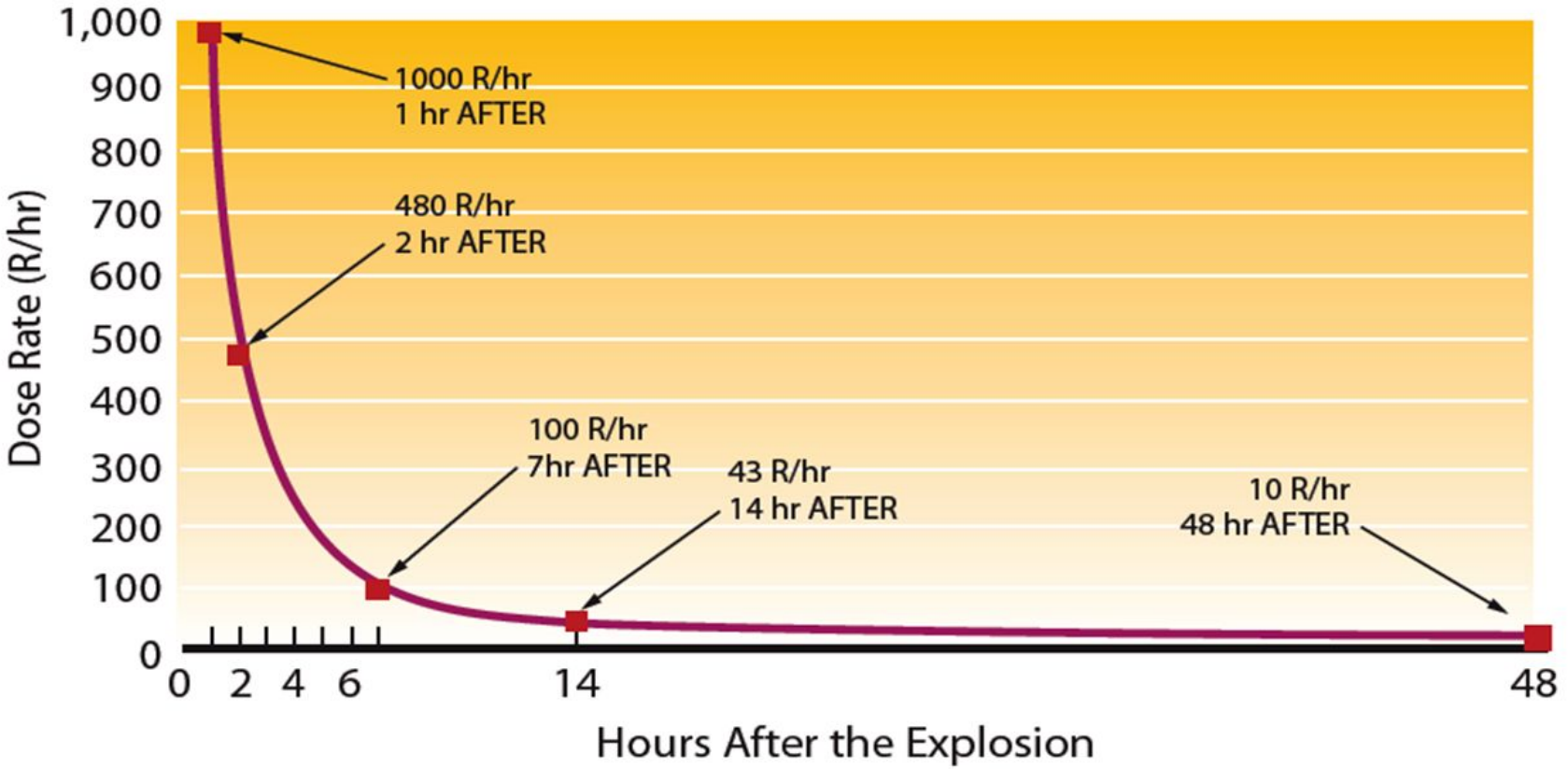
Fallout Radiation Levels with Time



Decay of the dose rate of radiation from fallout, from the time of the explosion, not from the time of fallout deposition.

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What Happens When An IND Goes Off?

- Let's use New York City as an example
  - 10 KT IND
  - Times Square in Manhattan
  - During a business day
  - Using historical weather and census data

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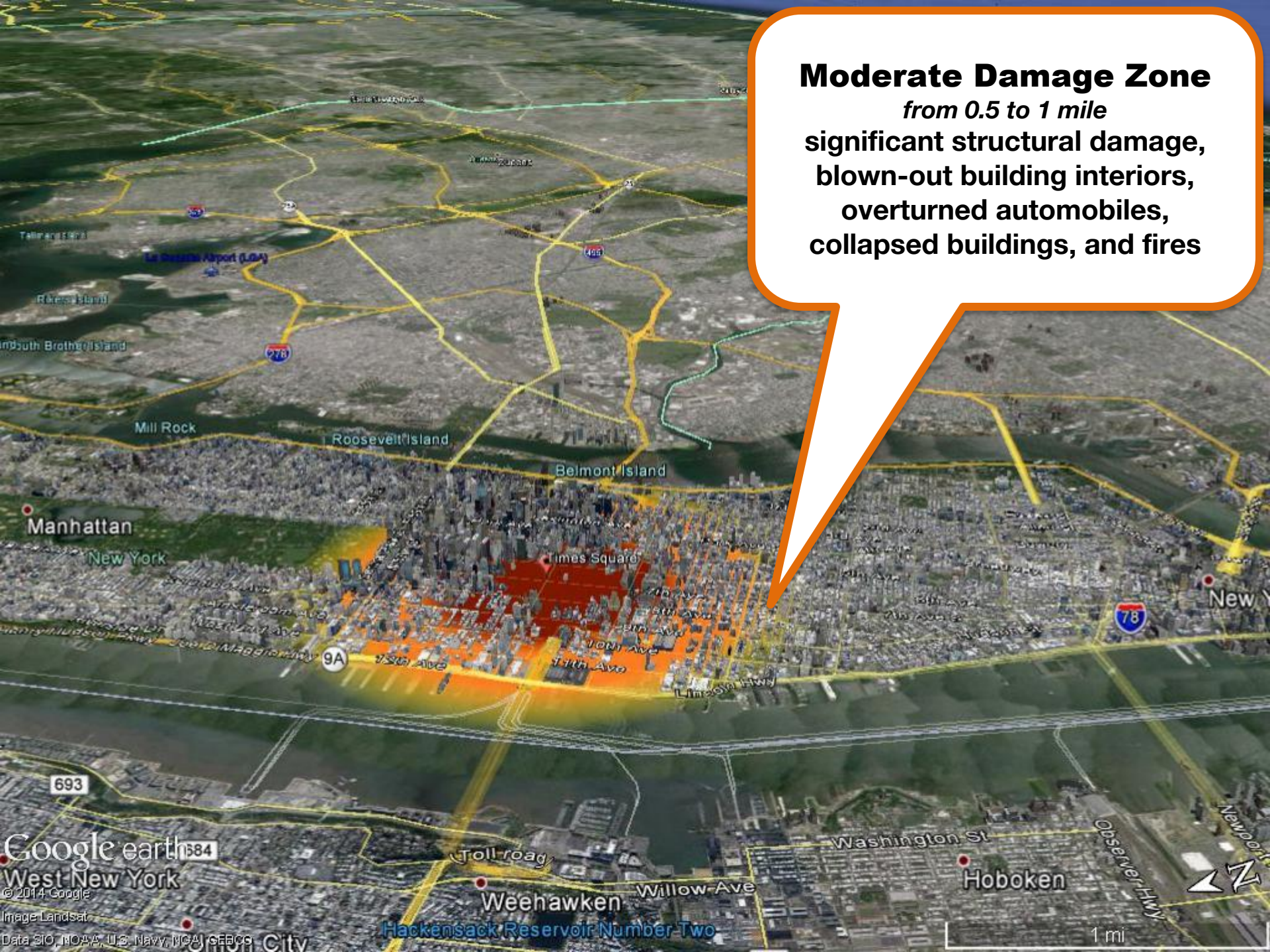
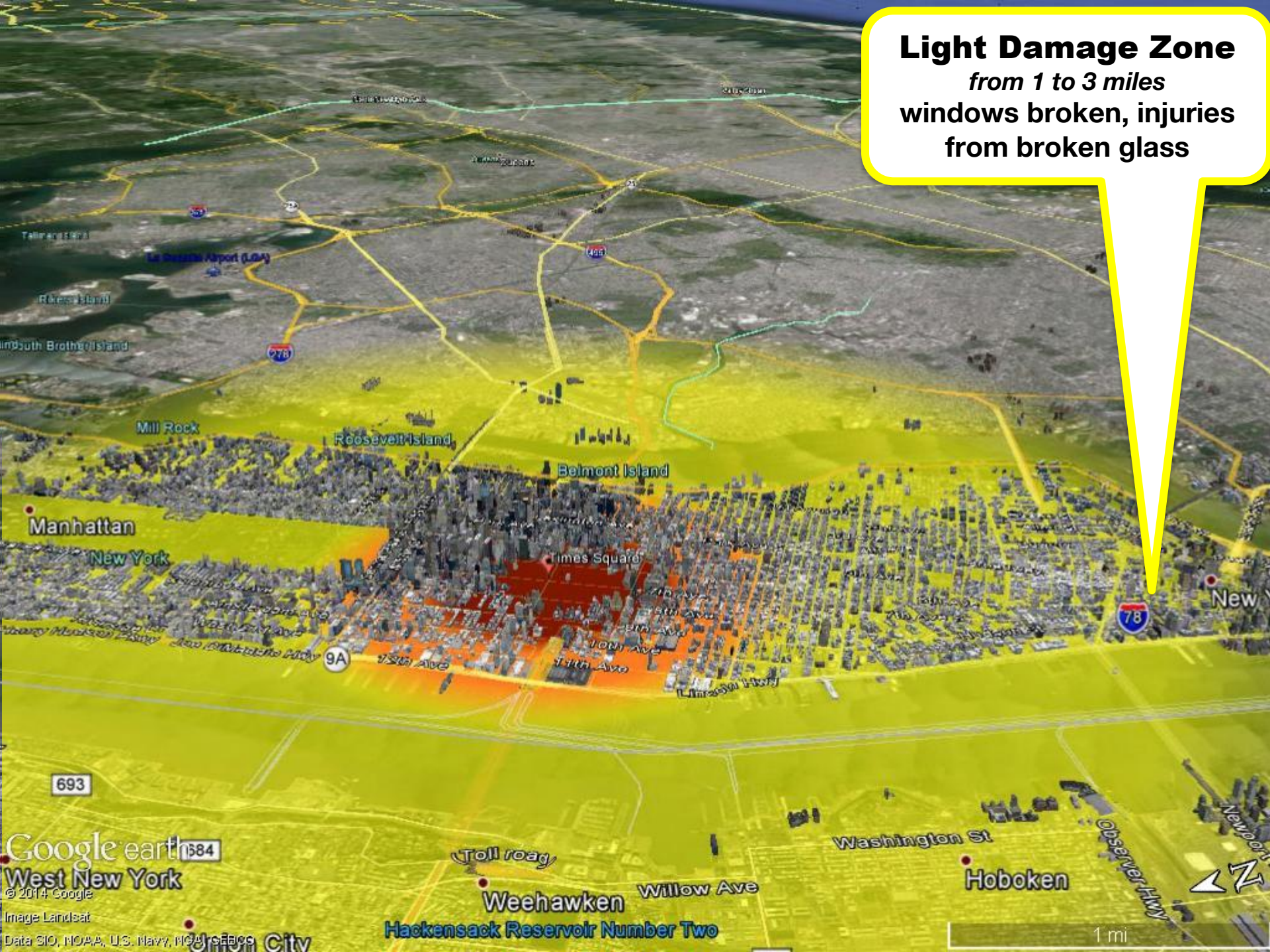
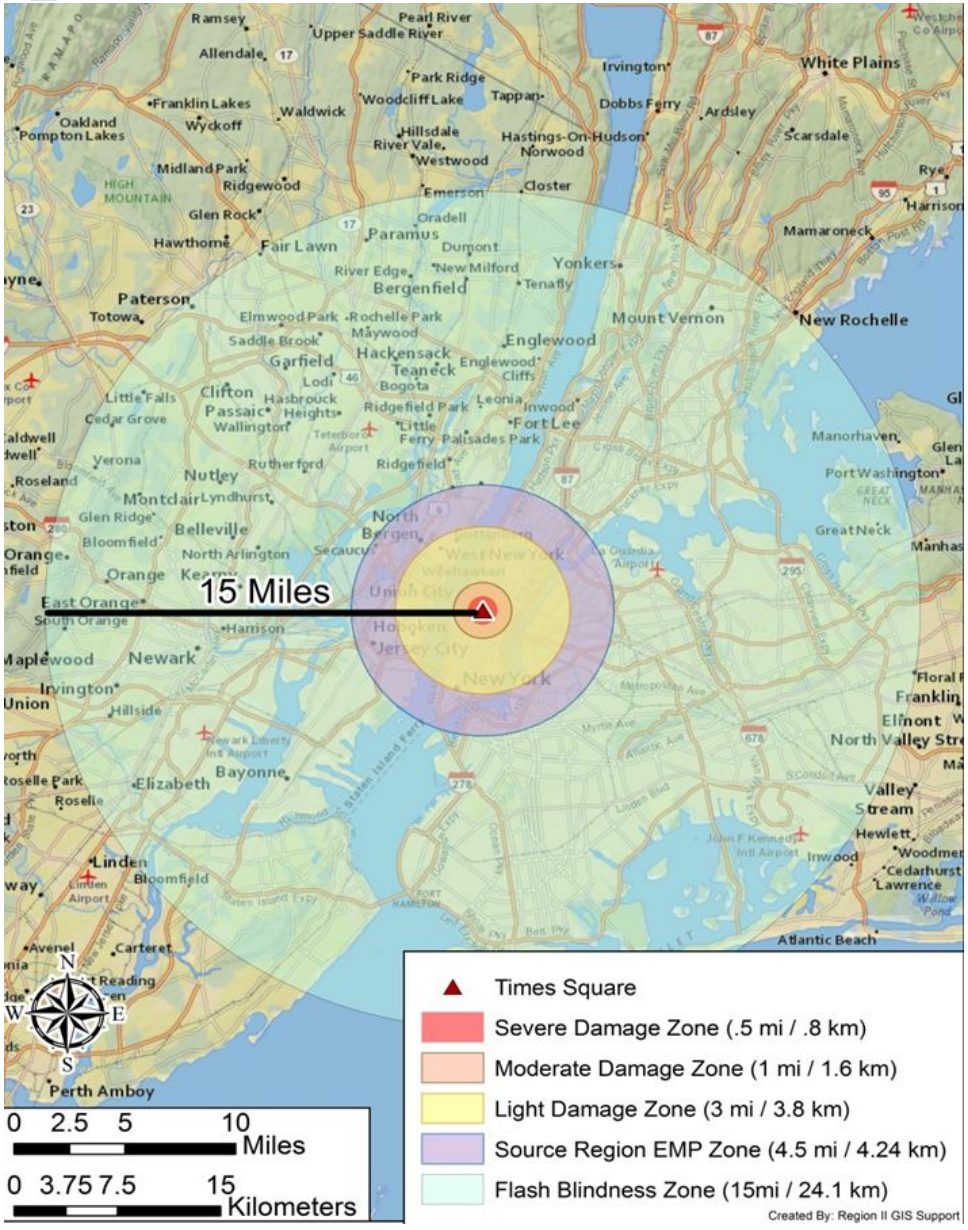

Moderate Damage Zone
from 0.5 to 1 mile
significant structural damage, blown-out building interiors, overturned automobiles, collapsed buildings, and fires
Mill Rock
Roosevelt Island
Belmont Island
Manhattan
New York
Times Square
9A
78
693
Google earth
West New York
Weehawken
Hackensack Reservoir Number Two
Toll road
Willow Ave
Washington St
Hoboken
Observer Hwy
1 mi
© 2014 Google
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO


Light Damage Zone
from 1 to 3 miles
windows broken, injuries from broken glass
Mill Rock
Roosevelt Island
Belmont Island
Manhattan
New York
Times Square
9A
78
693
584
West New York
Toll road
Weehawken
Willow Ave
Hackensack Reservoir Number Two
Washington St
Hoboken
Observer Hwy
Google earth
© 2014 Google
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
1 mi

What Happens When An IND Goes Off?



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What Happens When An IND Goes Off?

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What Happens When An IND Goes Off?

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Casualties Across the Damage Zones

	Severe Damage Zone (SDZ)		Moderate Damage Zone (MDZ)		Light Damage Zone (LDZ)		Total Population Across All Damage Zones
	Ground Zero to 0.5 mile		0.5 to 1 mile		1 to 3 miles		
	Percentage	Population	Percentage	Population	Percentage	Population	
Total Population	100%	588,000	100%	732,000	100%	840,000	2,160,000
Dead	95%	558,600	38%	278,160	0%	0	836,760
Expectant	5%	29,400	14%	102,480	0%	0	131,880
At Risk	0%	0	29%	212,280	6%	50,400	262,680
Recovered	0%	0	14%	102,480	37%	310,800	413,280
Uninjured	0%	0	5%	36,600	57%	478,800	515,400

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Delayed Effects – Fallout

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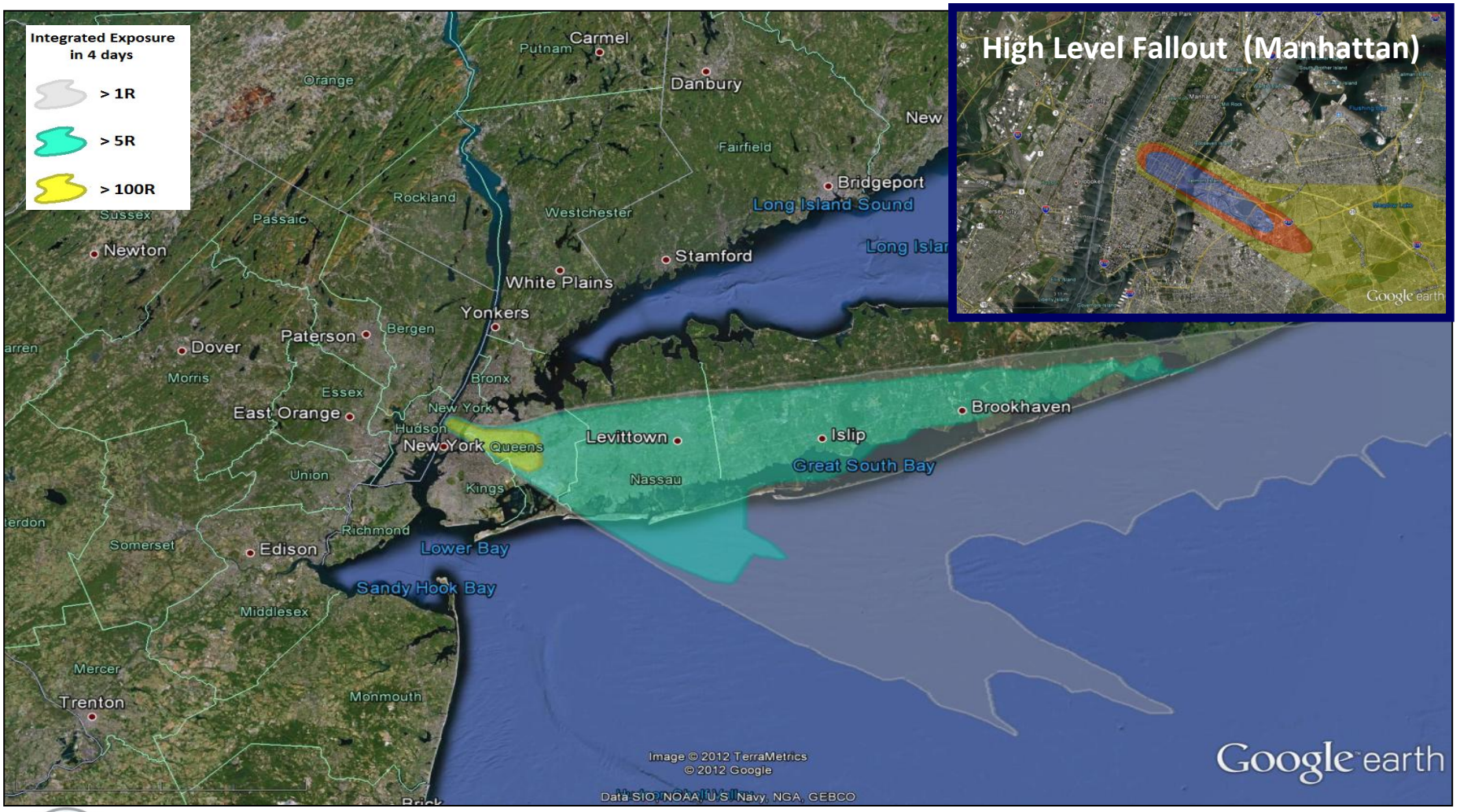
Planning Scenario Weather 01/14/2009



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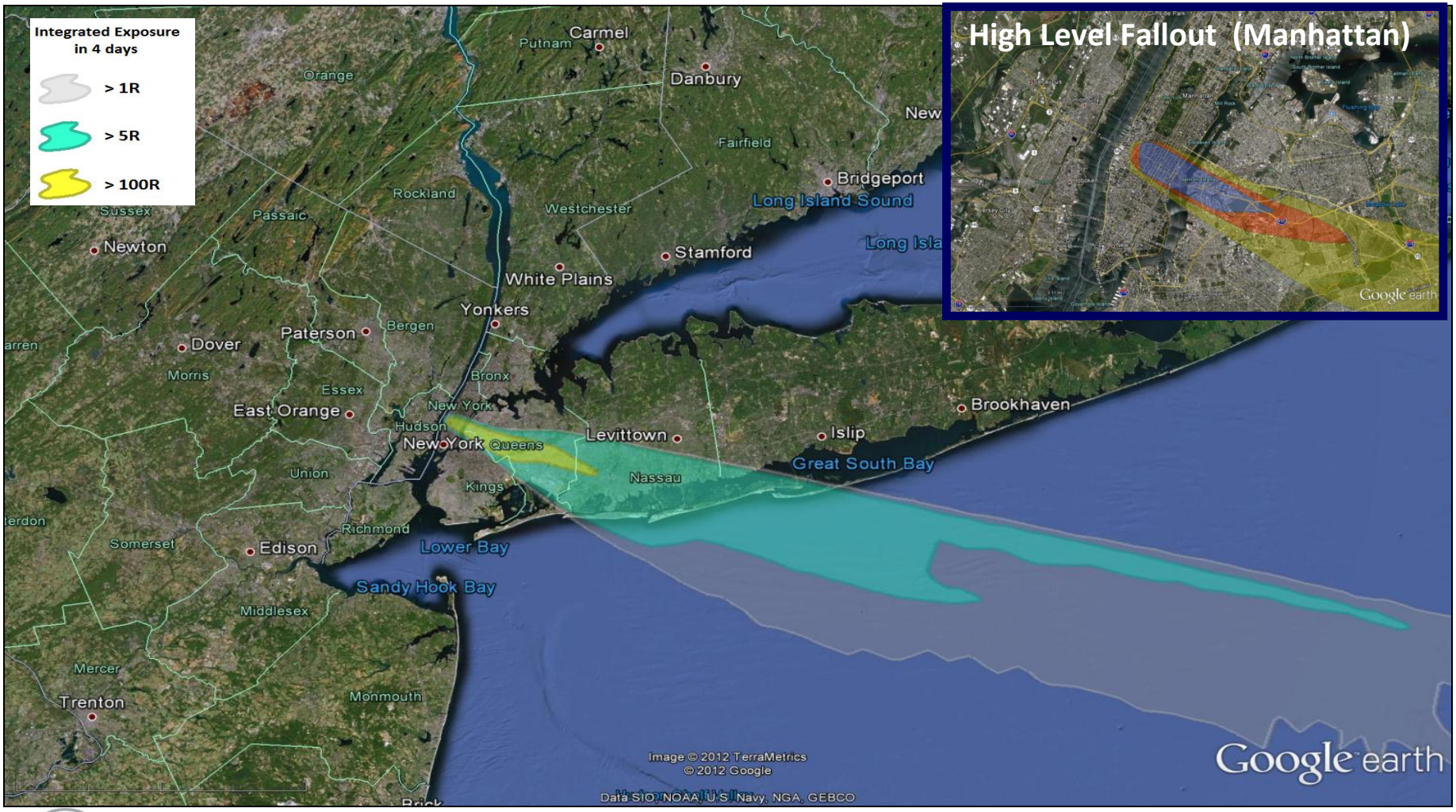
Planning Scenario Weather 02/14/2009



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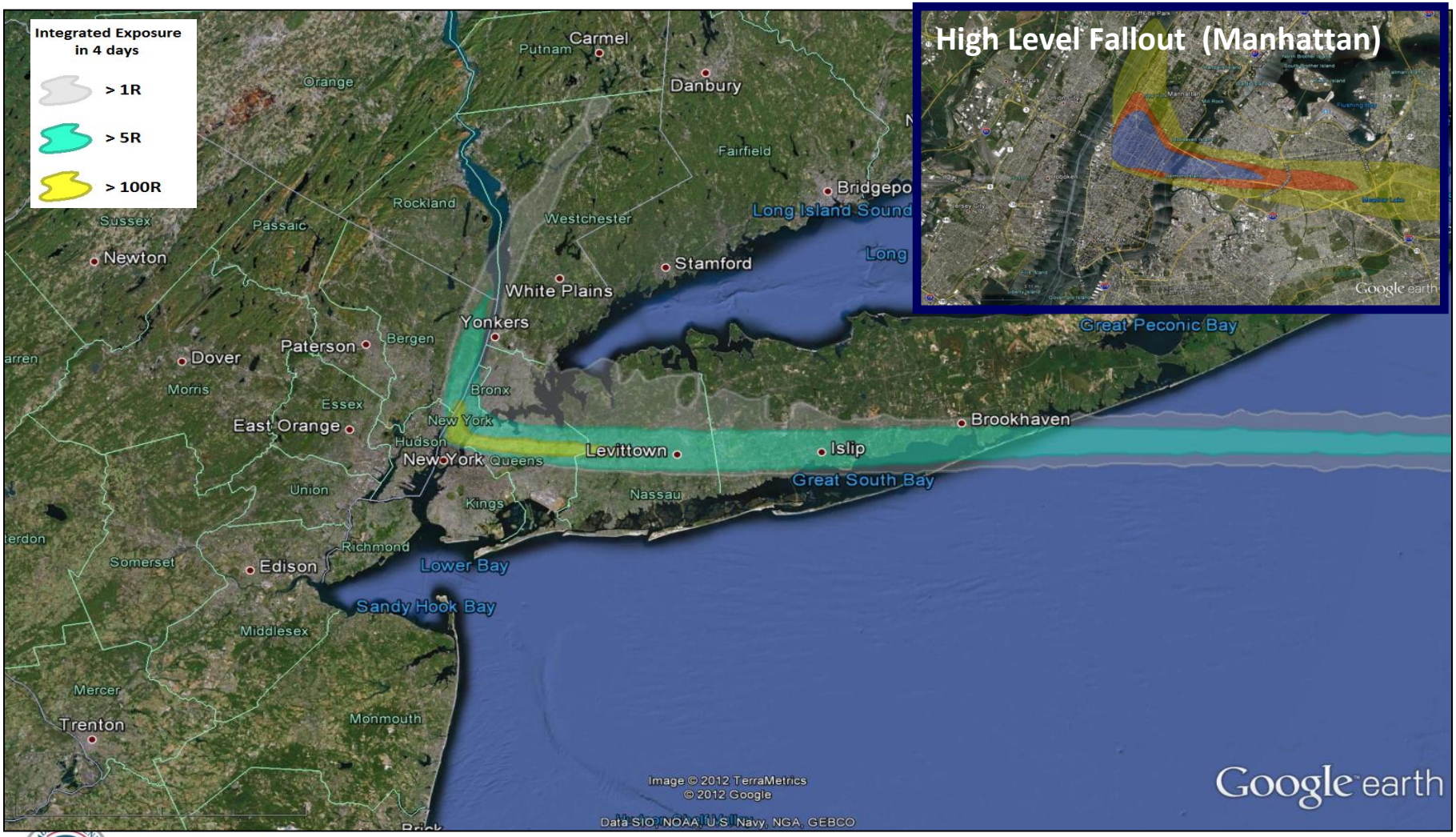
Planning Scenario Weather 03/14/2009



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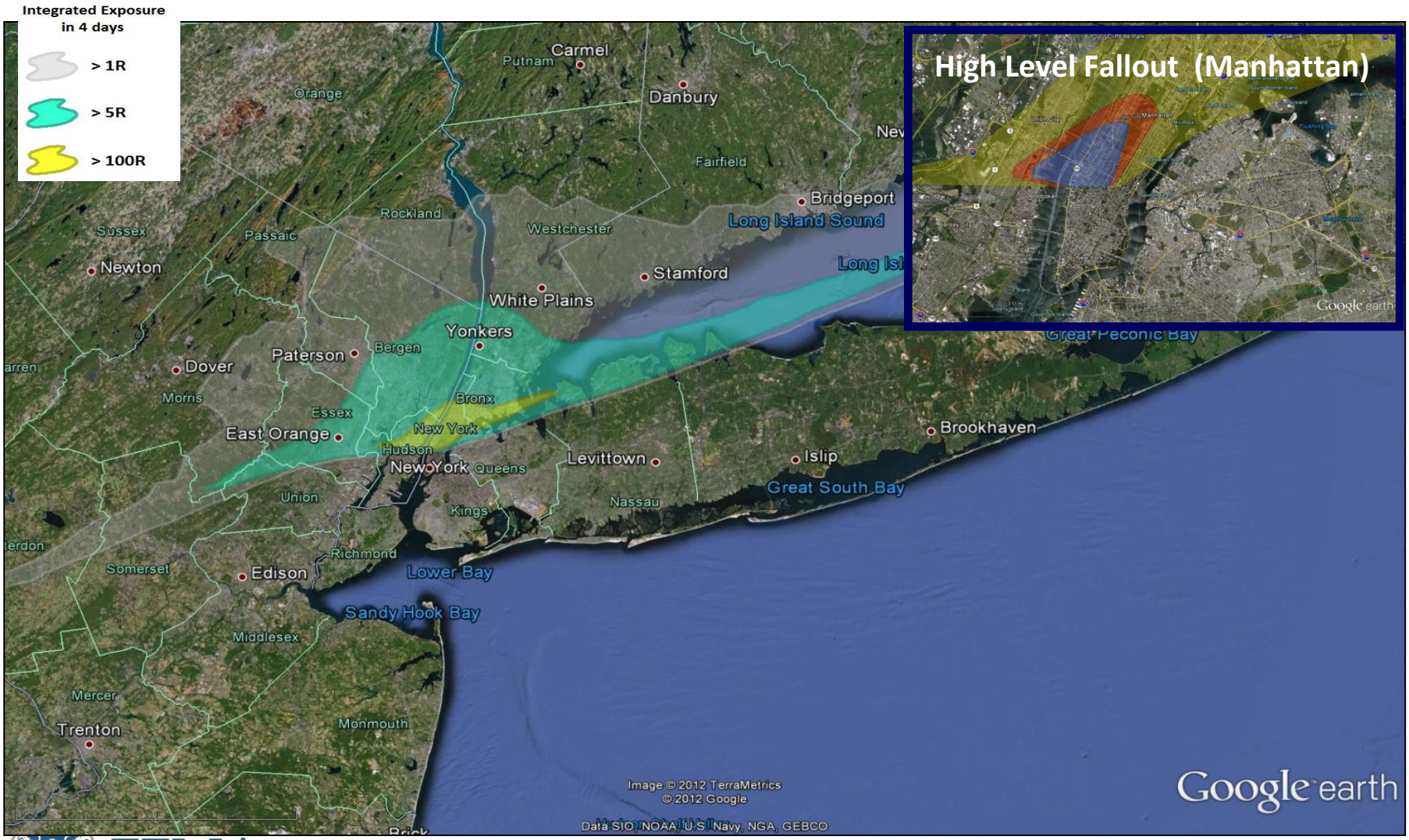
Planning Scenario Weather 04/14/2009



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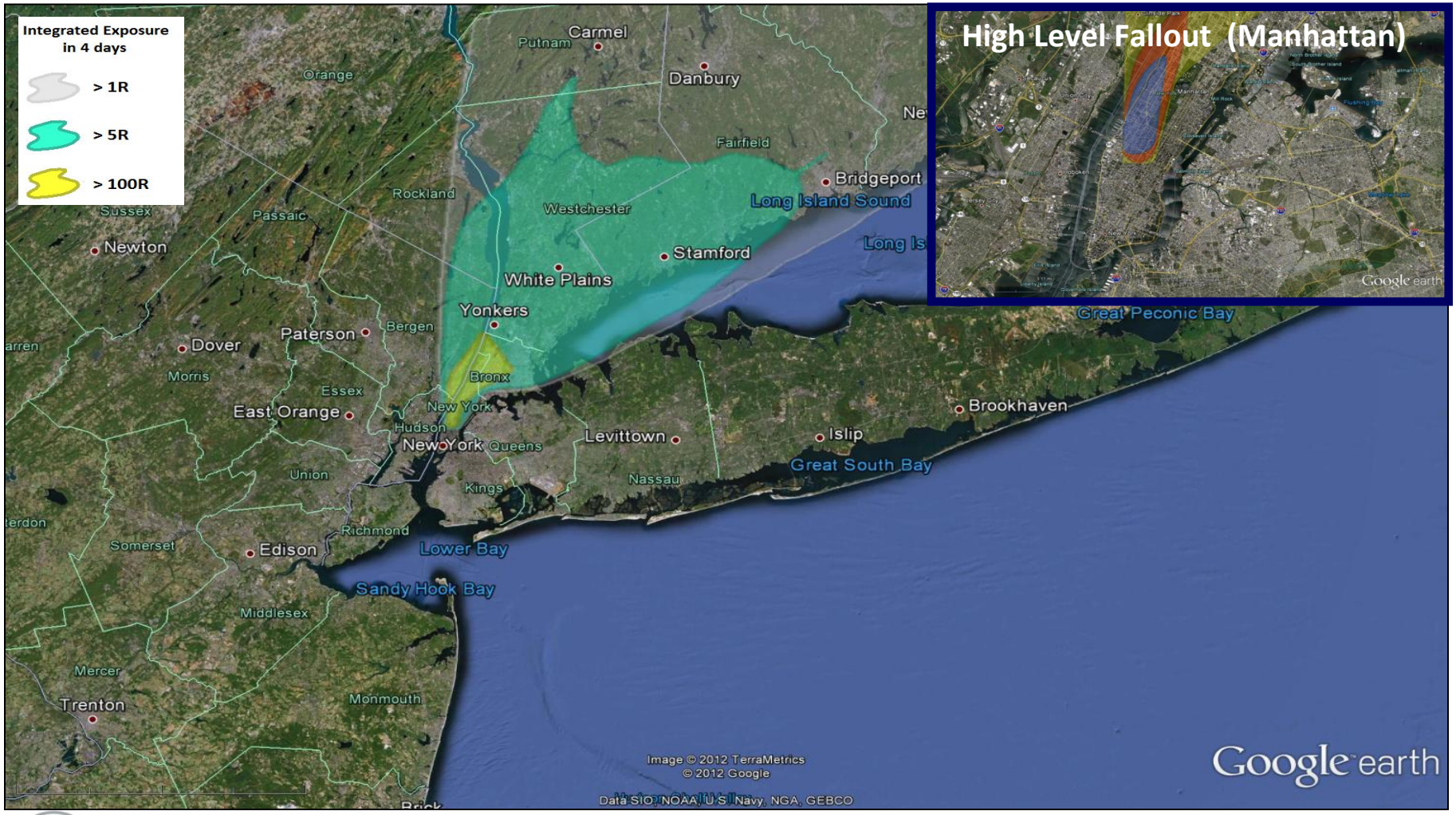
Planning Scenario Weather 05/14/2009



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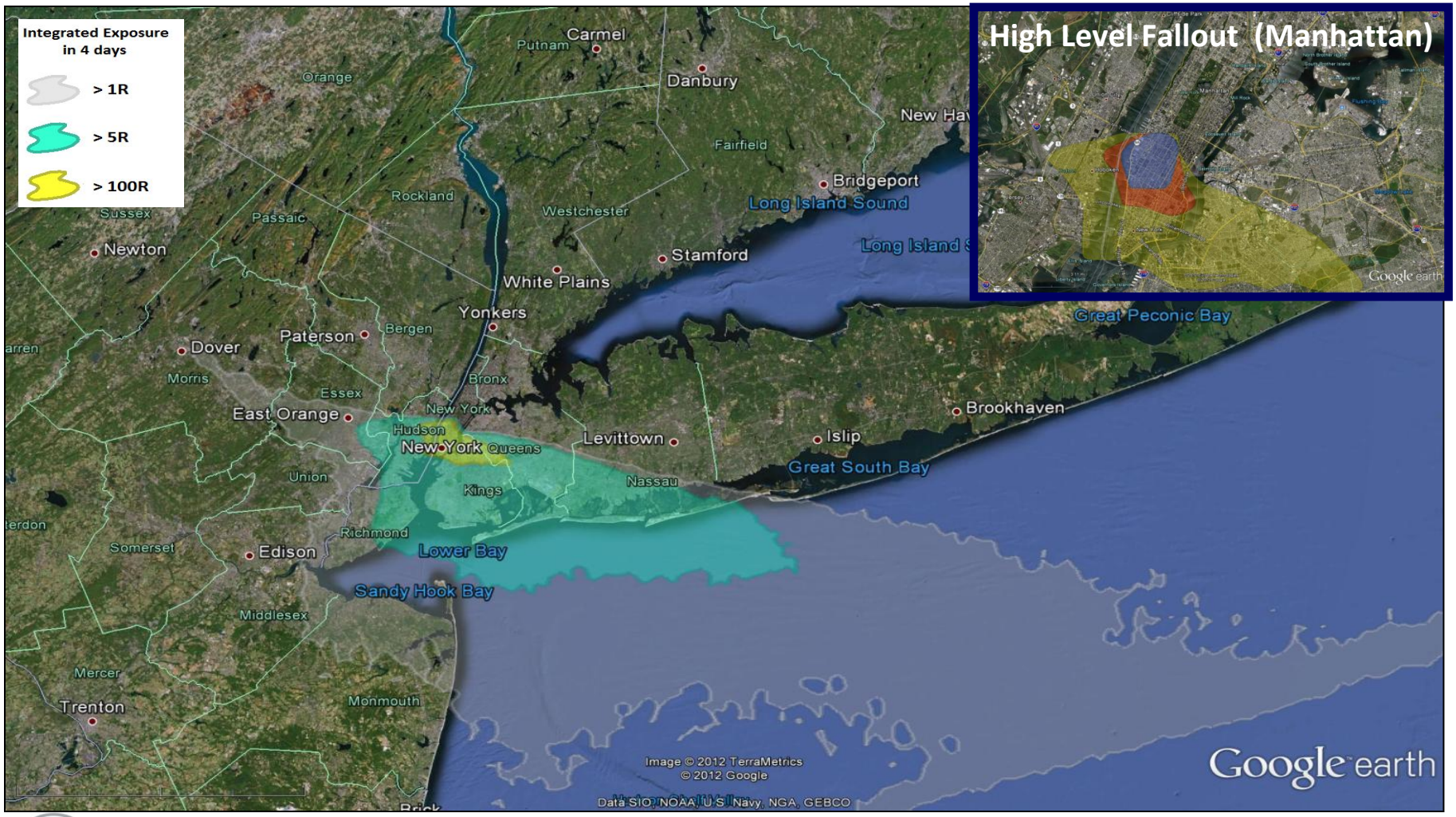

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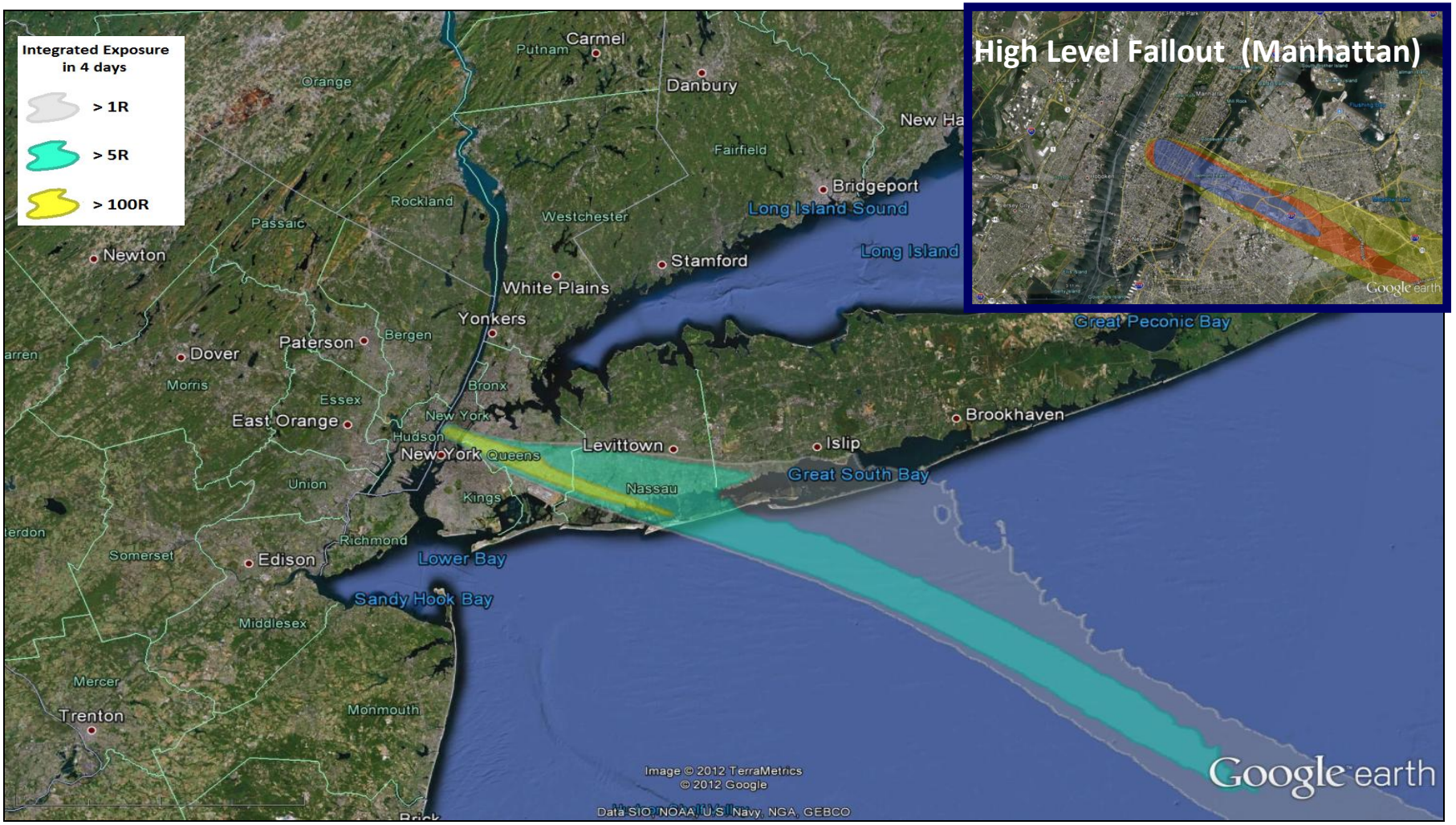

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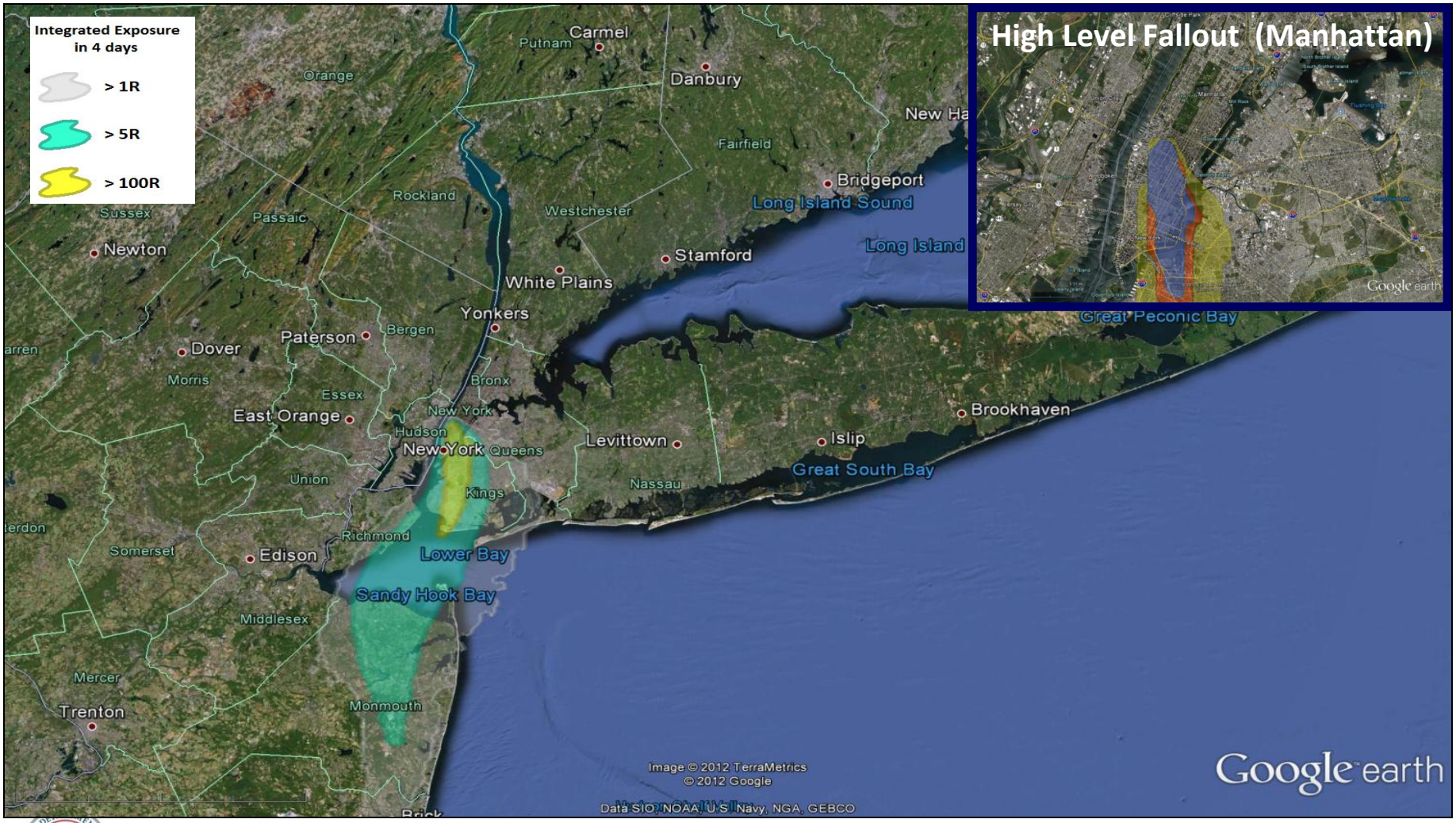
Planning Scenario Weather 08/14/2009



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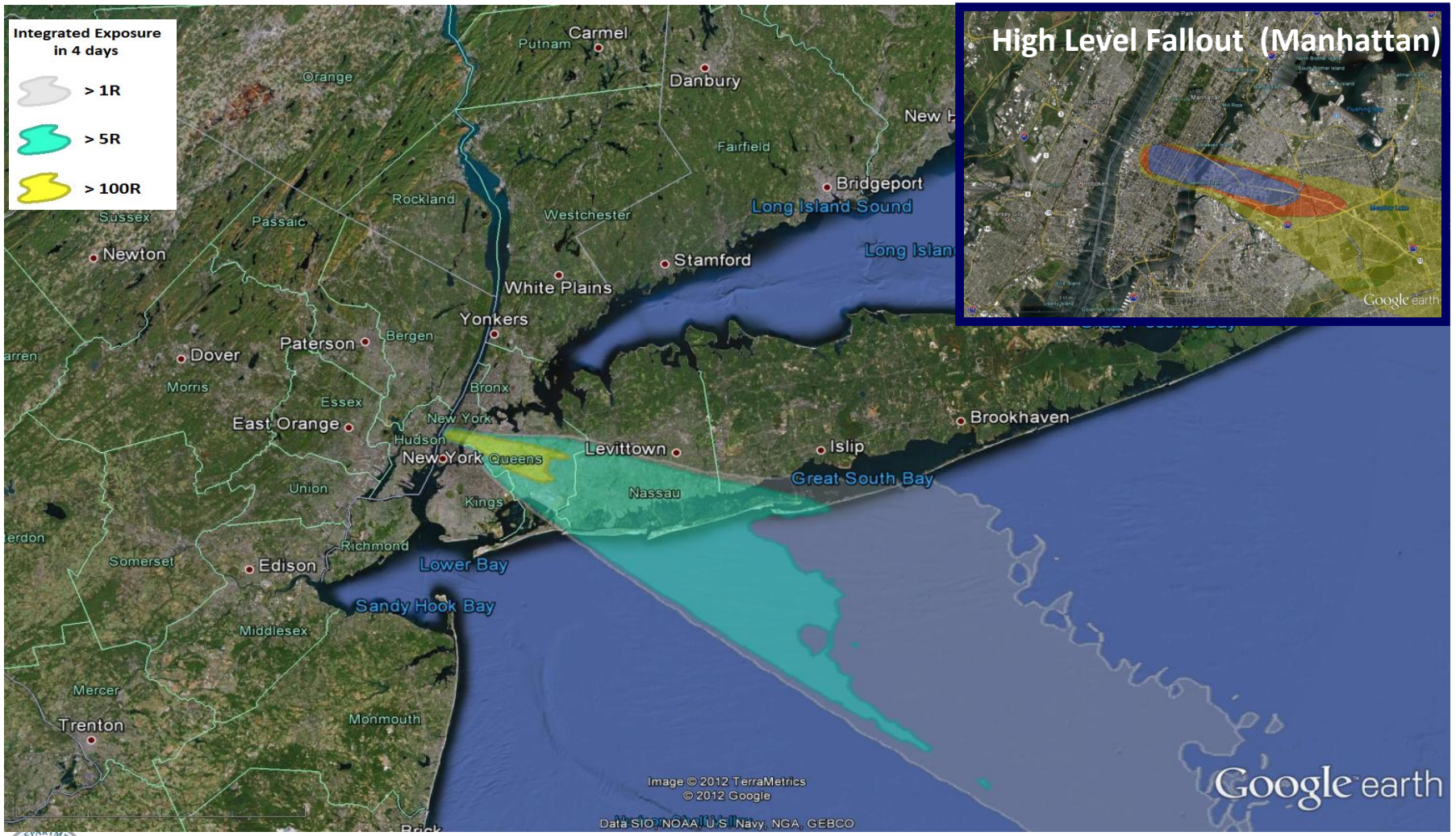
Planning Scenario Weather 09/14/2009



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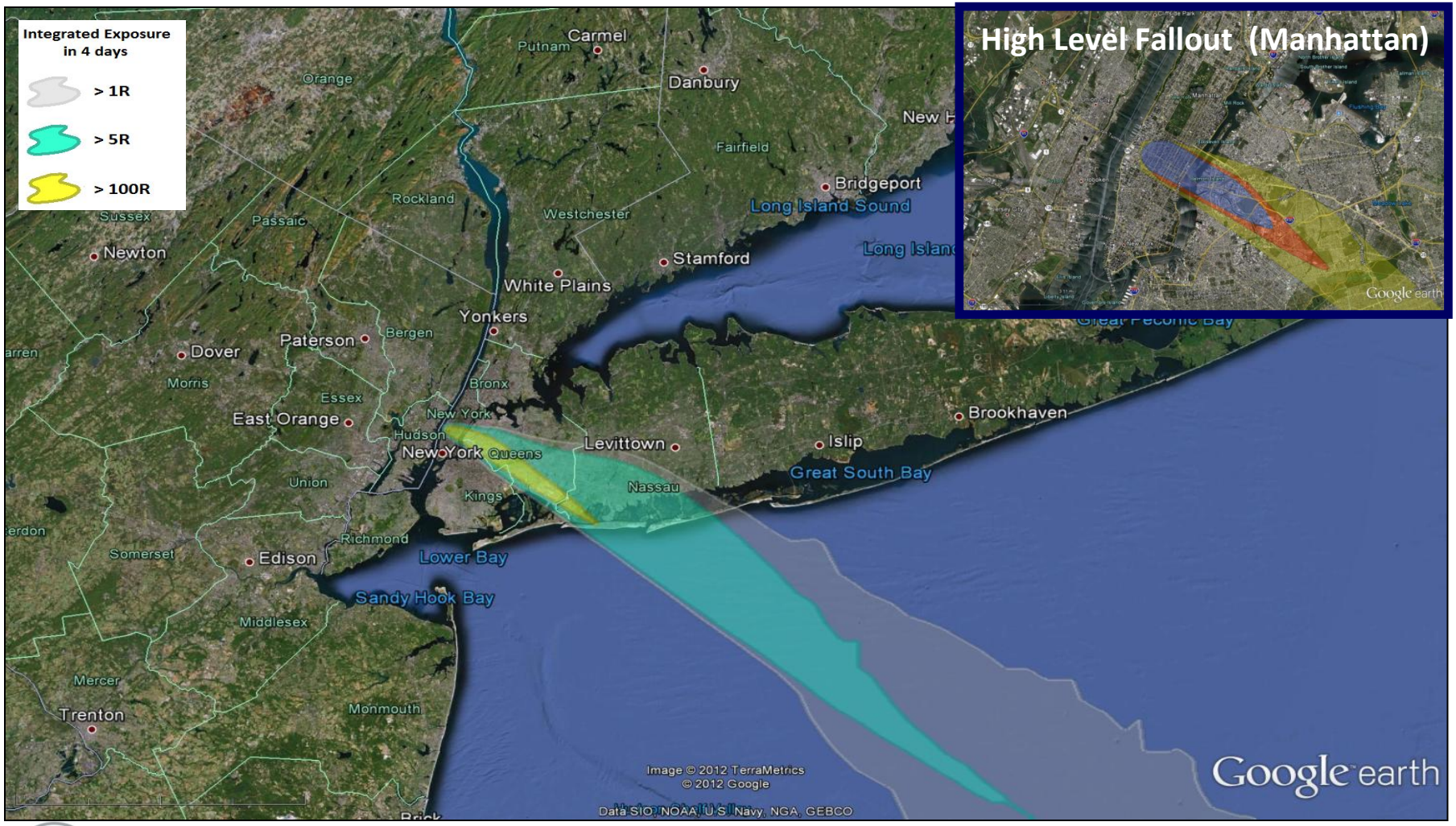
Planning Scenario Weather 10/14/2009



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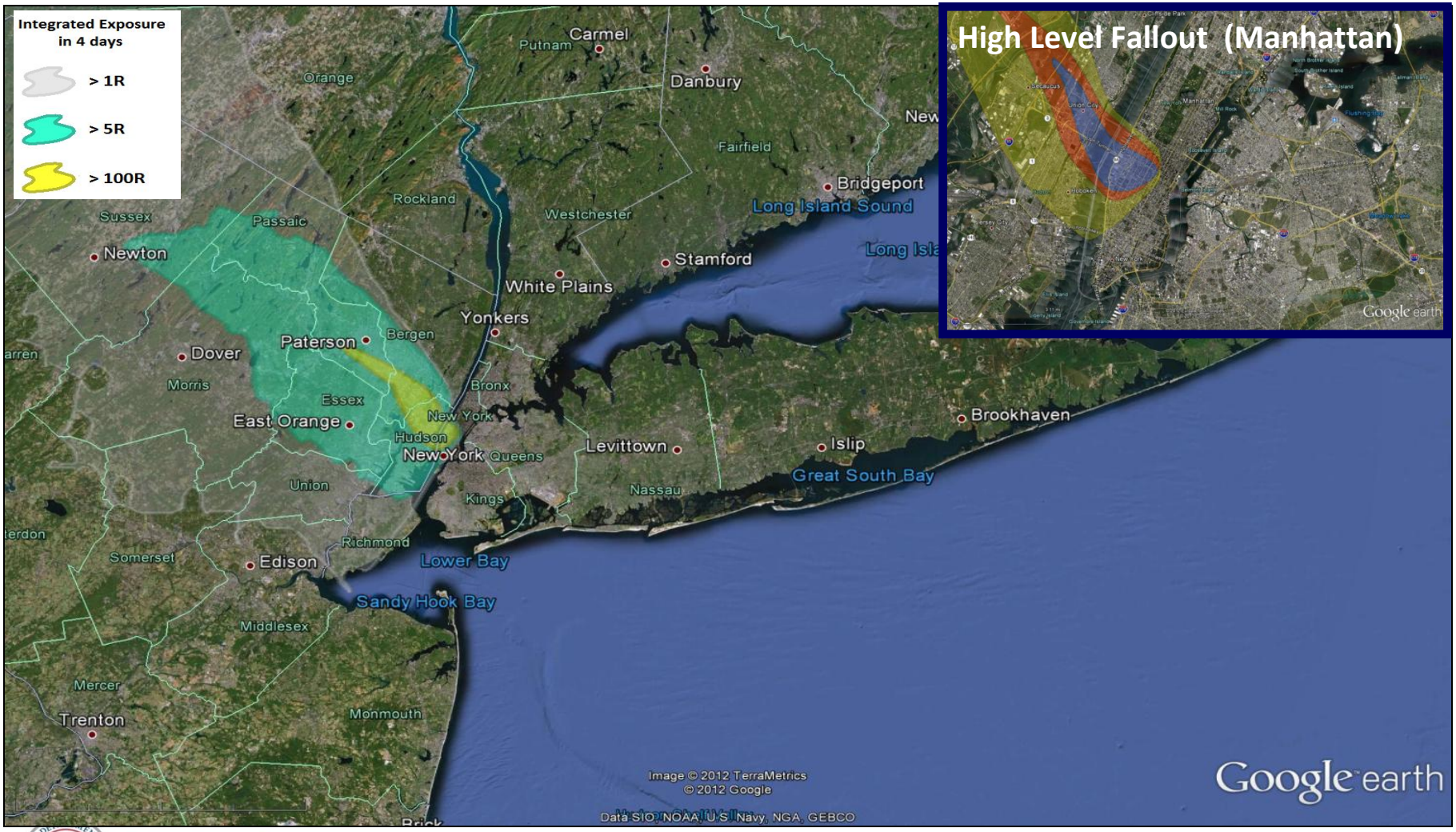
Planning Scenario Weather 11/14/2009



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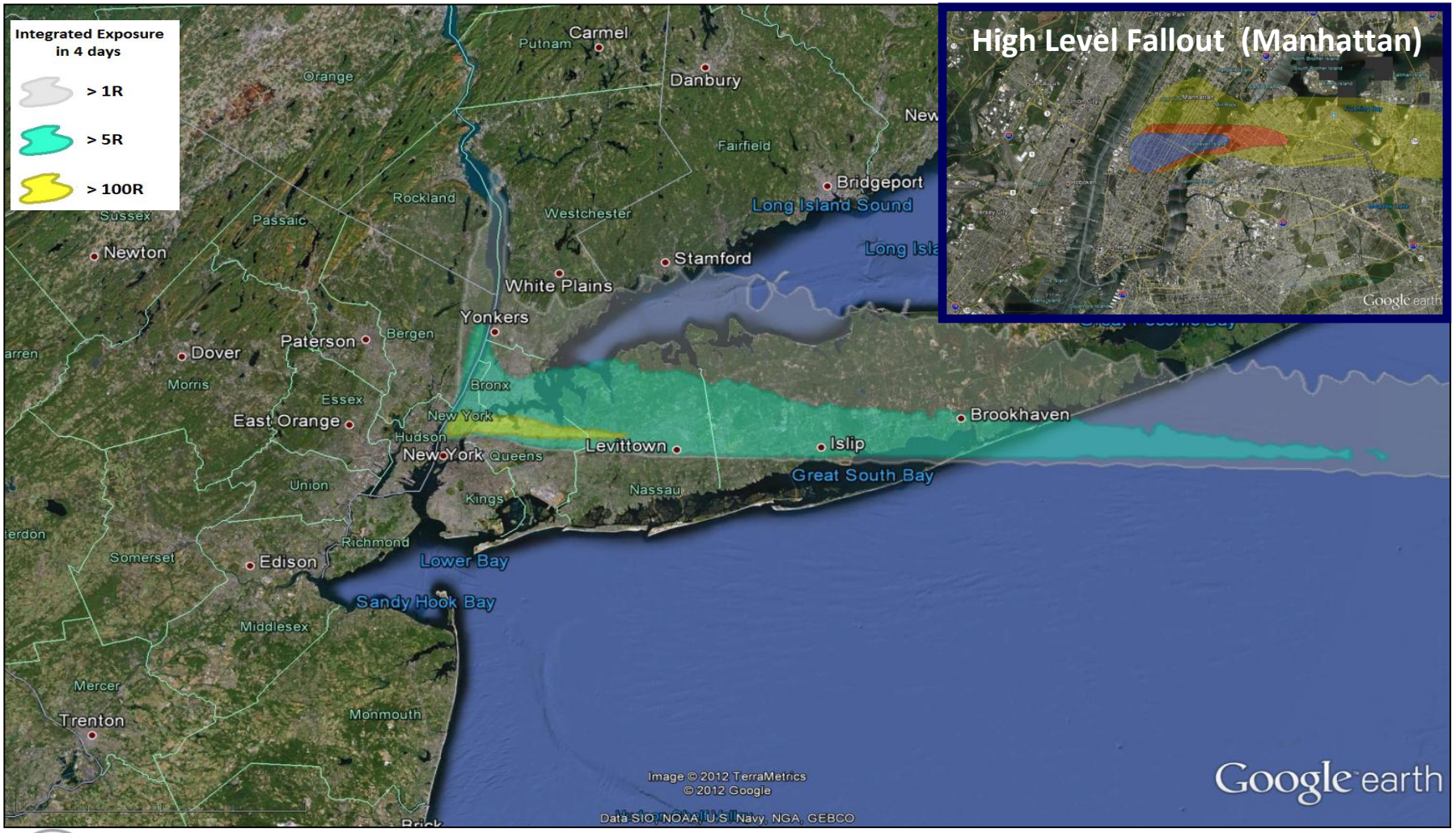

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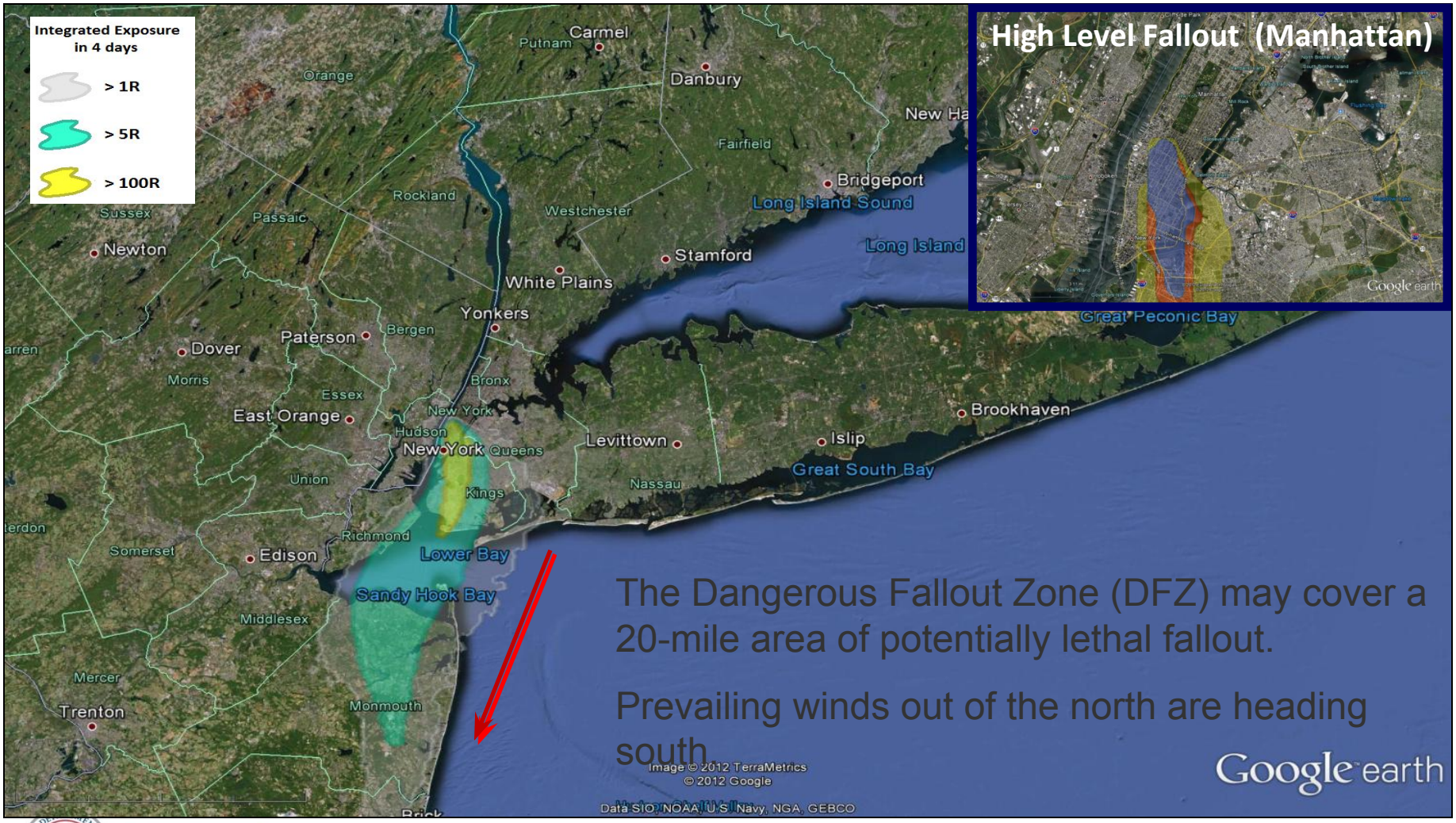
Modeled Weather Planning Scenario



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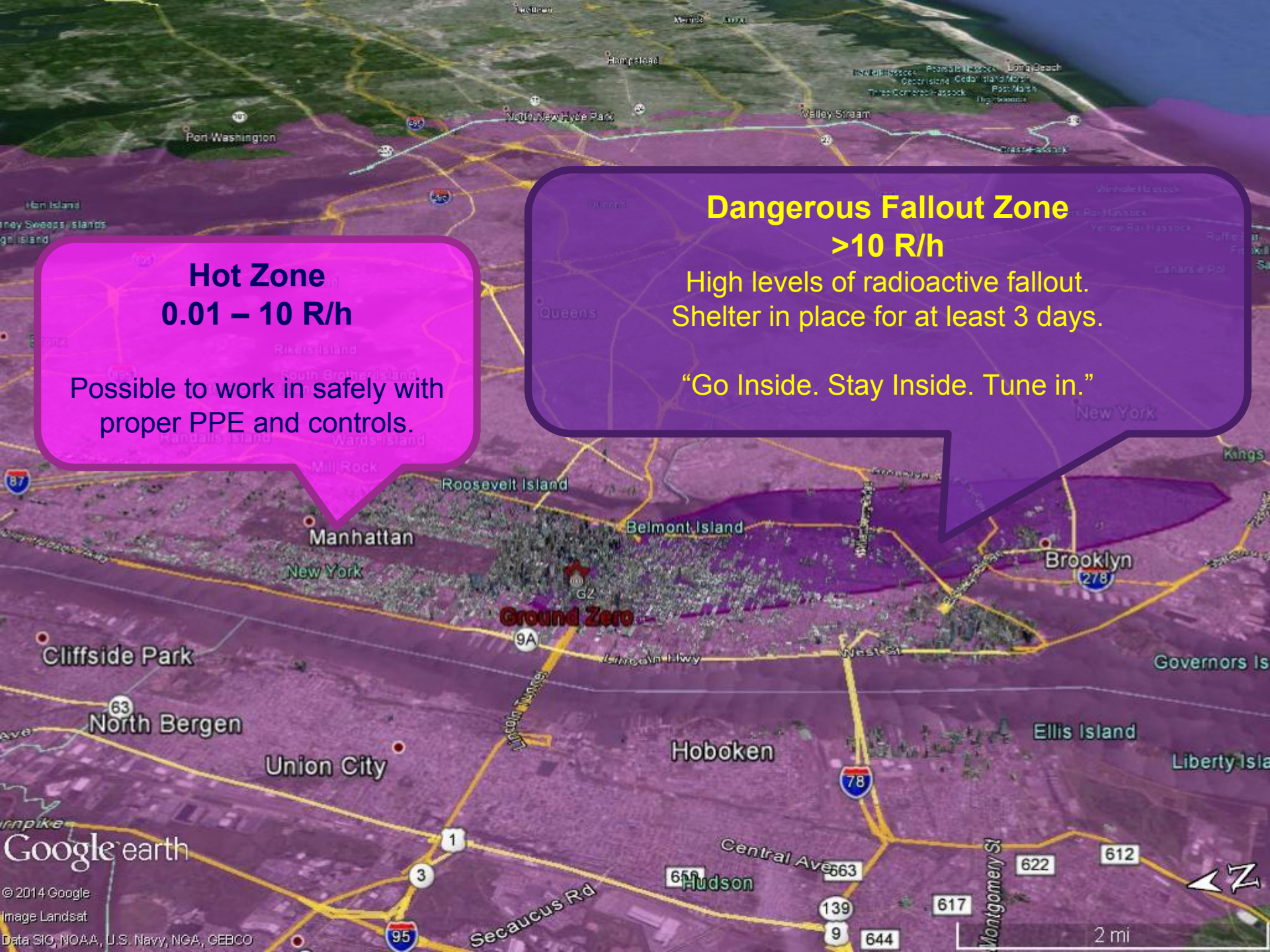
Dangerous Fallout Zone
>10 R/h
High levels of radioactive fallout.
Shelter in place for at least 3 days.
"Go Inside. Stay Inside. Tune in."
Hot Zone
0.01 – 10 R/h
Possible to work in safely with proper PPE and controls.
Port Washington
Roosevelt Island
Manhattan
New York
Belmont Island
GZ
Ground Zero
Brooklyn
Cliffside Park
North Bergen
Union City
Hoboken
Ellis Island
Liberty Isla
Governors Is
Hudson
Secaucus Rd
Central Ave
Montgomery St
Google earth
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Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
2 mi


Fireball rises at > 100 mph
Winds push the cloud to the south
Roosevelt Island
Times Square
New York
Hoboken
Weehawken
Union City
Willow Ave
Toll road
Observer Hwy
Hackensack Reservoir Number Two
Google earth
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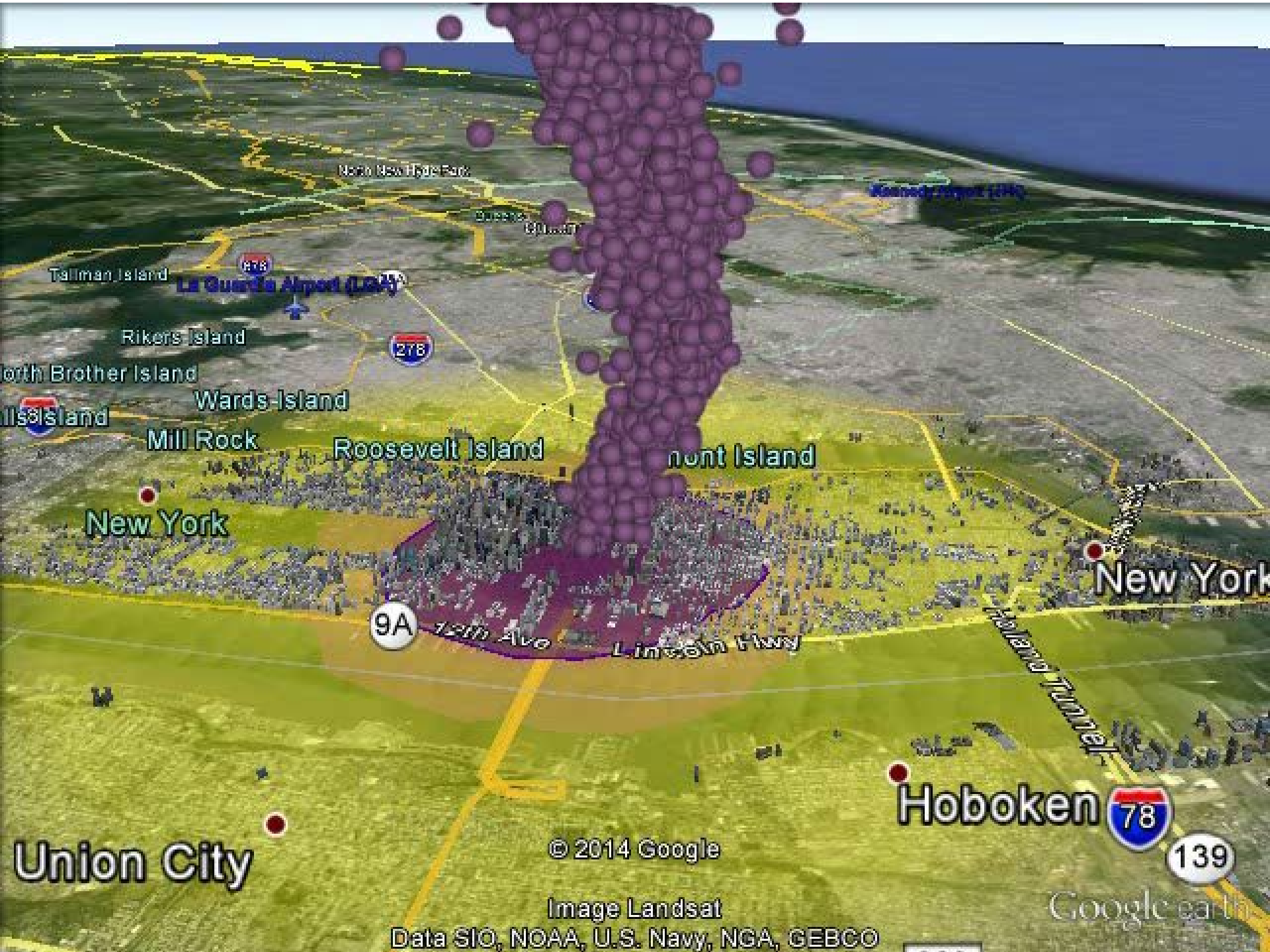
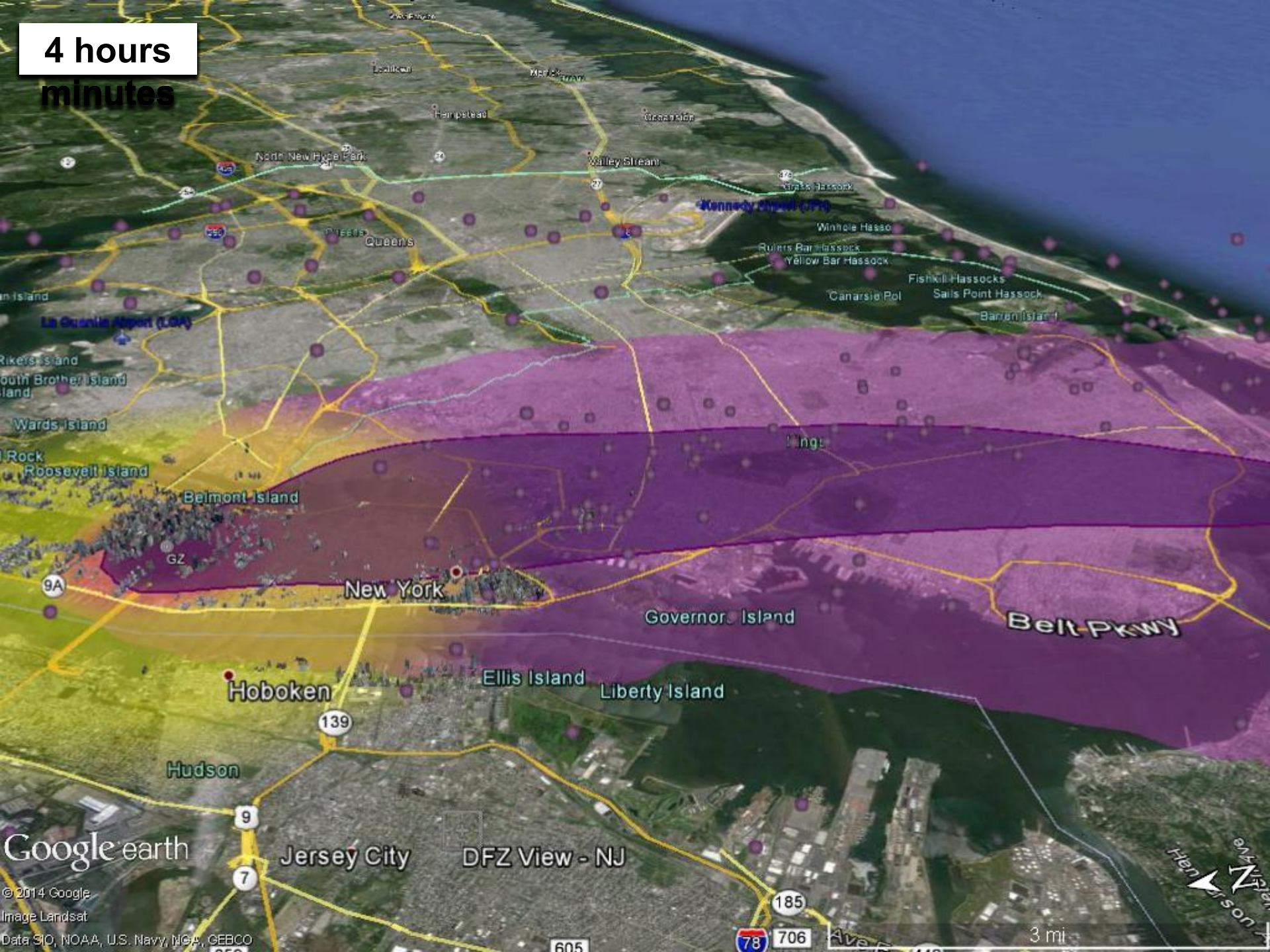

Tallman Island
Rikers Island
Wards Island
Mill Rock
Roosevelt Island
New York
9A
Lincoln Hwy
Hoboken
78
139
Union City
© 2014 Google
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth


4 hours
minutes
Hempstead
North New Hyde Park
Valley Stream
Queens
Kennedy Airport (JFK)
Winnie Hasso
Yellow Bar Hassock
Fishkill Hassocks
Sails Point Hassock
Canarsie Pol
Barren Island
La Guardia Airport (LGA)
Wards Island
Roosevelt Island
Belmont Island
GZ
9A
New York
Governor Island
Belt Pkwy
Hoboken
Ellis Island
Liberty Island
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Google earth
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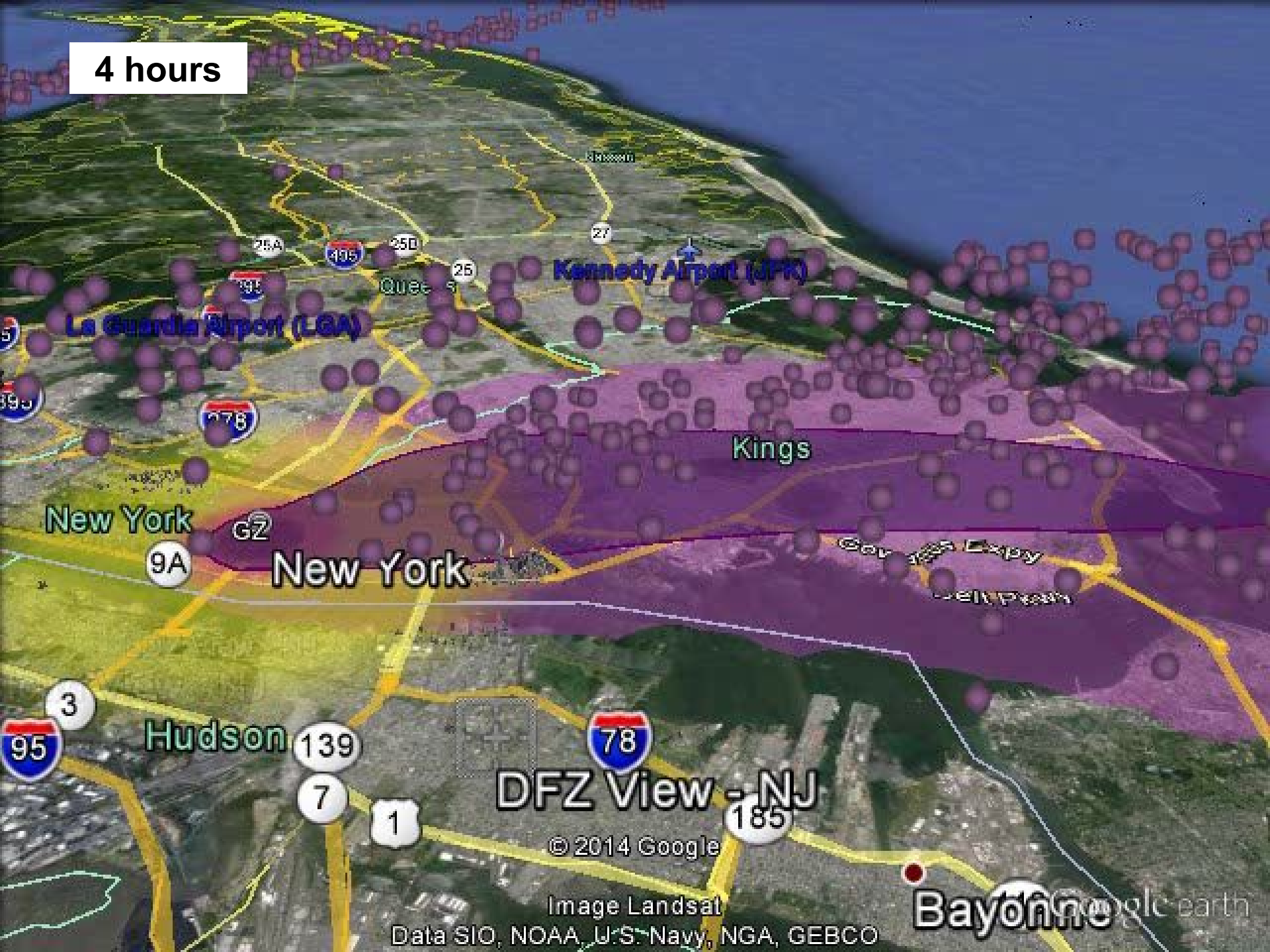
4 hours
Kennedy Airport (JFK)
La Guardia Airport (LGA)
Kings
New York
GZ
New York
DFZ View - NJ
Hudson
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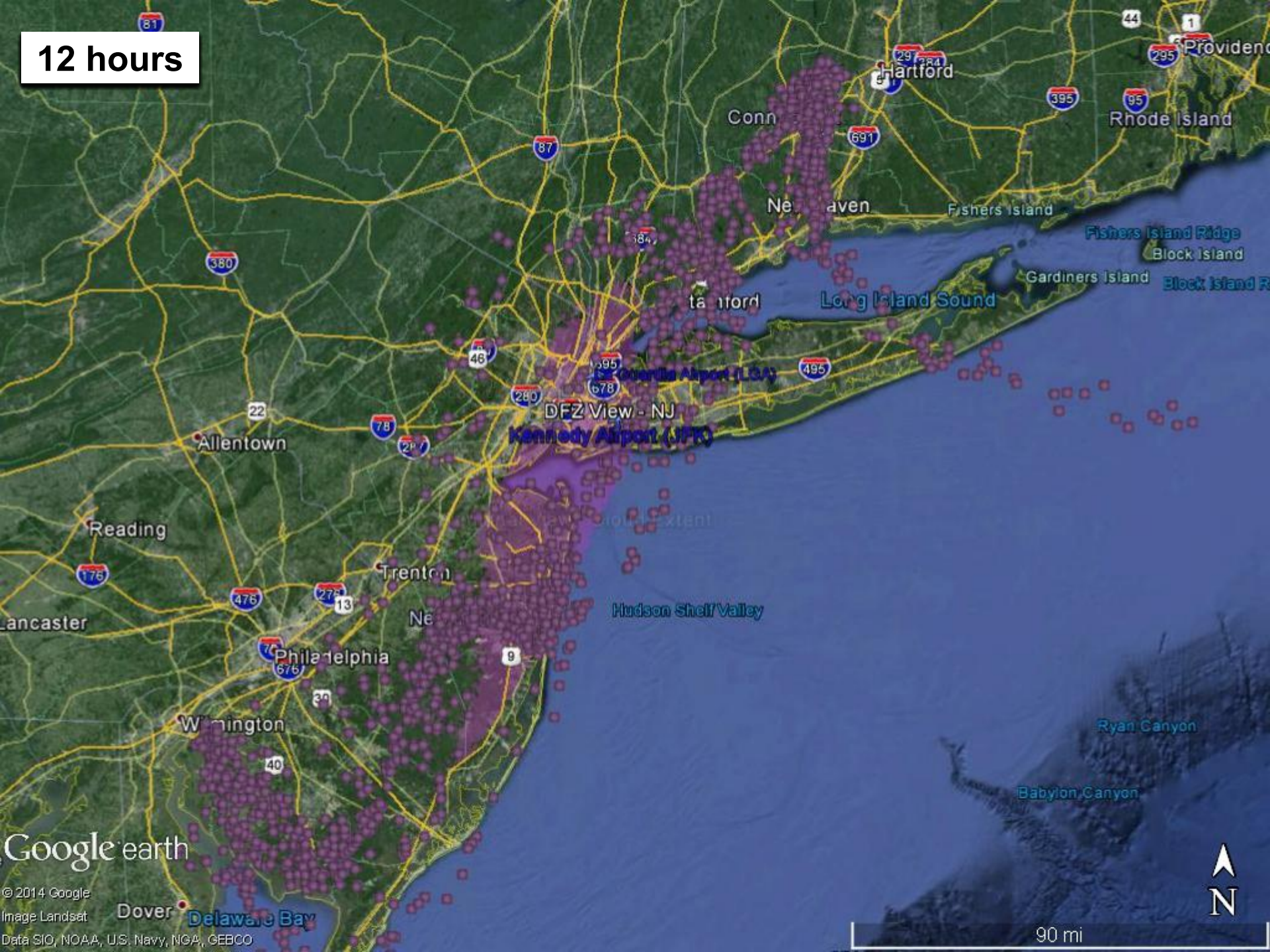
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Bayonne


12 hours
Hartford
Conn
Rhode Island
Providenc
Ne aven
Fishers Island
Fishers Island Ridge
Block Island
Gardiners Island
Long Island Sound
DFZ View - NJ
Kennedy Airport (JFK)
Allentown
Reading
Trenton
Philadelphia
Hudson Shelf Valley
Ryan Canyon
Babylon Canyon
Dover
Delaware Bay
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N
90 mi


48 hours
Hartford
Connecticut
Rhode Island
New Haven
Fishers Island
Fishers Island Ridge
Block Island
Gardiners Island
Stamford
Long Island Sound
New York
Kennedy Airport (JFK)
Allentown
Reading
Trenton
New Jersey
Hudson Shelf Valley
Philadelphia
Wilmington
Ryan Canyon
Babylon Canyon
Dover
Delaware Bay
Google earth
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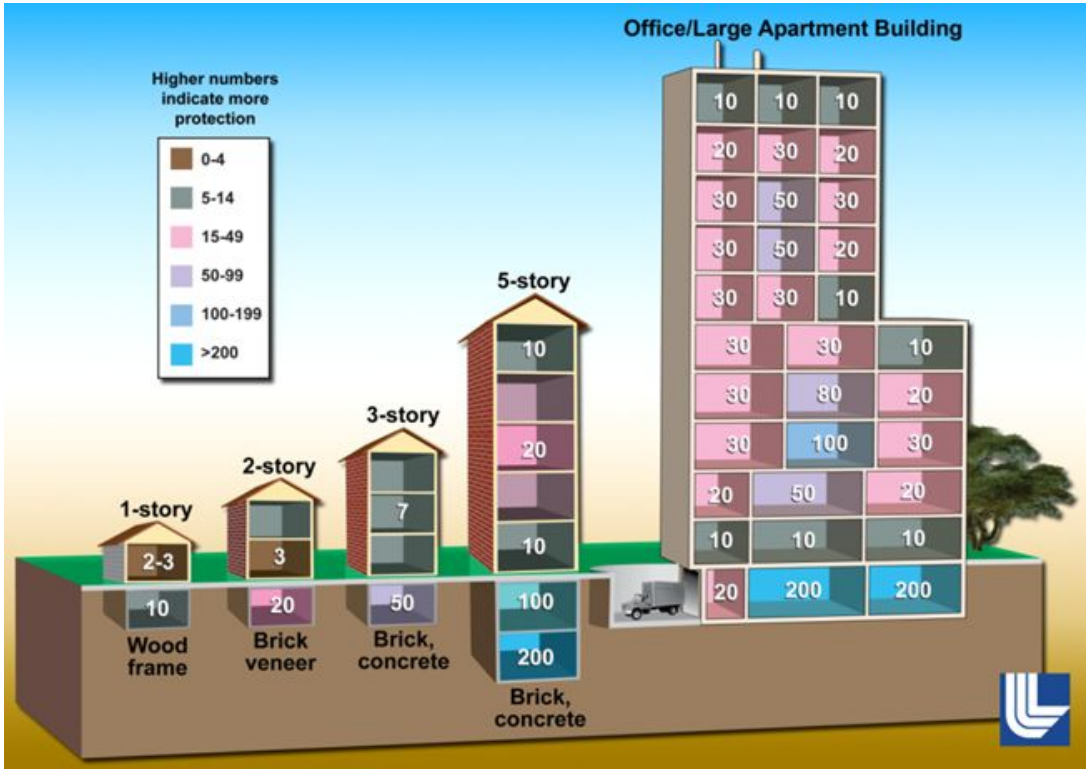
N
90 mi

What can you do?

- Seek shelter immediately – ‘Get inside, Stay Inside’
- Be informed – ‘Stay Tuned’



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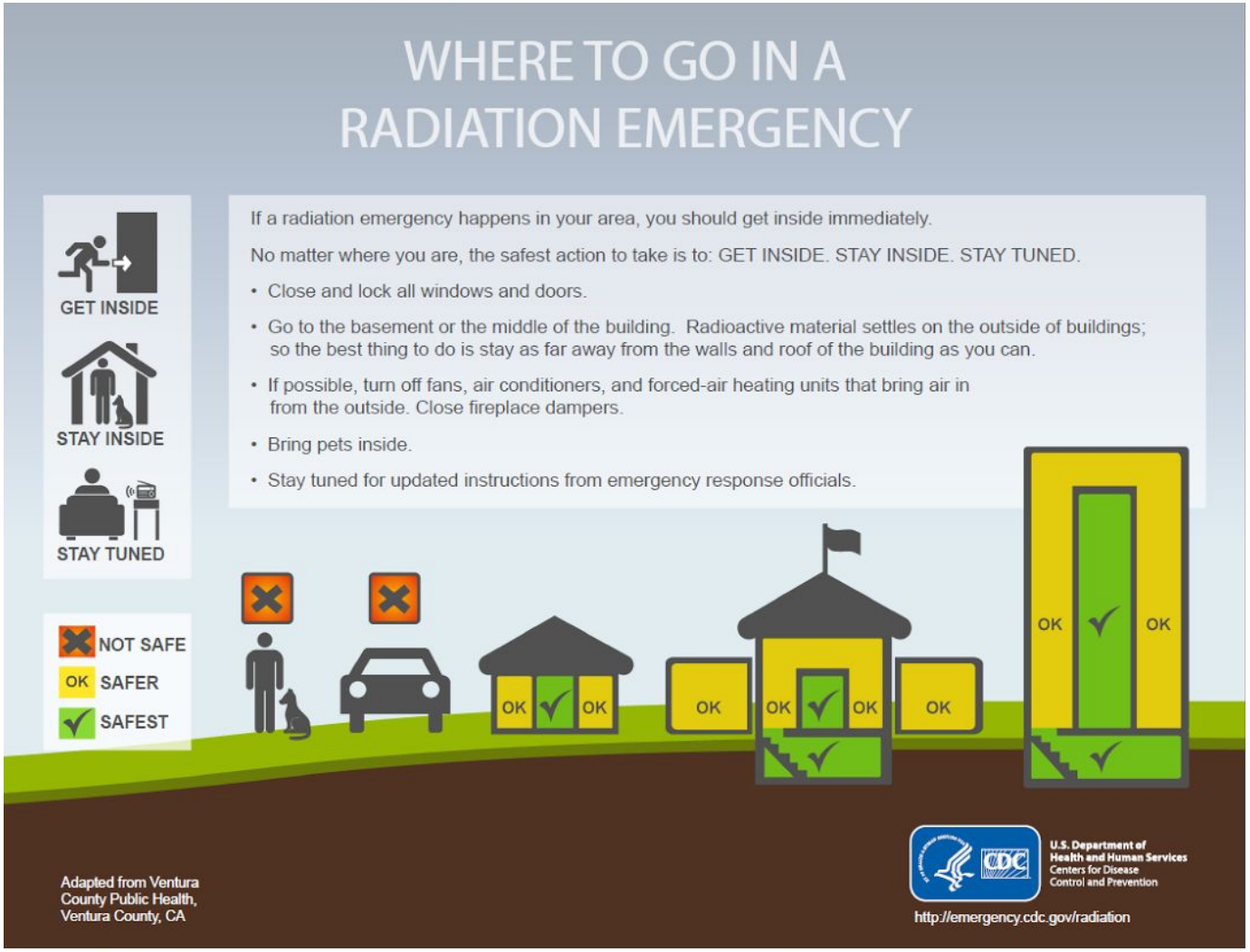
What can you do?



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How can you prepare?

- http://www.Ready.gov
- http://emergency.cdc.gov/radiation
- Build an Emergency Supply Kit
- Make a Family Emergency Plan

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DHS Strategy (from 2010)…

- Manage the Response
- Characterize the Incident
- Mass Evacuation and In-Place Protection
- Medical Triage
- Provide Casualty/Evacuee Care
- Stabilize and Control the Impacted Area
- Perform Site Cleanup and Recovery and Restore Functions

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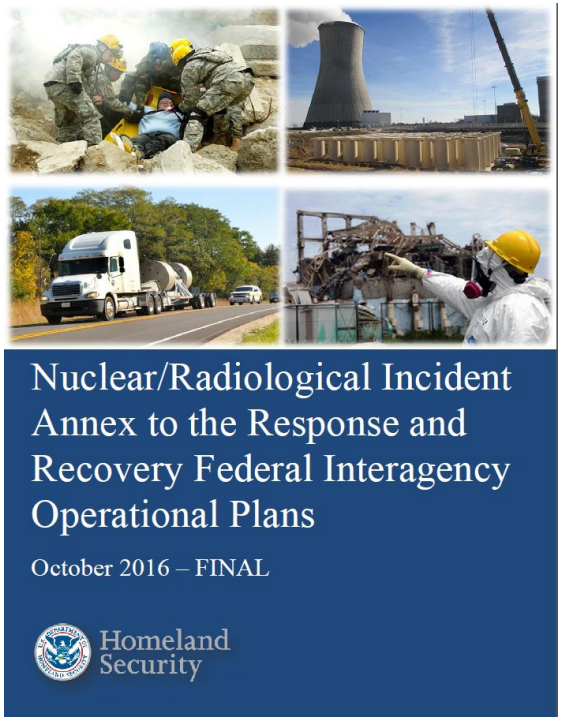
Nuclear / Radiological Incident Annex (2016)

- Characterize the Event
- Collect Real Time Radiation Measurements and Update Modeling
- Define Evacuation Strategies and Issue Guidance
- Communicate Evacuation Guidance
- Refine Analysis of What Happened and Prioritize Decontamination and Cleanup
- Define Medical Response and Prioritize Patient Care and Transport
- Decide When Some People Can Return to Affected Areas



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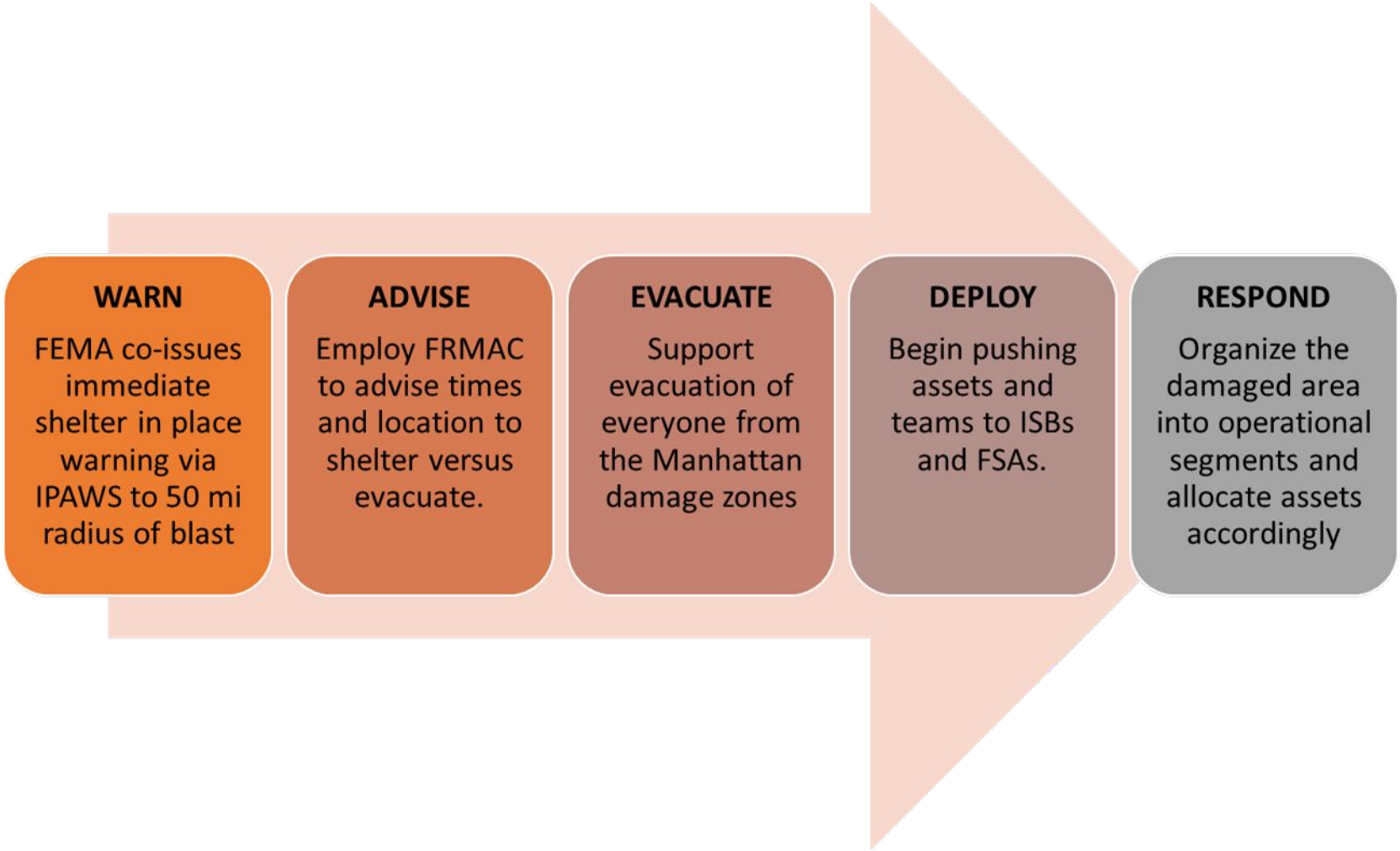
The Region II IND Operational Baseline



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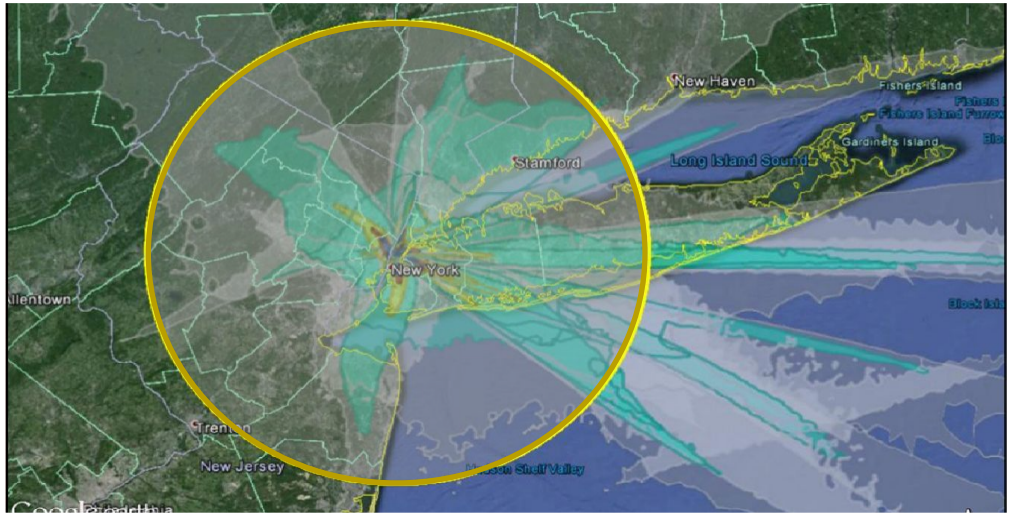
Goal 1 – Warn

- Greatest lifesaving achieved in first few minutes by sheltering
- FEMA warns 50 mile radius of blast: “Go Inside, Stay Inside” via IPAWS
- NYR States and Counties issue same message using available systems



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Goal 2 - Advise

- Push real-time radiological intelligence from FRMAC through NWC to EOCs, then to the UCG as established
- Employ 9 sets of Essential Information*
  1. Confirm the detonation
  2. Provide hazard specific information
  3. Identify boundaries for
     4. Prompt effects (damage zones)
     5. Radiation effects (immediate and fallout)
     6. EMP effects
  7. Weather conditions and forecasts
  8. Medical treatment and decontamination information
  9. Existing safety hazards
- Use EPA PAGs as initial go-by, refine with incoming rad intel data from local and Fed sources
- Support quick assessments of critical infrastructure
  - Primary bridges, tunnels, and major highways to enable evacuation and ingress of responders and commodities
  - Utilities (electric, IT/telecom, water, sanitation) to support emergency operations

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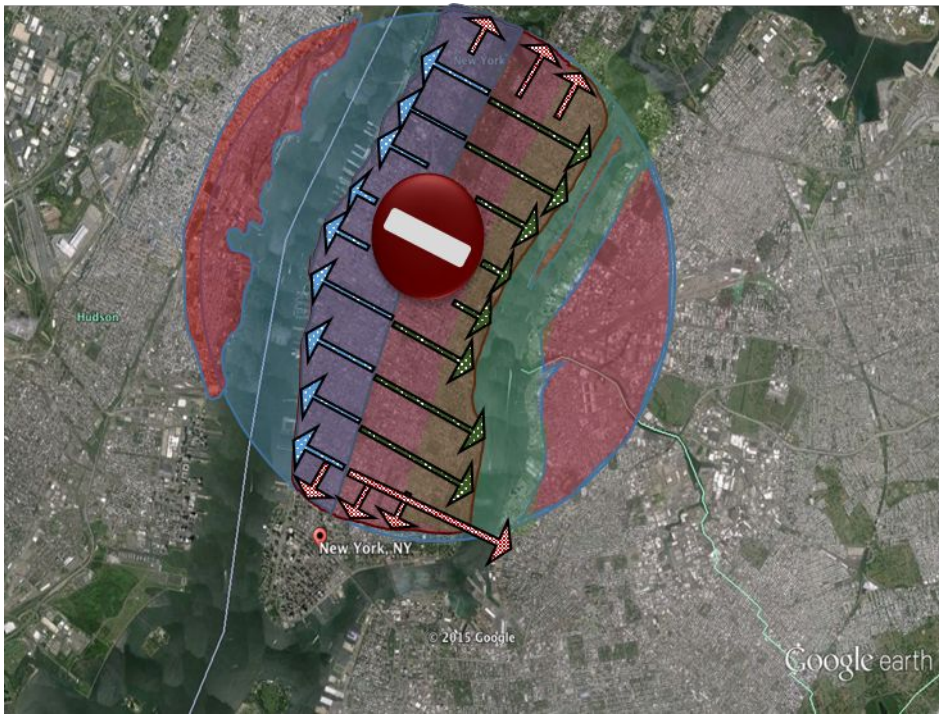
Goal 3 - Evacuate

- When safe, direct evacuation through designated routes to shorelines.
- Support maritime evacuation from Manhattan to NJ and BK/Queens



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Goal 3 - Evacuate

- Start with gross decon of the shoreline

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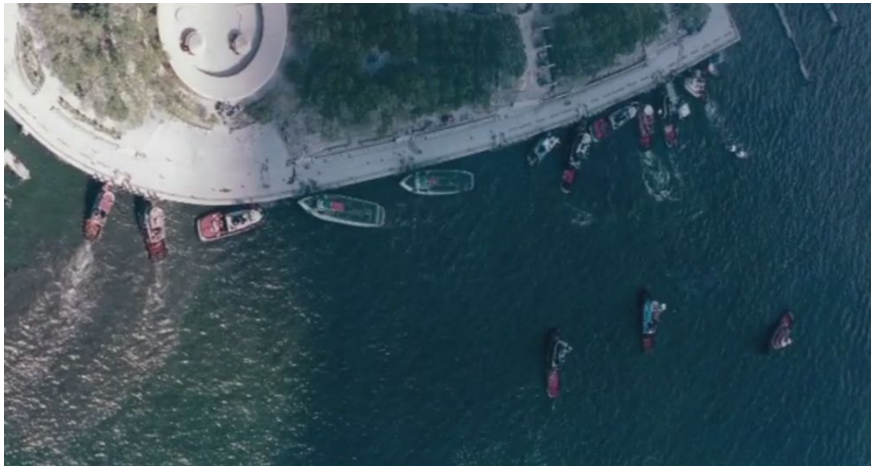
Goal 3 - Evacuate

- Boat Lift – Repeat of 9/11 Operation



FEMA

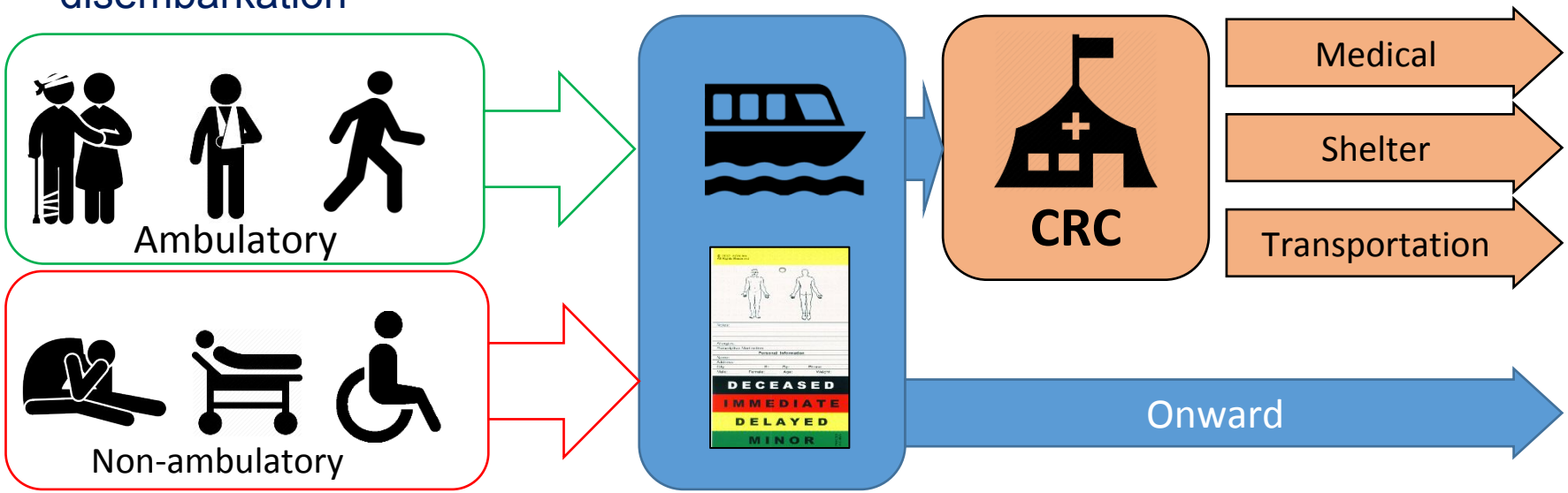
Goal 3 - Evacuate

- Approx. 500,000 evacuated in 9 hours

FEMA

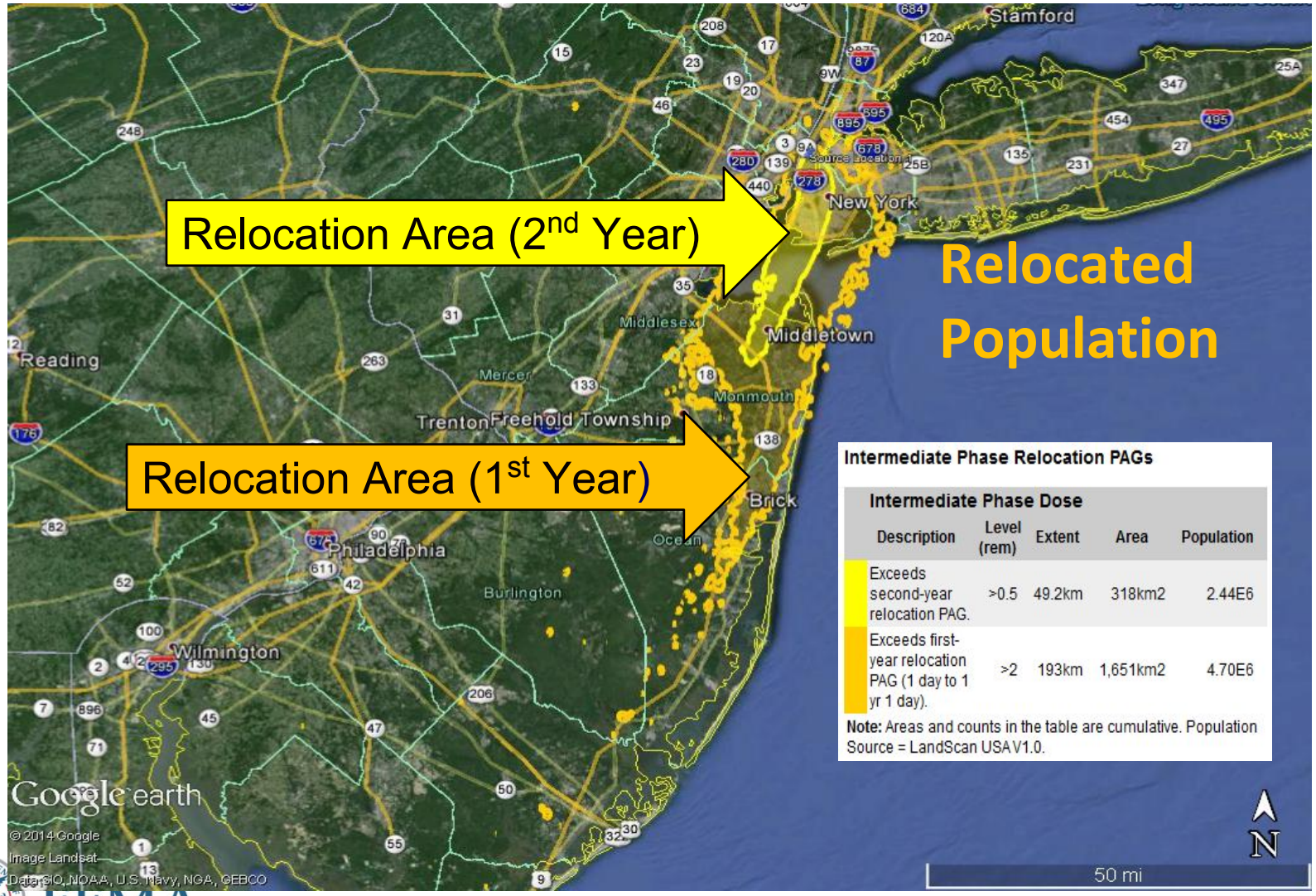
Goal 3 - Evacuate

- HHS leads ESF-8, FEMA coordinates this function
  - FEMA will coordinate execution of priorities set by HHS
  - Federal focus will be on post evacuation mass medical care
- Employ messaging systems to direct able populations to embarkation
- Employ Federal medical teams to assist unable populations to embarkation
- Perform decon, triage, and medical care at reception centers at/near points of disembarkation



FEMA

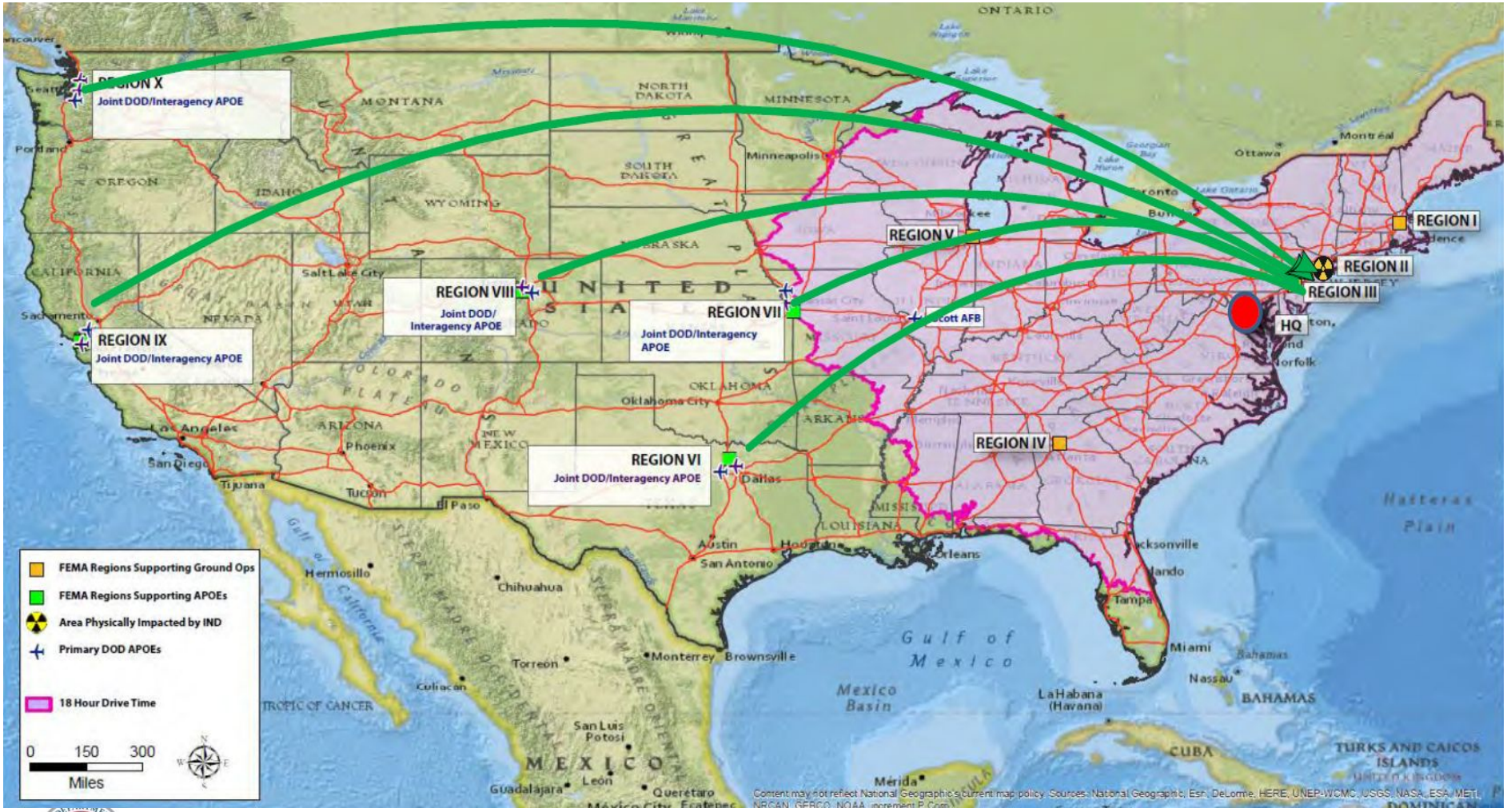
Planning Factors – Population Relocation



FEMA

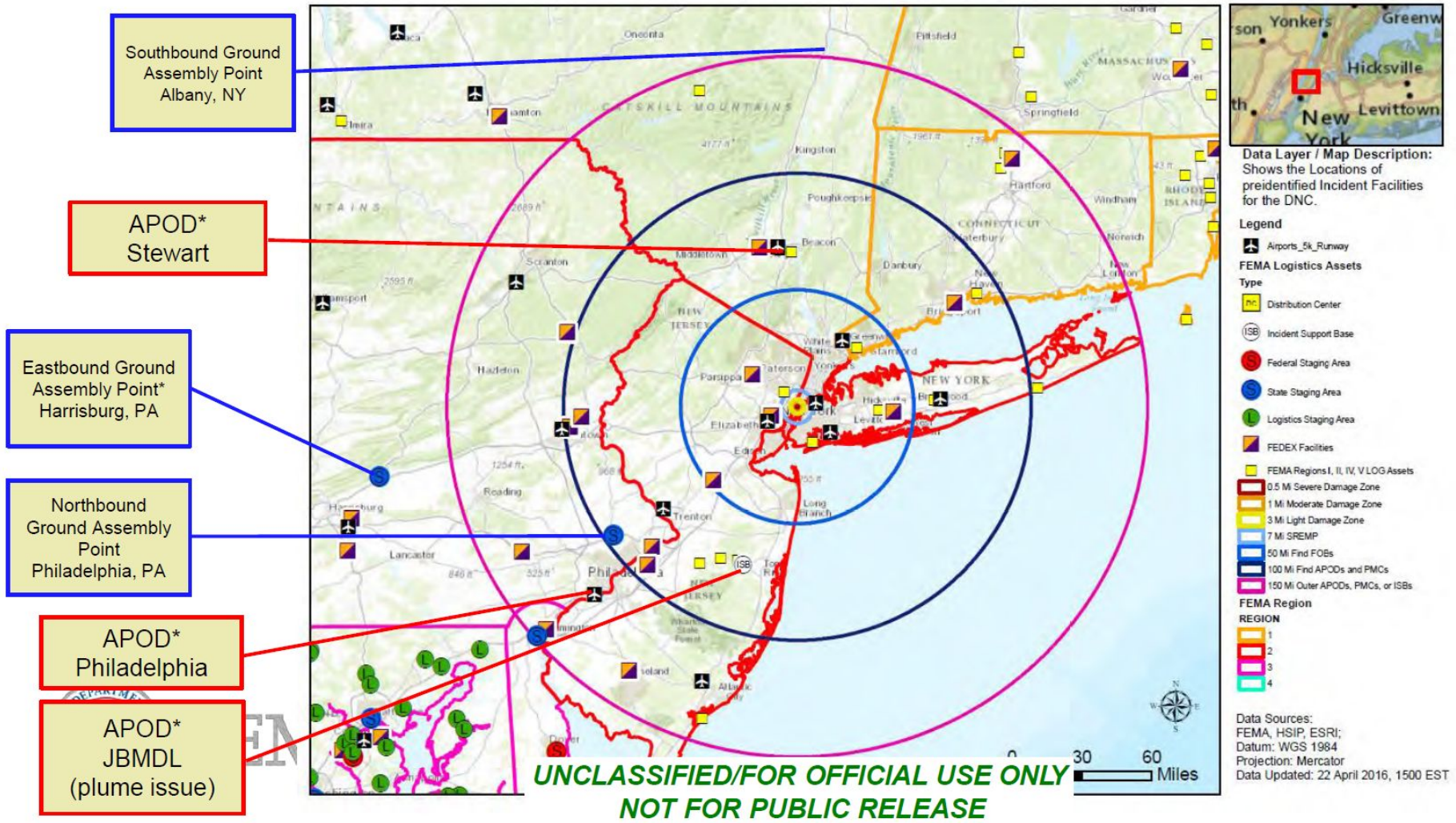
ARA

Goal 4 - Deploy



FEMA

Goal 4 - Deploy



FEMA

Goal 5: Respond

- Providing incident management support to State and locals
- Providing direct Federal assistance the other Response Core Capabilities
  - Example: Critical Transportation, Public Safety, Fire Suppression

FEMA

Discussion

Comments and Questions

FEMA

FEMA