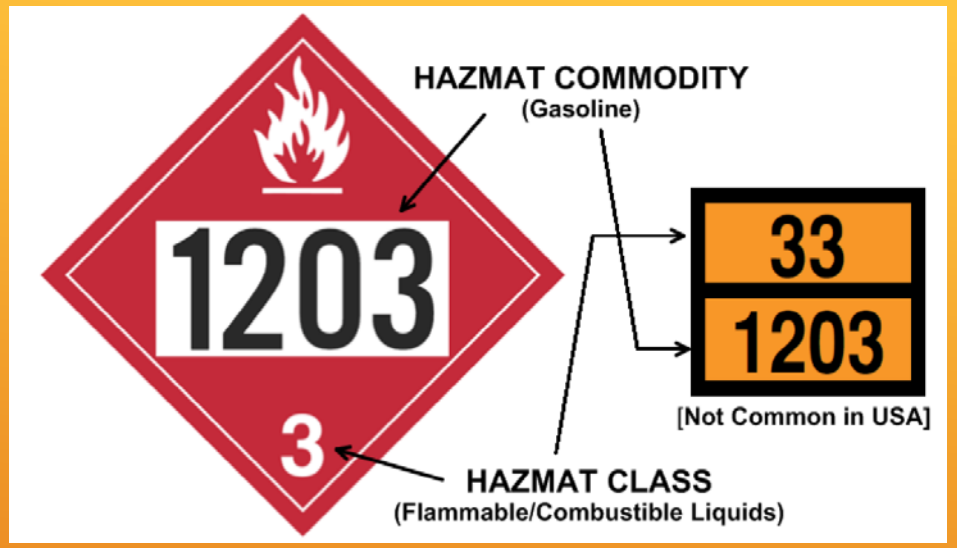
CITY OF MERCED
COMMUNITY RISK ASSESSMENT FOR HAZARDOUS MATERIALS



COMMODITY FLOW STUDY

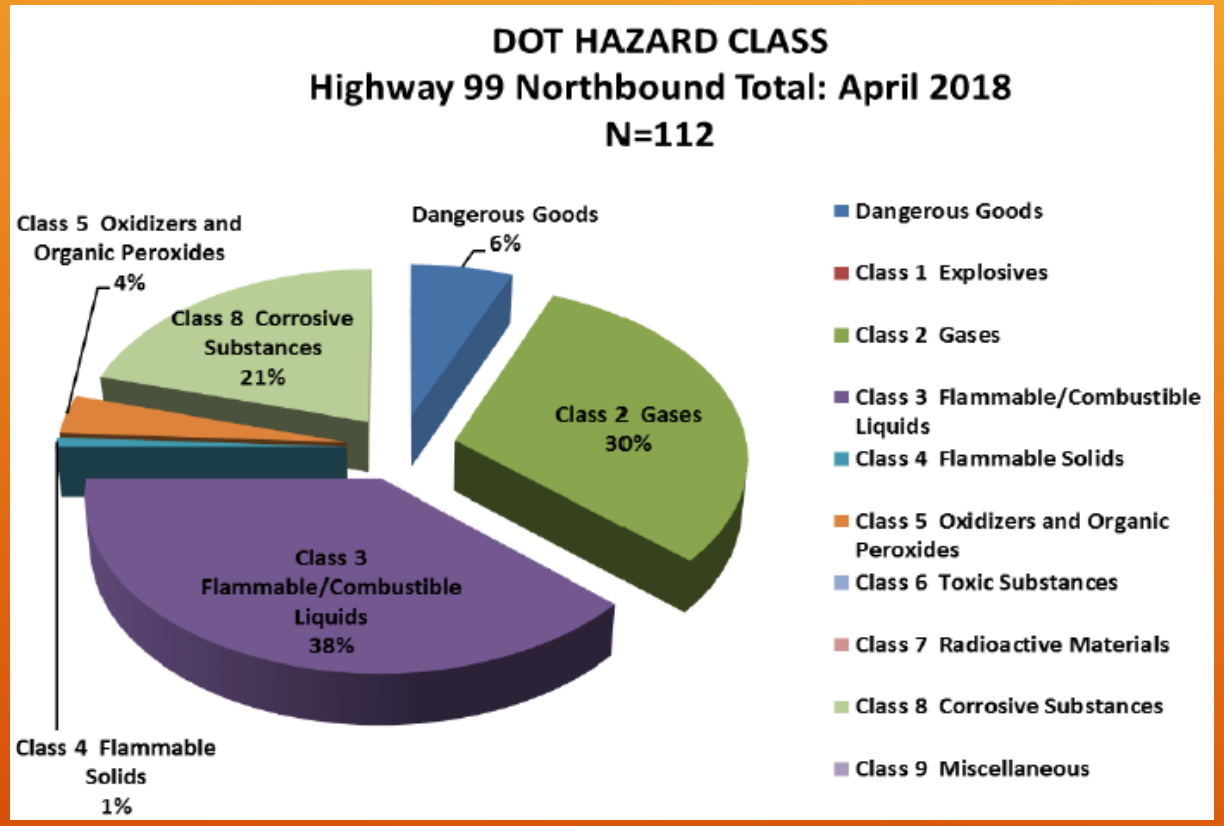
OBJECTIVE OF COMMUNITY RISK ASSESSMENT – HAZARDOUS MATERIALS

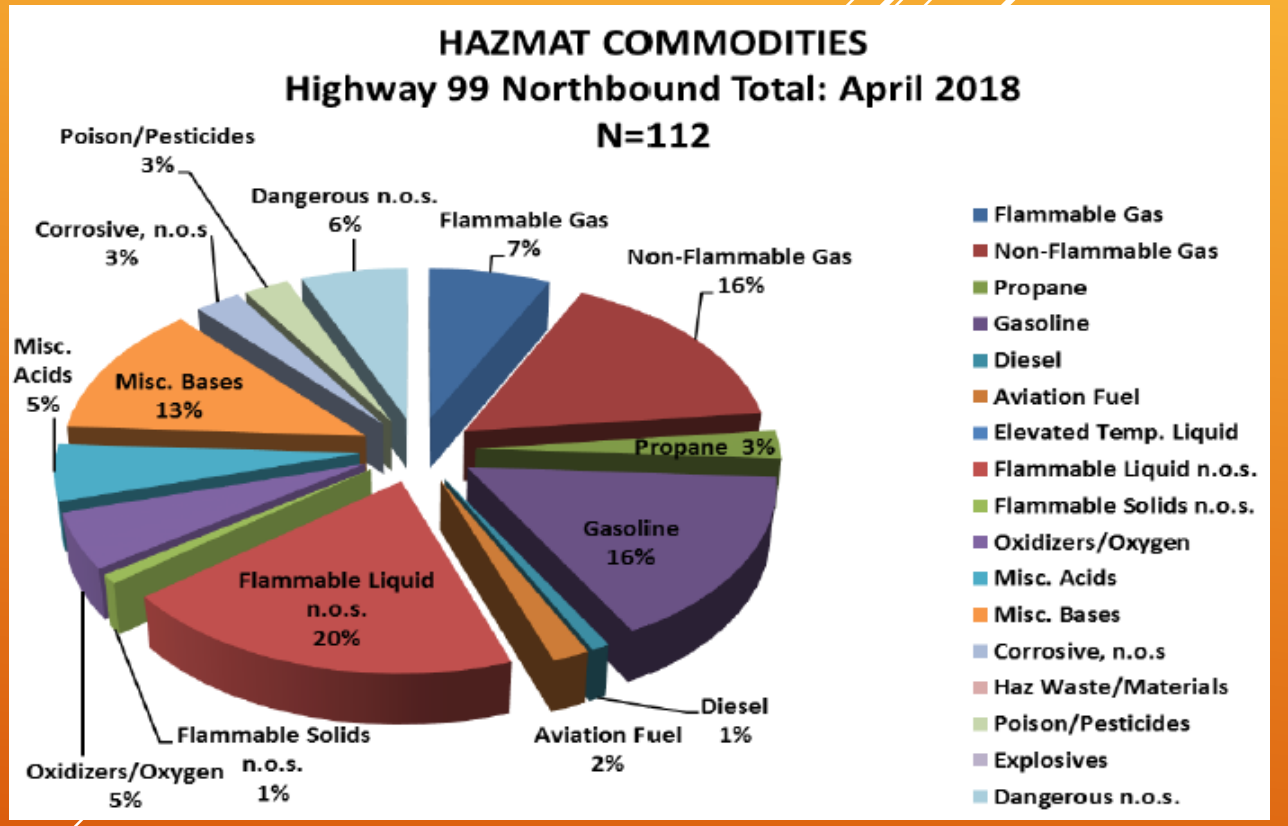
- To determine the potential for a high–risk, transportation-related hazardous materials incident/accident within the City of Merced.
- To assess the consequences of such an incident on vulnerable populations within the City of Merced.
- To determine a path forward to mitigate the consequences of such an incident.

DATA SOURCES

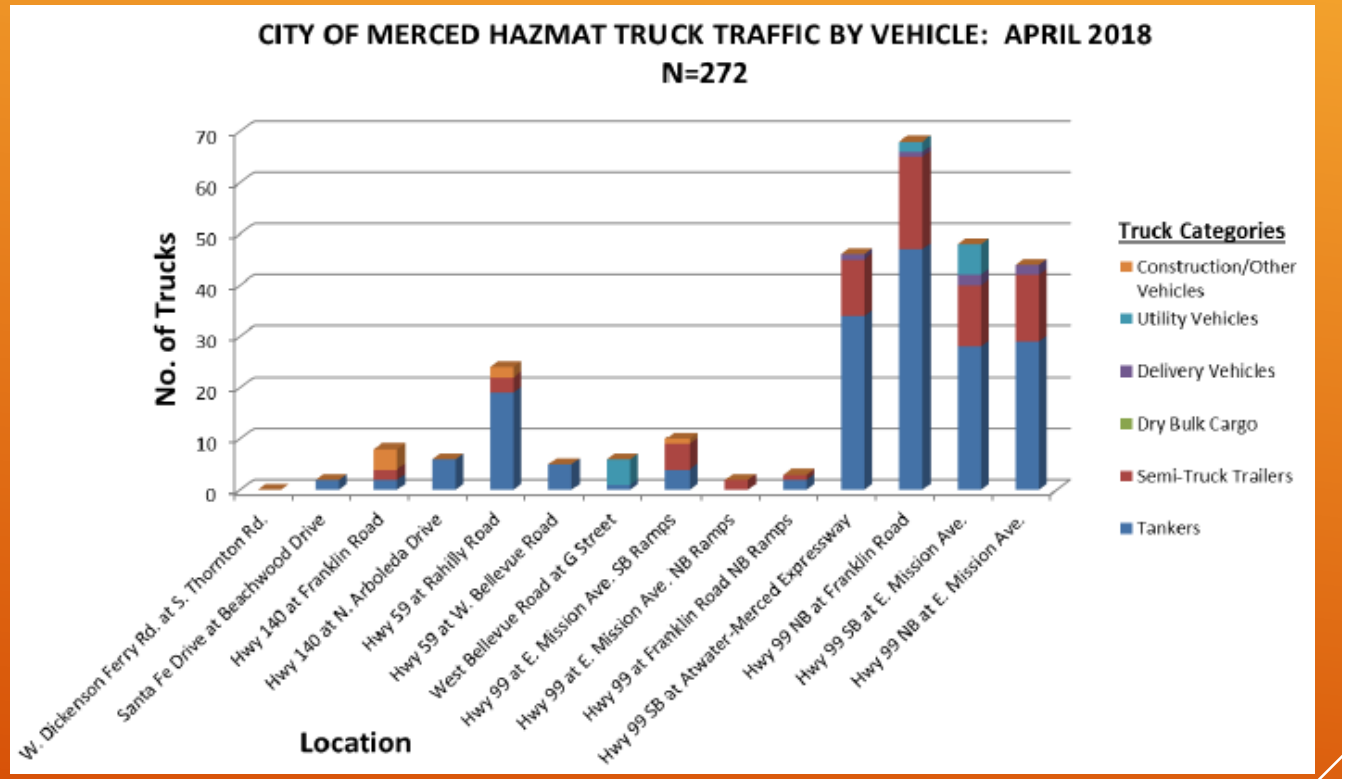
- City of Merced Local Hazard Mitigation Plan, Chapter 3: Risk Assessment, March 19, 2015
- Hazardous Materials Commodities Flow Study for the City of Merced, June 2018
- ALOHA Plume Diagrams

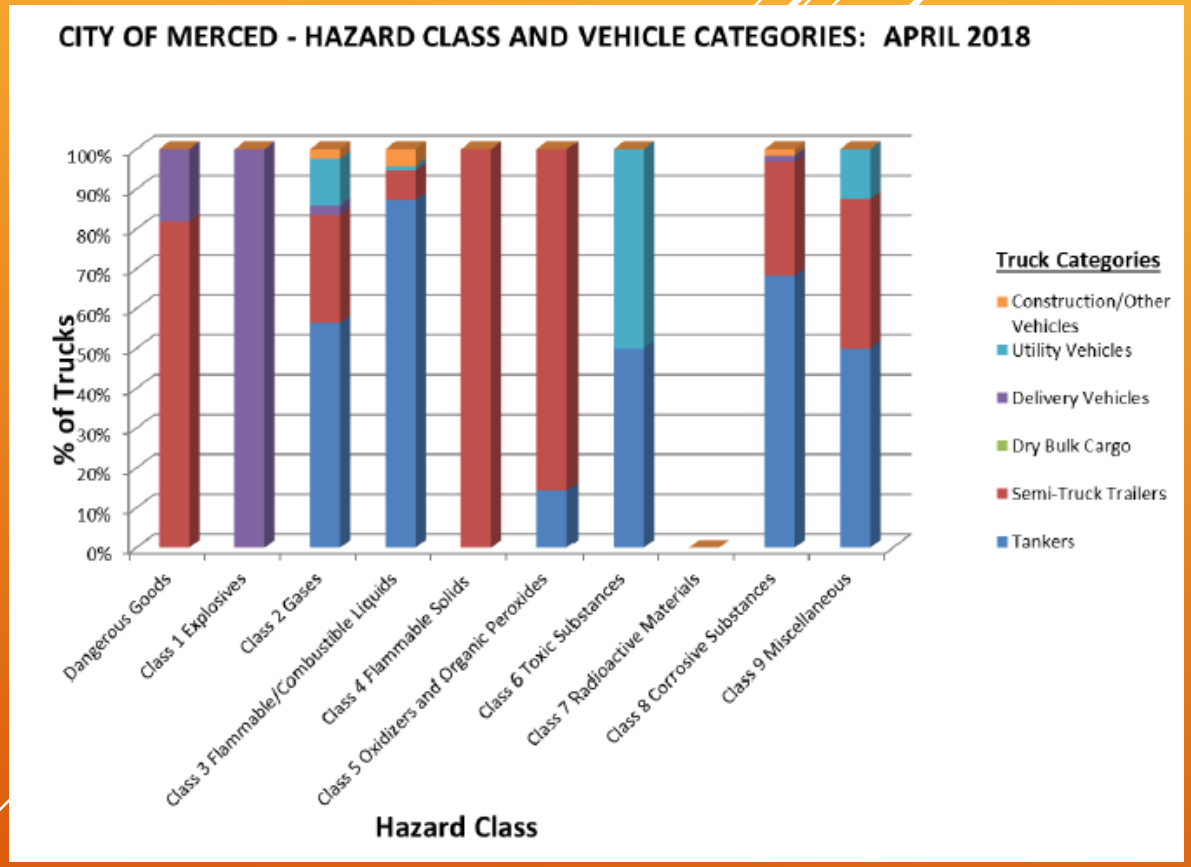
COMMODITY FLOW STUDY





COMMODITY FLOW STUDY





COMMUNITY RISK ASSESSMENT

OBJECTIVE

- To determine the potential for a high–risk, transportation-related hazardous materials incident/accident within the City of Merced.
- To assess the consequences of such an incident on vulnerable populations within the City of Merced.
- To determine a path forward to mitigate the consequences of such an incident.

RISK ASSESSMENT STRATEGIES

- Analysis of toxic chemical plumes (chlorine and anhydrous ammonia) using USEPA ALOHA modeling program (Aerial Locations of Hazardous Atmospheres).
- Analysis of a Bakken crude oil rail car incident.
- Discussion of underground pipeline incidents.

TOXIC CHEMICAL PLUMES

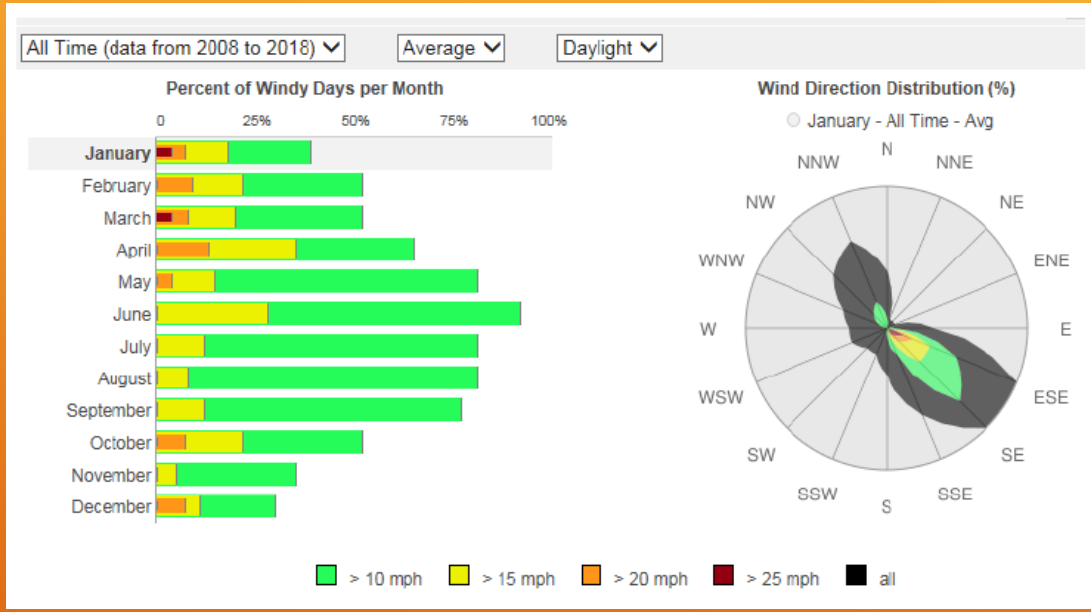
- Both chlorine and anhydrous ammonia/ammonia can be dangerous to life and health.
- Chlorine

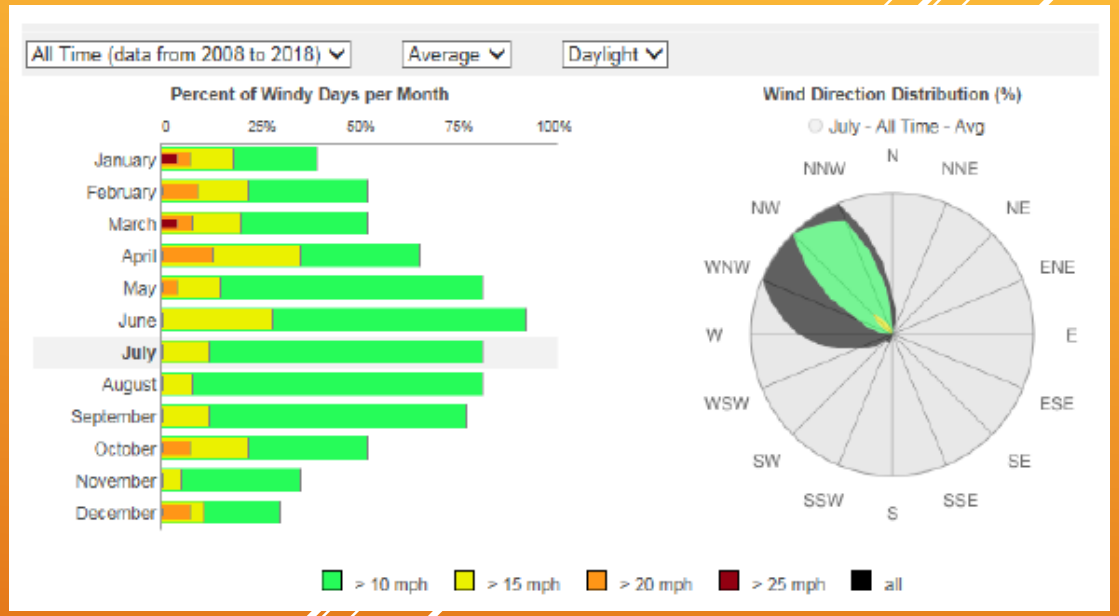
- Ammonia/Anhydrous Ammonia

TOXIC CHEMICAL PLUMES
ALOHA PLUME MODELING

- ALOHA modeling based on:
  - Weather Patterns: Temperature, wind direction
  - Transportation Patterns: Areas of highest hazardous materials transportation
  - Demographics: Areas of concentration of most vulnerable populations/receptors
  - Critical Facilities: Fire and Police Departments, Municipal Buildings, Emergency Operations Facilities, Medical Facilities, Schools,
  - Risk Control Points: Locations most likely to experience an accident/incident
- 3 zones modeled
  - Red zone: Life threatening health effects or death
  - Orange Zone: Irreversible or serious, long-lasting adverse health effects
  - Yellow Zone: Notable discomfort/irritation, but not disabling. Effects transient and reversible upon cessation to exposure

TOXIC CHEMICAL PLUMES
WEATHER PATTERNS - MERCED

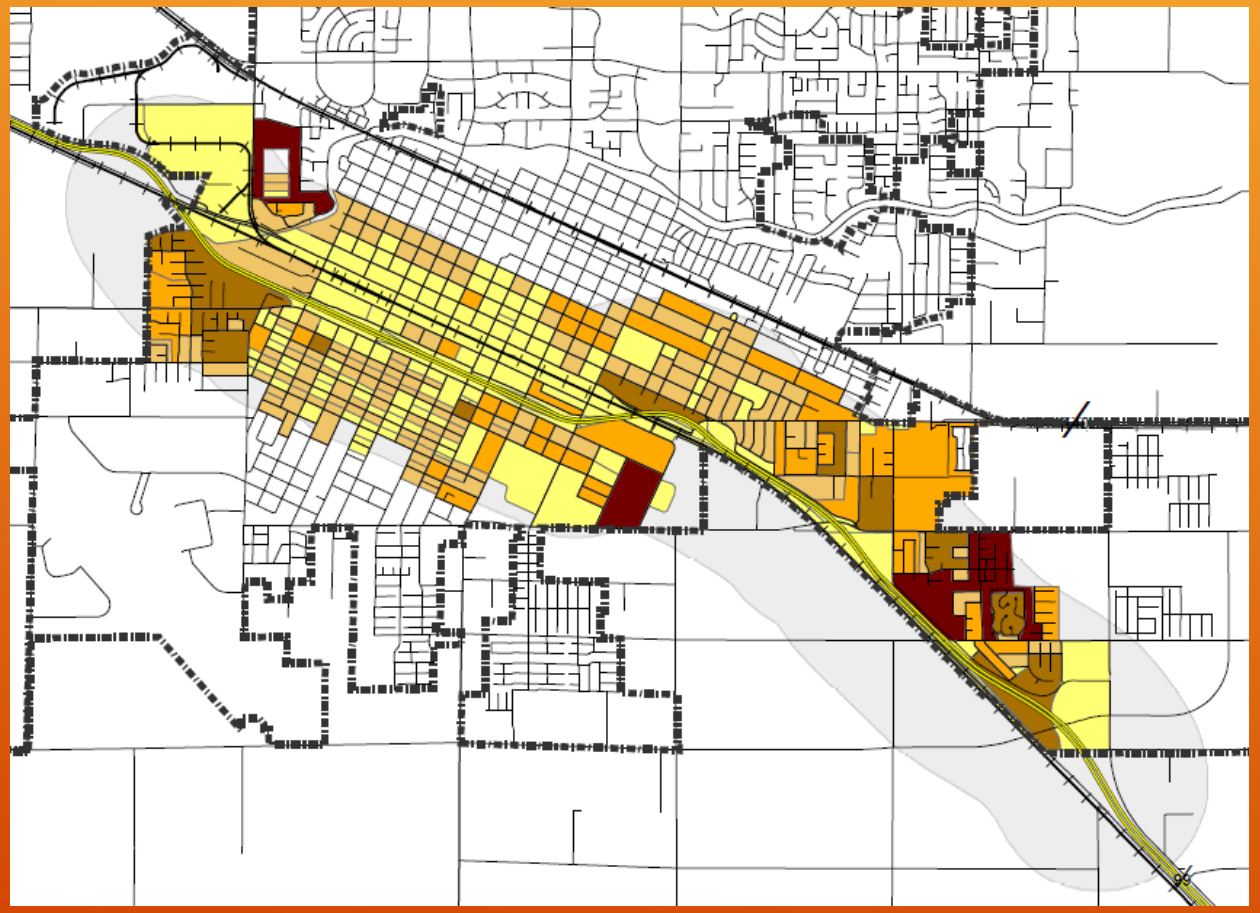




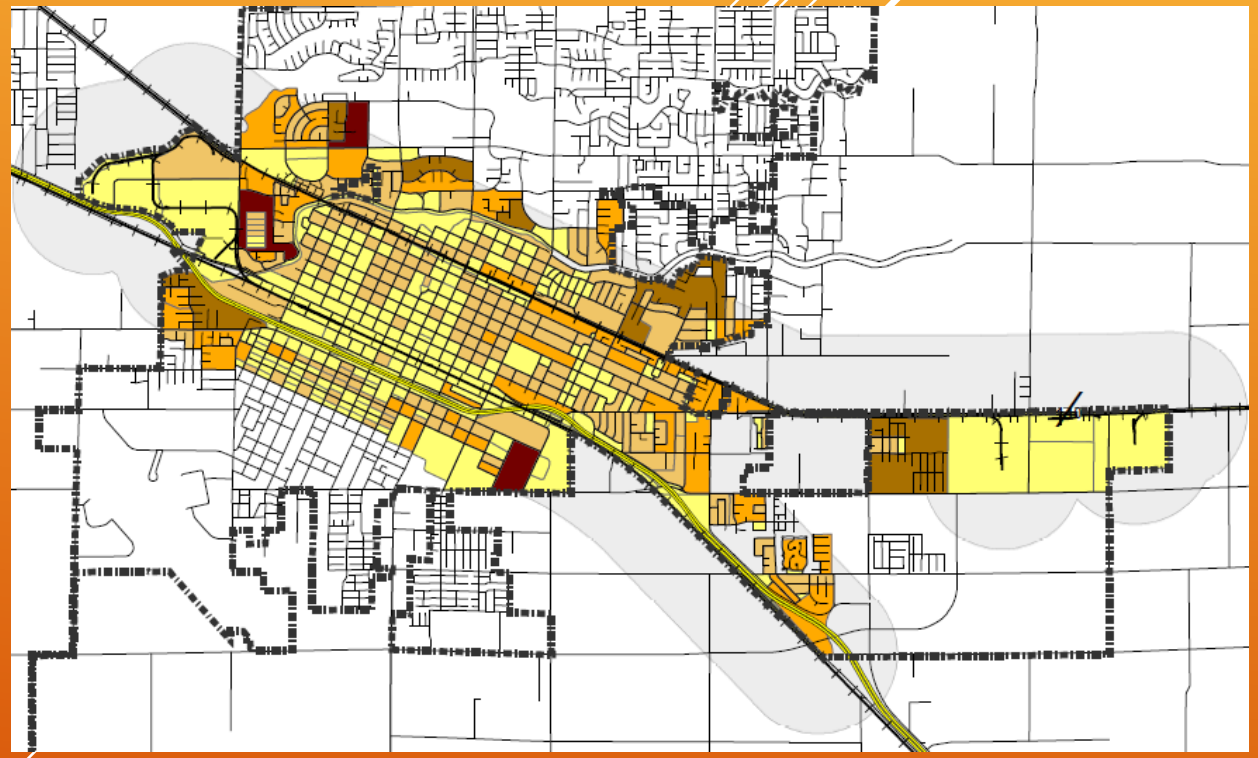
CITY OF MERCED - ANNUAL WEATHER DATA		
	January	**July**
Wind Direction Primary	S45°E	N40°W
Wind Direction Secondary	N22°W	N/A
Average Wind Speed (mph)	5.3	7.5
Daily High Temperature (average)	55	97
Daily Low Temperature (average)	38	60
Average Temperature	47	79
Average Precipitation (inches)	2.5	0.1
% Cloudiness	55	2

TOXIC CHEMICAL PLUMES TRANSPORTATION CORRIDORS - MERCED

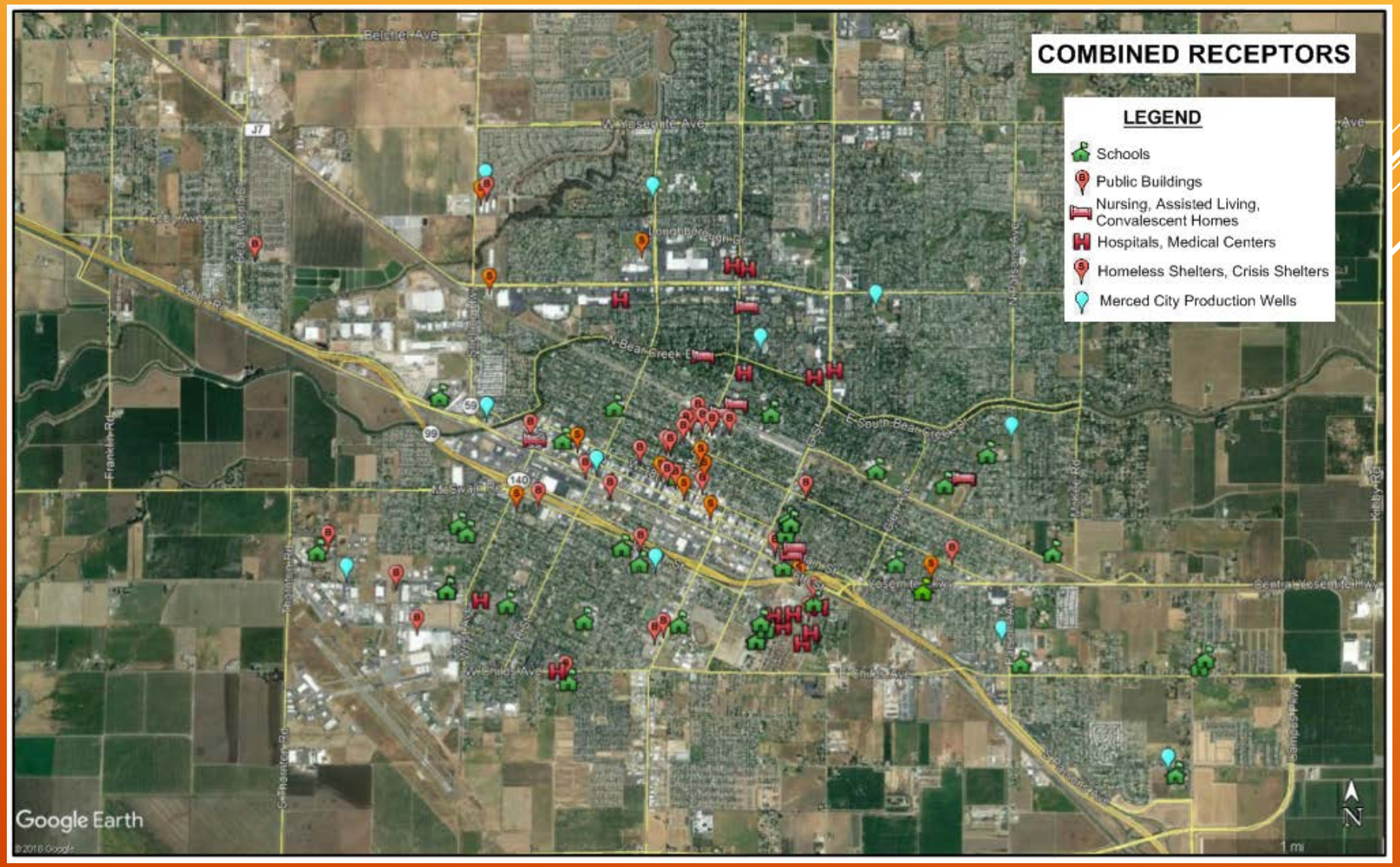
Highway 99



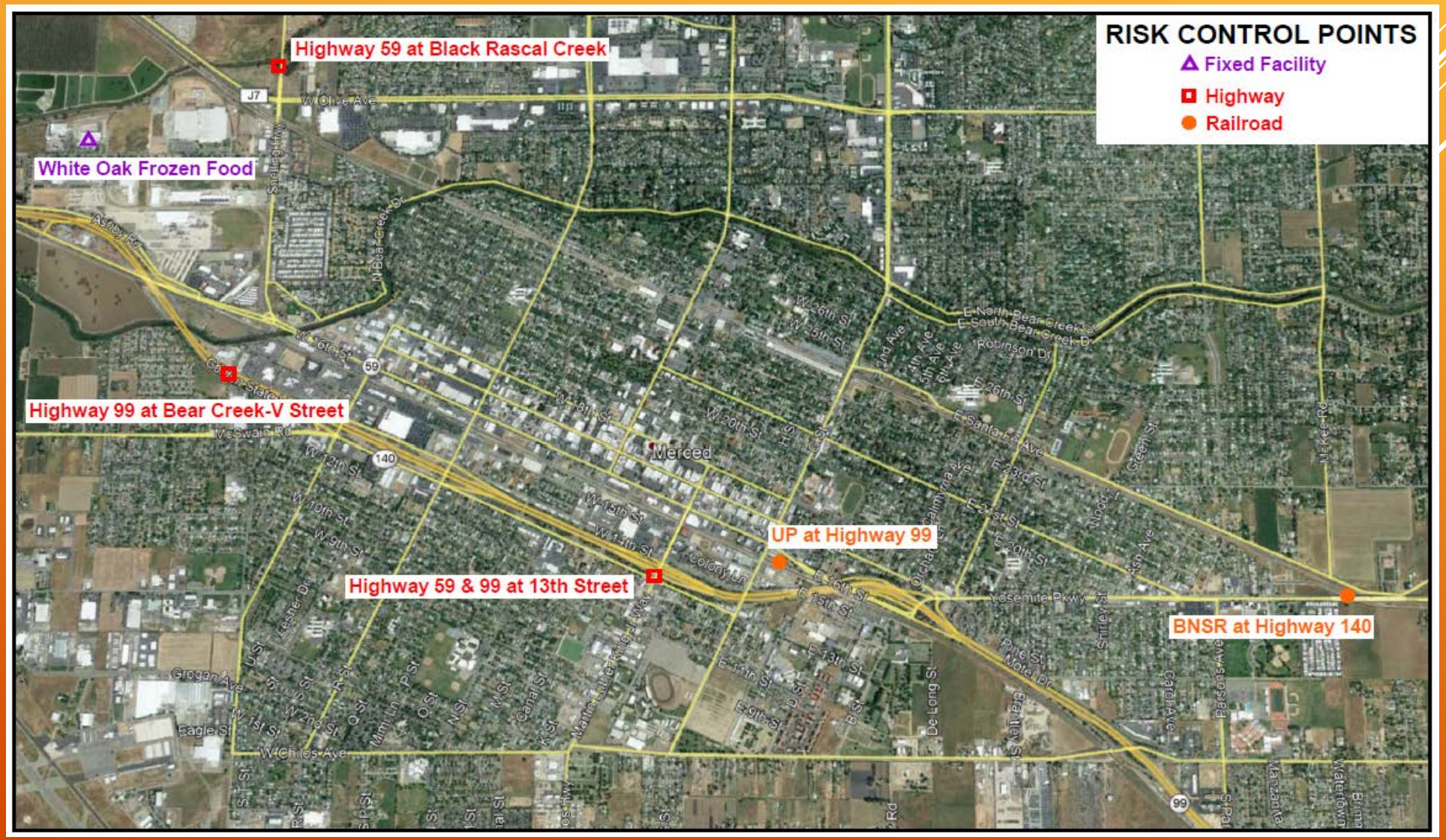
Railroads



TOXIC CHEMICAL PLUMES RECEPTORS/CRITICAL FACILITIES- MERCED

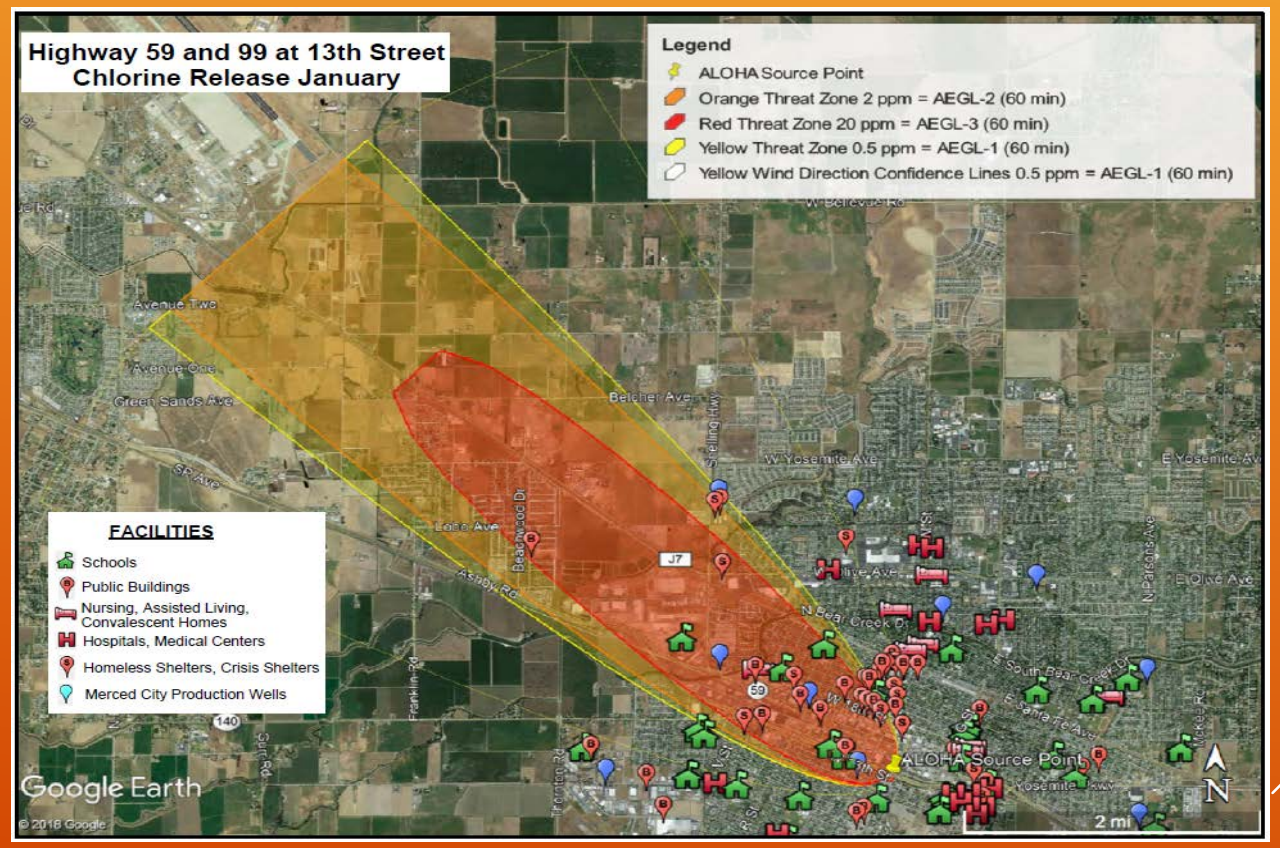


TOXIC CHEMICAL PLUMES
RISK CONTROL POINTS - MERCED

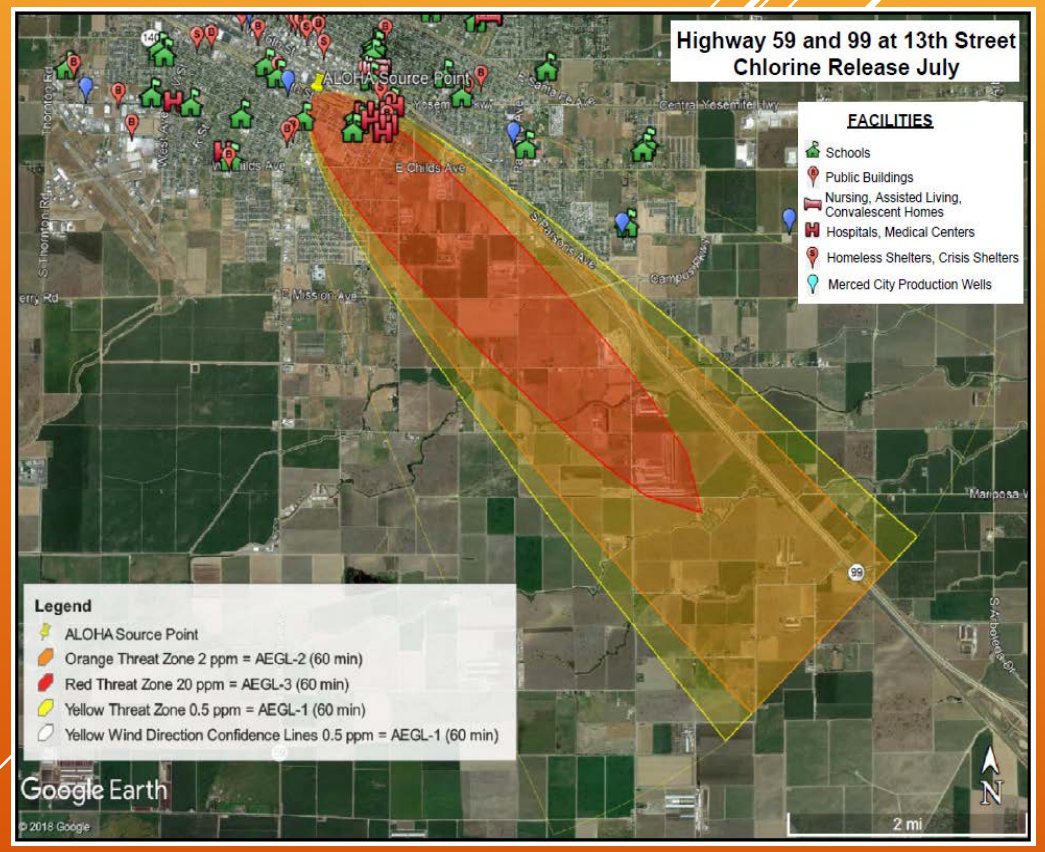


TOXIC CHEMICAL PLUMES
CHLORINE PLUMES - MERCED

January

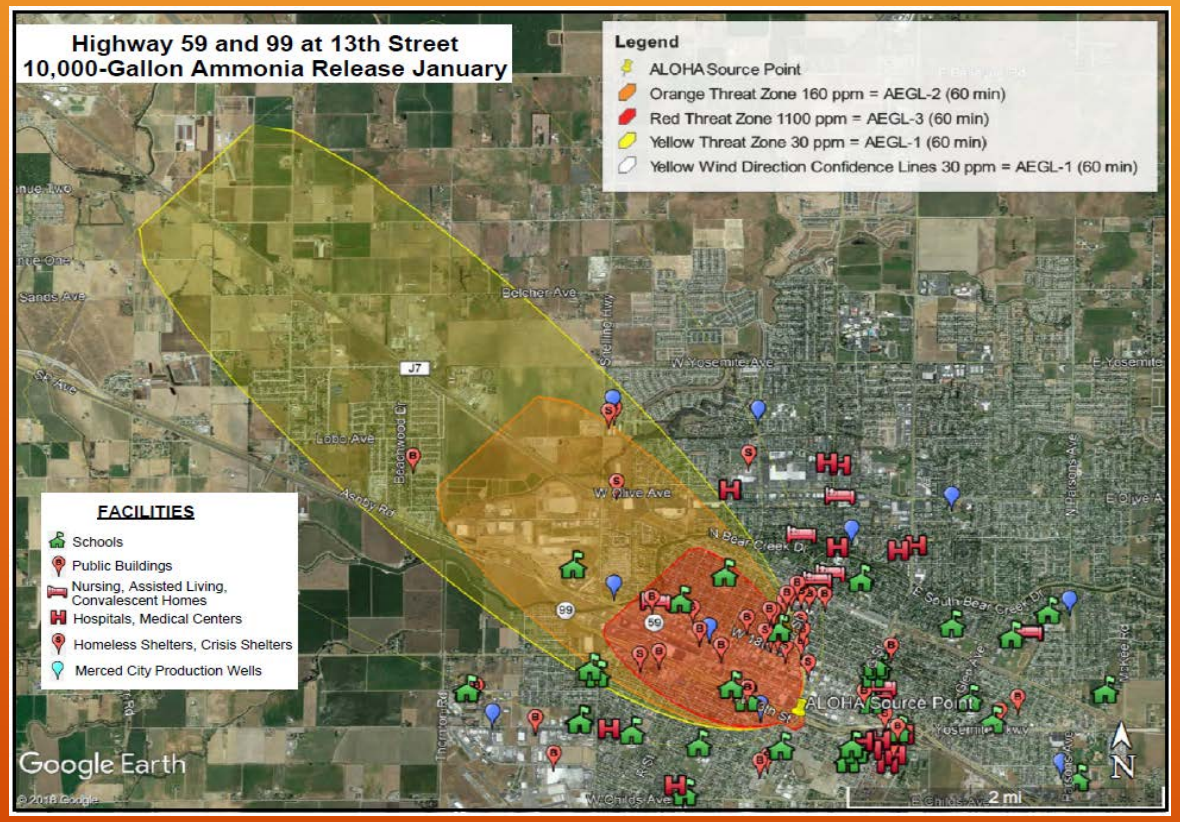


July

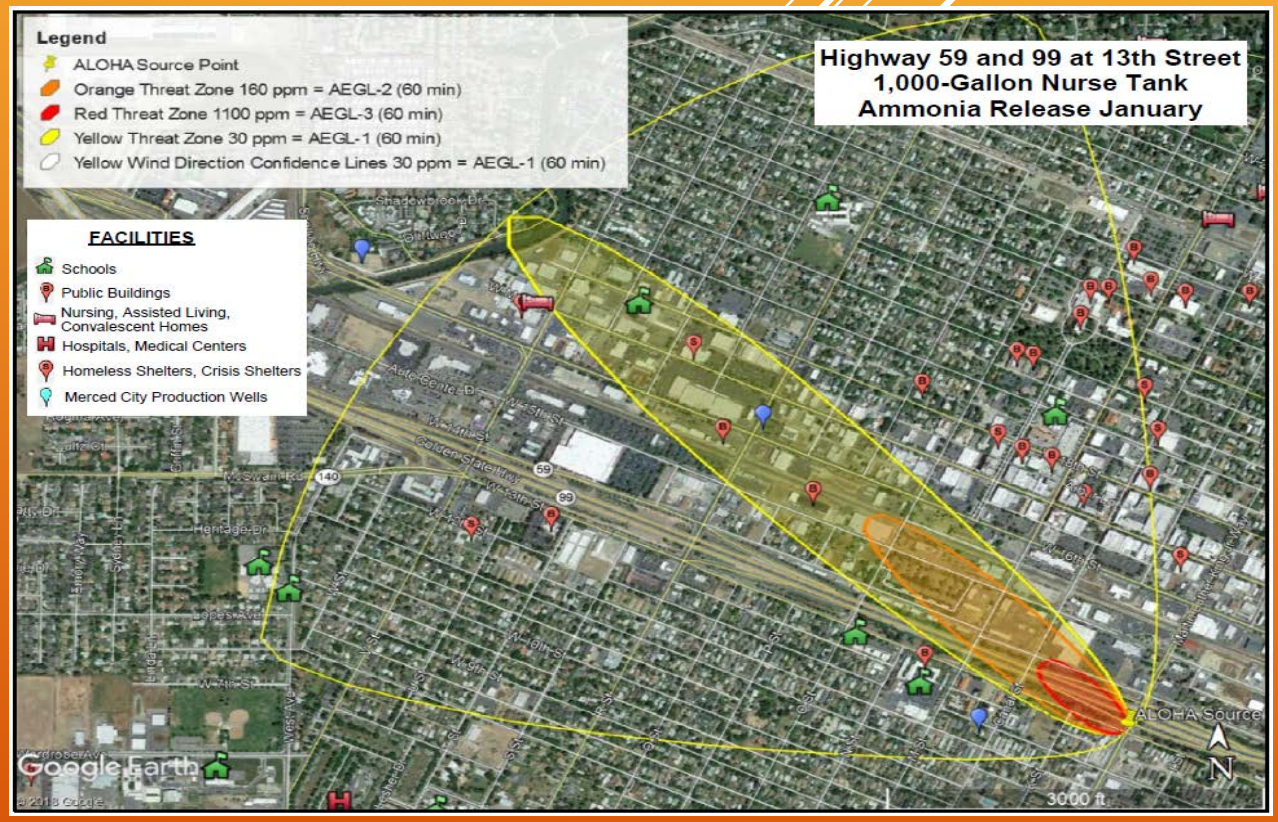


TOXIC CHEMICAL PLUMES
AMMONIA PLUMES - MERCED

10,000-Gallon Tanker Truck

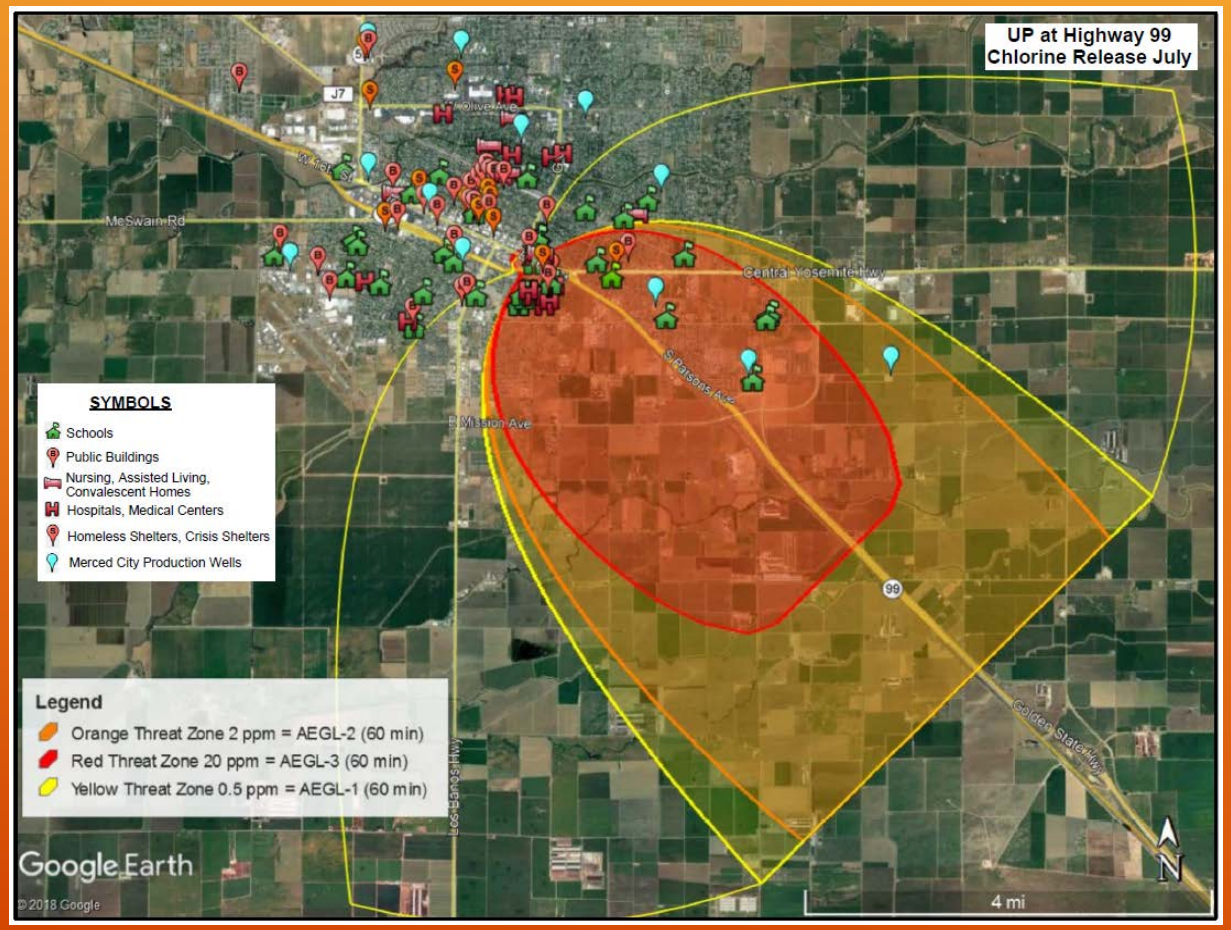


1,000-Gallon Nurse Tank

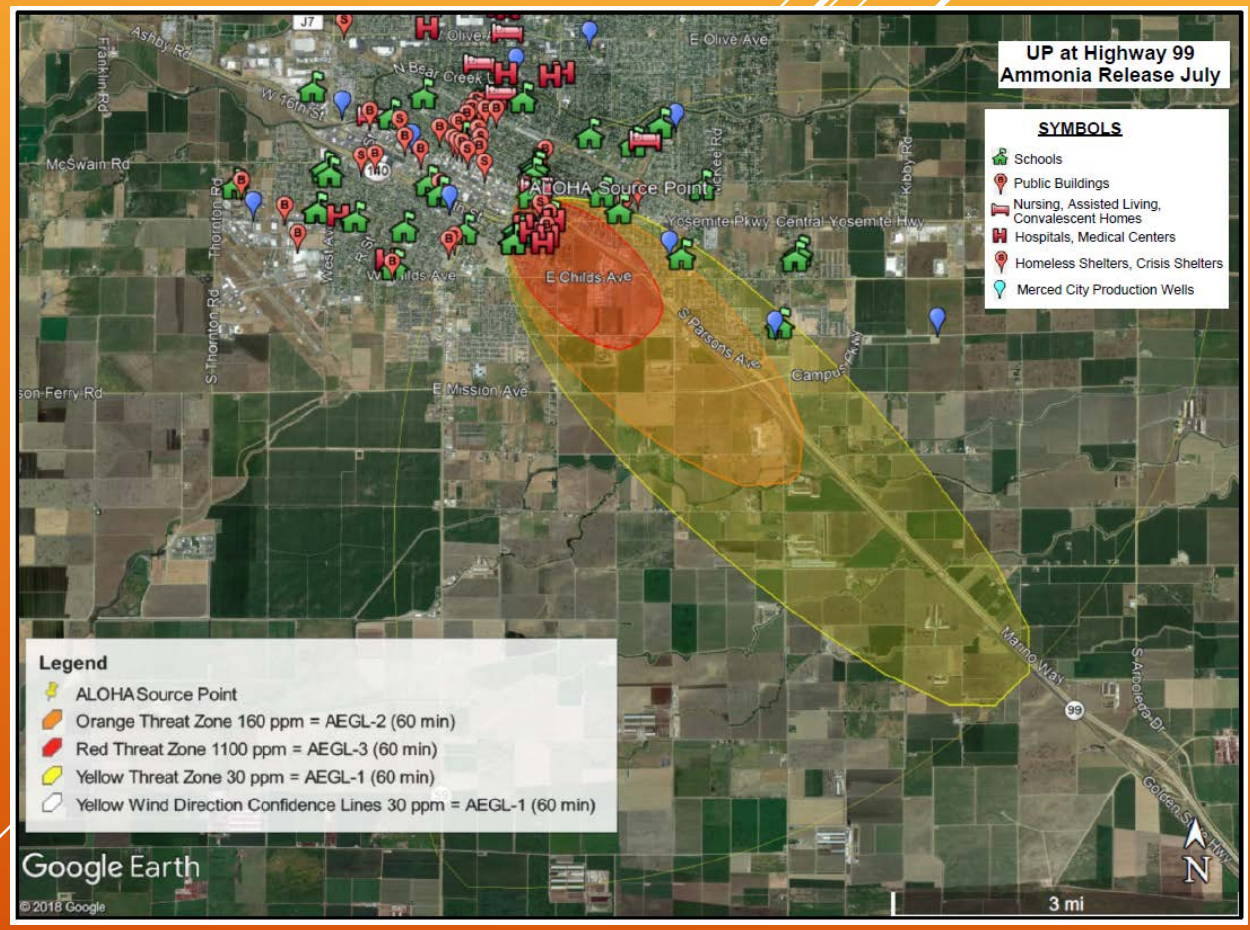


TOXIC CHEMICAL PLUMES
CHLORINE & AMMONIA PLUMES - RAILROAD

Chlorine - July



Ammonia - July



TOXIC CHEMICAL PLUMES RESPONSE AND MITIGATION

- Proactive vs. Reactive
- Reactive
  - Inability to mitigate the source
  - Massive evacuations of vulnerable populations from the affected areas
  - Critical facilities non-functional
  - Death and critical illness of vulnerable populations
- Proactive
  - First Responders properly equipped and trained to respond to and isolate source of release
  - Prevents toxic plume from spreading over a wide area
  - Significant reductions in death and critical illness
  - Massive evacuation may not be necessary

CRUDE OIL RELEASE INCIDENT - RAIL

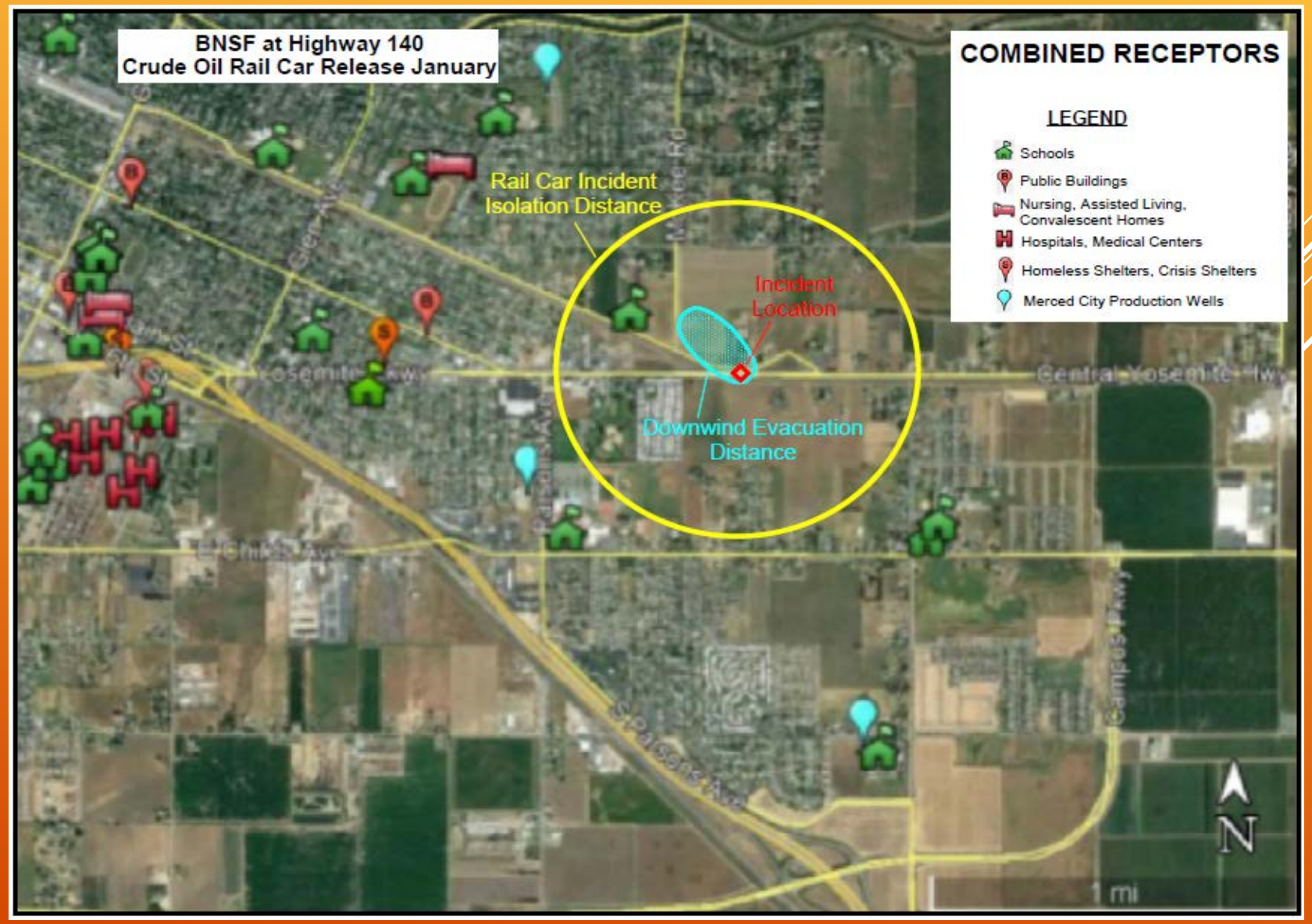
- 30,000-Gallon tanker car with Bakken crude oil
- Has ruptured and oil is spilling out and has ignited
- Extremely flammable with possibility of explosion
- Bakken crude oil not considered a lethally toxic chemical

THE POSSIBILITY OF A RAIL CAR INCIDENT INVOLVING BAKKEN CRUDE OIL IS SIGNIFICANTLY HIGHER THAN AN INCIDENT INVOLVING CHLORINE OR AMMONA DUE TO THE HIGHER VOLUME OF BAKKEN CRUDE BEING TRANSPORTED THROUGH THE CITY OF MERCED.

CRUDE OIL RELEASE INCIDENT - RAIL

MAJOR INCIDENT IN LAC MEGANTIC, QUEBEC IN JULY 2013 RESULTED IN 47 DEATHS AND 30 BUILDINGS DESTROYED.

CRUDE OIL RELEASE INCIDENT - RAIL



CRUDE OIL RELEASE INCIDENT RESPONSE AND MITIGATION

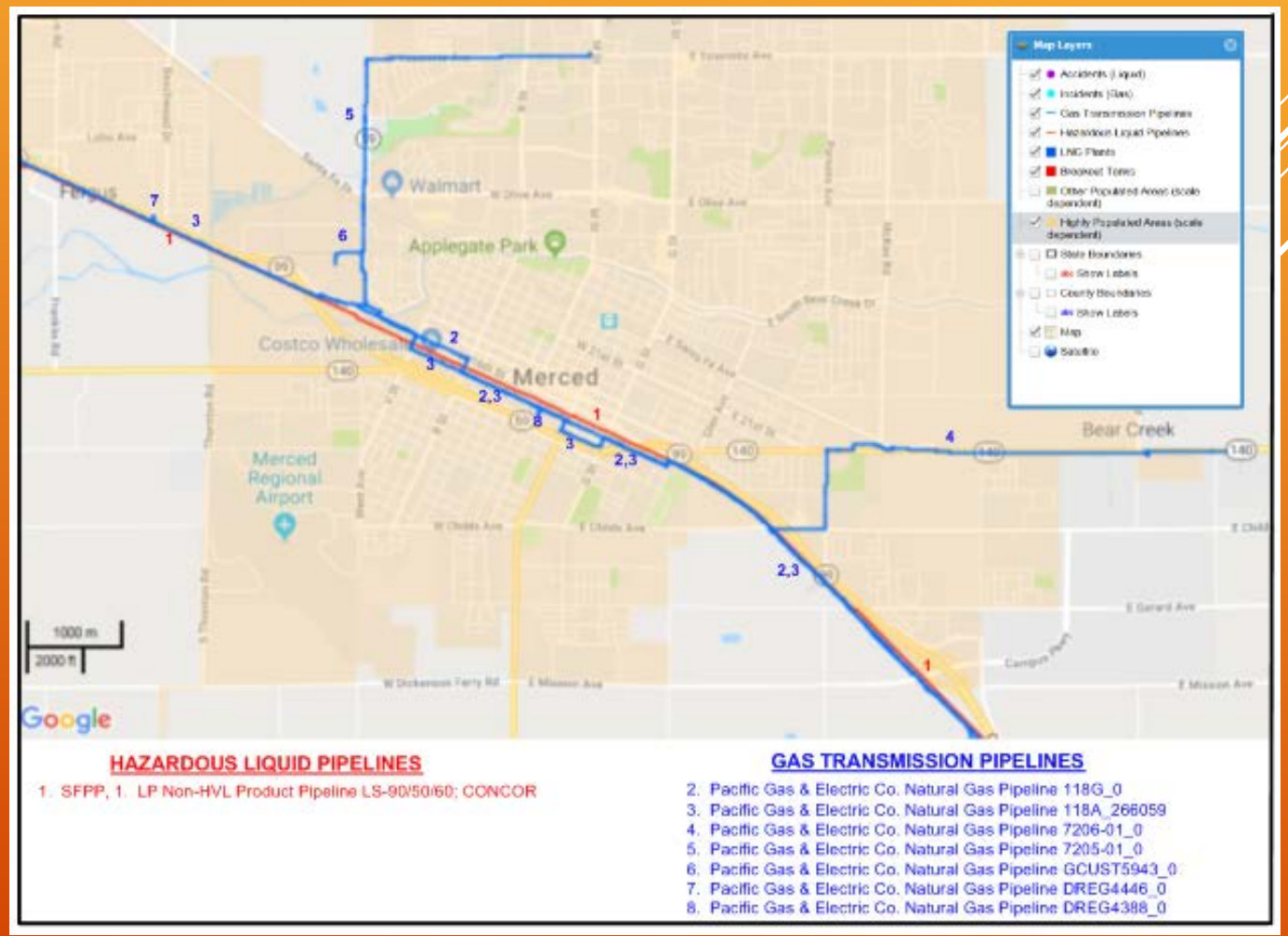
- Proactive vs. Reactive
- Reactive
  - Inability to mitigate the source
  - Evacuation of vulnerable populations in immediate vicinity of incident
- Proactive
  - First Responders properly equipped and trained to respond to and isolate source of release
  - First Responders properly equipped and trained to extinguish fires
  - First Responders properly equipped and trained to prevent any crude oil liquid from entering waterways, sewers, storm drains, wells, or other sensitive environmental receptors
  - Evacuation of vulnerable populations as needed

GASOLINE TANKER TRUCK RELEASE INCIDENT

- 10,000-Gallon tanker truck with gasoline
- Similarities of gasoline and Bakken crude oil will require a similar response.
- Gasoline is the most common hazardous commodity transported through the City of Merced.
- Could happen **anywhere and at any time** within the City of Merced

PIPELINE RELEASE INCIDENT

- Major hazardous liquid and natural gas transmission pipelines run primarily along the Highway 99 transportation corridor



PIPELINE RELEASE INCIDENT RESPONSE AND MITIGATION

- First responders coordinate with pipeline operators to immediately isolate affected pipelines
- Evacuation of affected populations if necessary
- Pipeline operators to upgrade older pipelines

SUMMARY – VULNERABLE POPULATIONS

- Convergence of demographics, location of transportation corridor, weather patterns indicates that the area most at risk for a hazardous materials incident is along and adjacent to transportation corridor.
- Downtown Merced and a significant number of critical facilities are located in this zone.
- Depending on the chemical, a hazardous material release is most likely to be located in this zone.
- Massive evacuation, critically ill people, and death.

SUMMARY – MITIGATION ACTIONS

- Proactive vs. Reactive
- Reactive
  - Inability to mitigate the source
  - Massive evacuations of vulnerable populations from the affected areas
  - Critical facilities non-functional
  - Death and critical illness of vulnerable populations
- Proactive
  - First Responders properly equipped and trained to respond to and isolate source of release
  - Prevents toxic plume from spreading over a wide area
  - Significant reductions in death and critical illness
  - Massive evacuation may not be necessary

FIRE DEPARTMENT NEXT STEPS

Evaluating the resources necessary for program implementation:

- Phase 1 – Develop Mutual Aid Response Model
  - MOU between County and City for use of equipment
  - Collaborative training to ensure mutual response
  - Hold annual large-scale exercise

- Phase 2 – Possible Independent Hazmat Response
  - Additional trained staff
  - Acquire necessary equipment
  - Additional protective gear