



UrbanDataLabs, LLC

Unlocking TIER II Data
Leveraging Analytics and GIS for
Data-Driven Hazmat Planning

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Harnessing the Transformative Potential of Urban Data Science and GIS

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Welcome and Introduction

- Five years of Emergency Management at the county level
 - Certified Urban Planner (AICP)
 - Certified GIS Professional (GISP)
 - R Programmer (Analytics)
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- Started UrbanDataLabs, LLC in 2023 to blend Analytics, GIS, and Urban Planning for Urban Resilience




Bernardo Salazar, AICP, GISP

Presentation Outline

- Overview and Background of TIER II
- Using the CAMEO Suite
- Leveraging Analytics and GIS
- Examples
- Questions/Comments





Ammonium Nitrate Explosion
15 died (mostly volunteer firefighters)
200 more injured
350 homes damaged
School disruption

April 17, 2013

West Fertilizer Explosion and Fire, West, TX

Overview and Background of TIER II

Emergency Planning and Community Right-to-Know Act (EPCRA)

- In 1986, Congress passed the Emergency Planning and Community Right-to-Know Act
 - Establishes Local Emergency Planning Committees (LEPCs)
 - Chemical reporting requirements (TIER II)
- Reaffirmation for Hazmat Planning after the West Explosion
 - April 17, 2013, an ammonium nitrate explosion occurred at the West Fertilizer Company storage in West, Texas, eighteen miles north of Waco.
 - Fifteen people were killed, more than 160 were injured, and more than 150 buildings were damaged or destroyed.

What is a TIER II Report?

- Hazardous chemical inventory report submitted to LEPC, Fire Departments & TCEQ
- Provides crucial information:
 - **Facility Identification**
 - **Owner/Operator Information**
 - **Emergency Contact Information**
 - **Chemical Inventory**
 - **Other Attachments**



TIER II Chemical Data Access

State of Texas Environmental Electronic Reporting System

- Three Components for Tier II Reporting in STEERS:
 - Tier II Core Data (EPR TIERII)
 - Tier II Reporting (TIERII)
 - Tier II Government Official (TIERII GOV)
- Tier II Government Official (TIERII GOV)
 - Access to Government Officials, Fire, Emergency Managers
- Exports still compatible with CAMEO Data Manager

Using the CAMEO Suite

Using the CAMEO Suite

Computer-Aided Management of Emergency Operations

CAMEO Data Manager: Keeps track of information provided by facilities through Tier II reports, such as Chemical Inventory, Contacts, Facility Information. Integrates with other CAMEO Programs

CAMEO Chemicals: A hazardous materials database with thousands of datasheets, response recommendation, and chemical reactivity

ALOHA: Areal Locations of Hazardous Atmospheres – generate threat zones and plume models

MARPLOT: Mapping Application for Response, Planning, and Operational Tasks – import spatial data, link facilities from CAMEO Data Manager, display ALOHA plume models

TIER II
Data



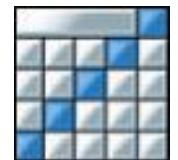
Cameo
Chemicals



Data
Manager



ALOHA

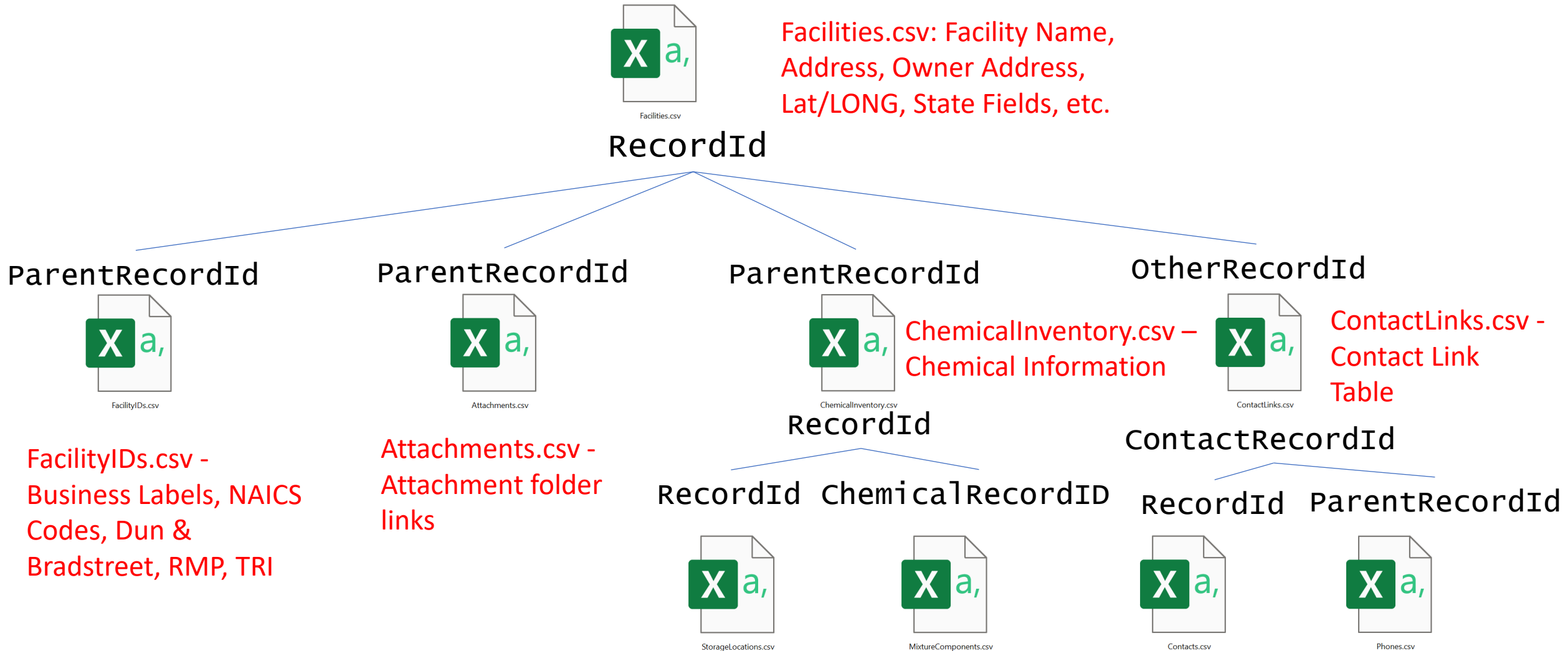


MARPLOT



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TIER II Data Structure



Limitations of Using CAMEO

Assumes Perfect Data: CAMEO Data Manager imports data without any data quality control. This is critical for TIER II location data.

Limited Perspective: The CAMEO Suite provides a narrow view of the overall chemical threats, potentially leading to an incomplete risk assessment. You need to know what you're looking for.

Not Exploratory in Nature: Users need to have a clear idea of the information they are seeking, as the software does not support broad or vague search parameters.

Lack of Interoperability: The CAMEO Suite does not seamlessly interact or exchange data with other software systems, potentially causing difficulties in integrated data analysis or cross-platform usage.

Leveraging Analytics and GIS

Why Use Analytics and GIS?

Analytics, refers to systematically applying statistical, mathematical, or computational techniques to analyze and make sense of TIER II Chemical Data.

- **Data Cleaning and Validation**
- **Data Aggregation**
- **Descriptive Analytics**

TIER II Chemical Data can be difficult to interpret in its raw, tabular form. GIS offers a spatial dimension to the analysis, interpretation, and visualization of this data.

- **Spatial Analysis**
- **Visualization**
- **Real-time Tracking**

Working with TIER II Data Using R

R Programming Language

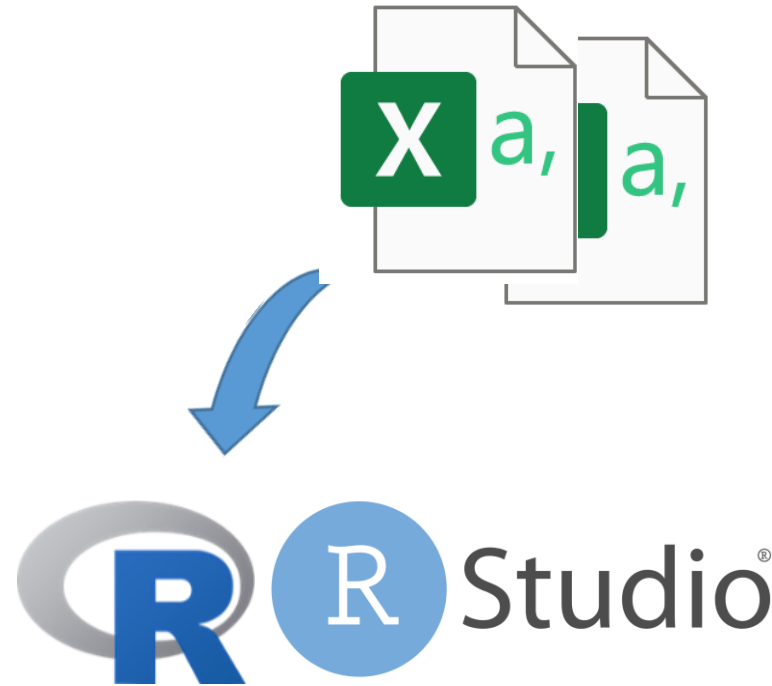
Robust statistical software used by Data Scientists and Data Analysts

Perfect for data mining, cleaning/transformation, and visualization

Growing number of packages available for GIS

Strong community support

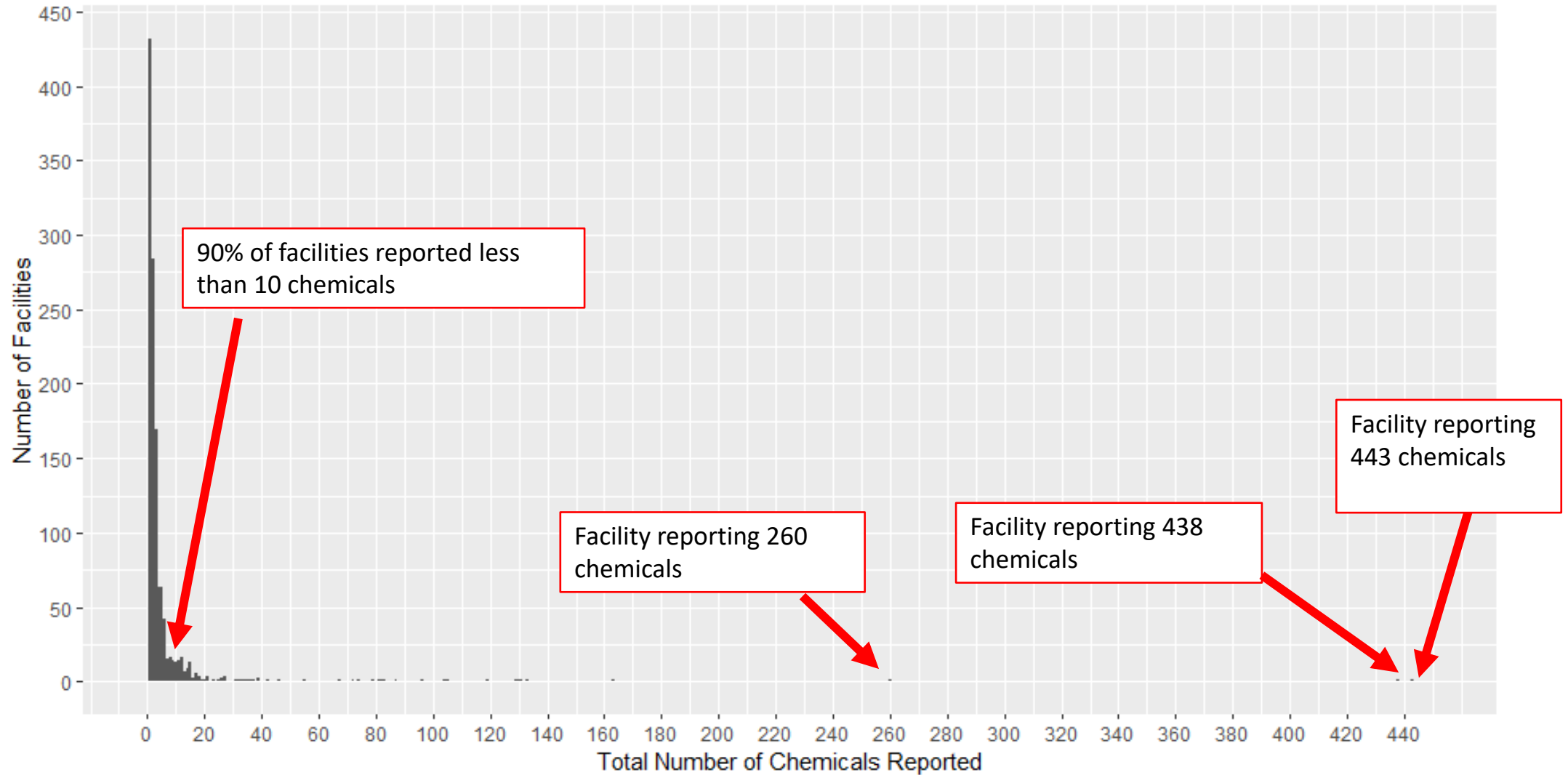
It's free!!



Examples

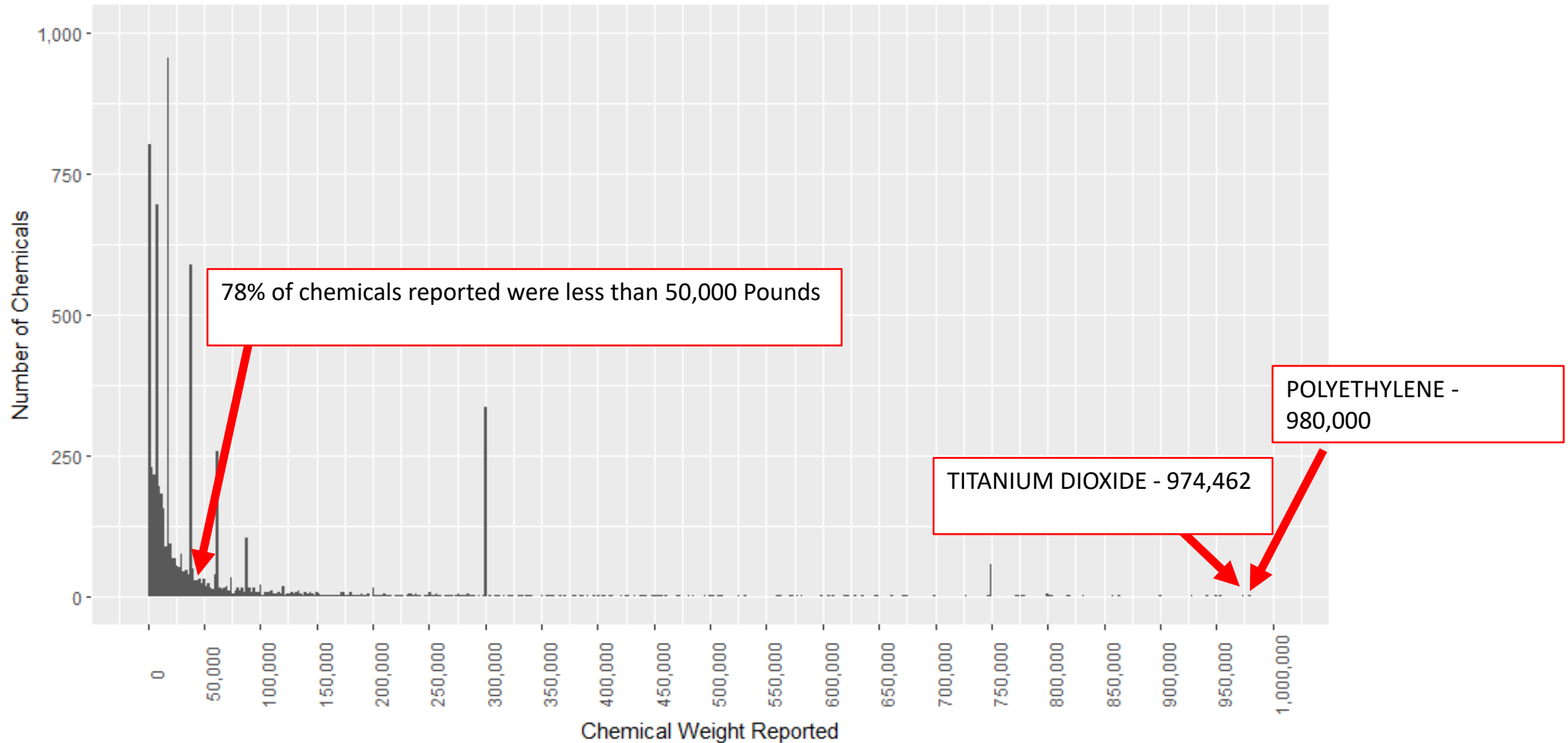
TIER II Analysis: Summary Statistics

Distribution of Total Chemicals Reported by Facility



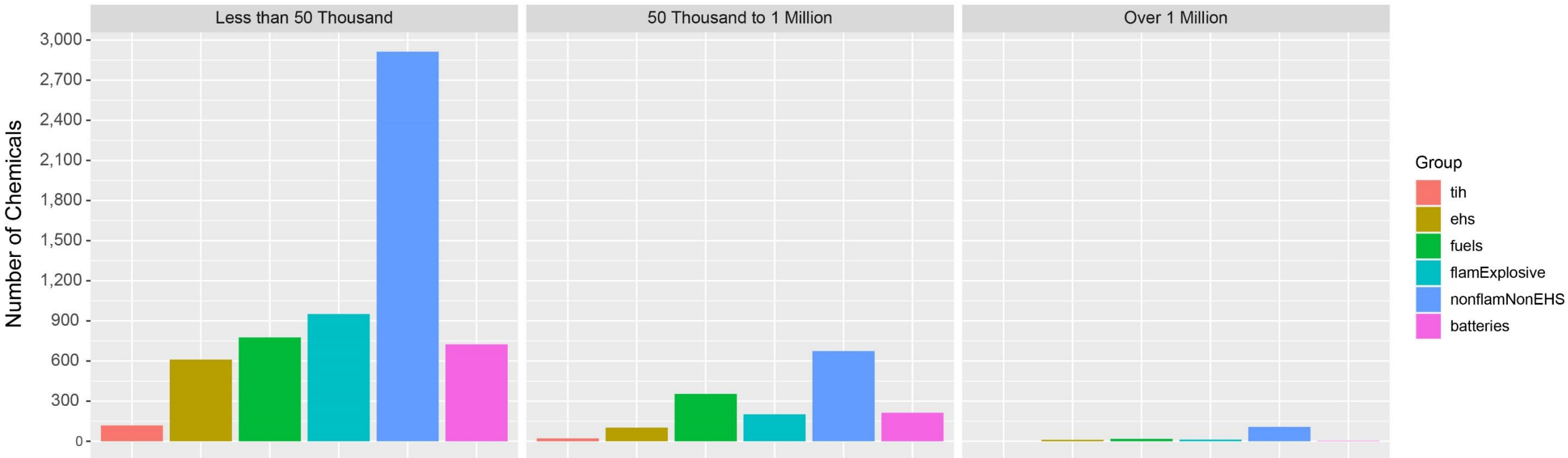
TIER II Analysis: Summary Statistics

Distribution of Reported Chemical Weight (Less than 1 Million Pounds)



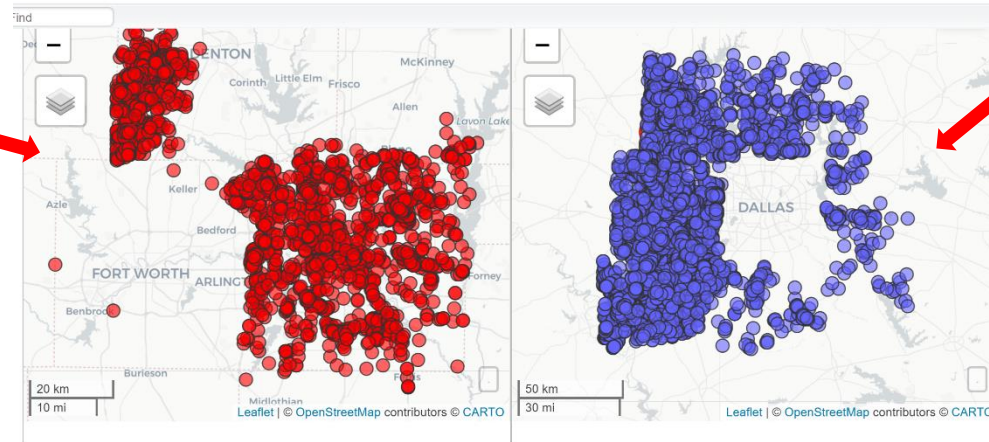
TIER II Analysis: Chemical Categories

Chemical Hazard Group by Chemical Weight Group



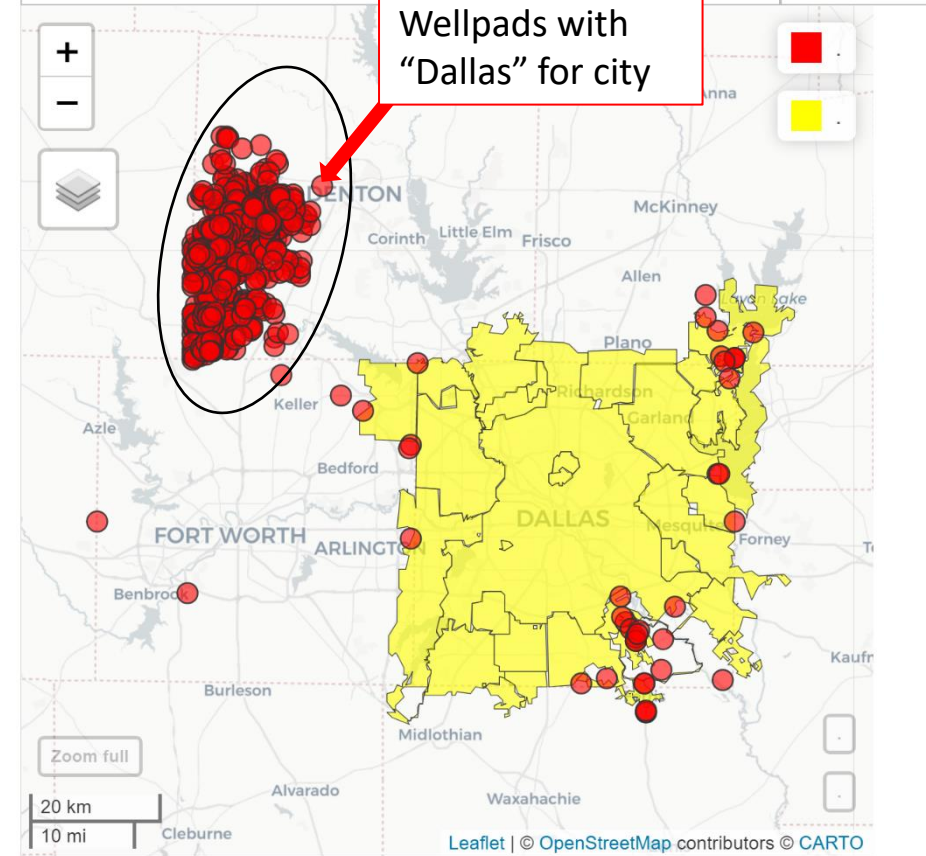
TIER II Location Verification

Dallas County Cities

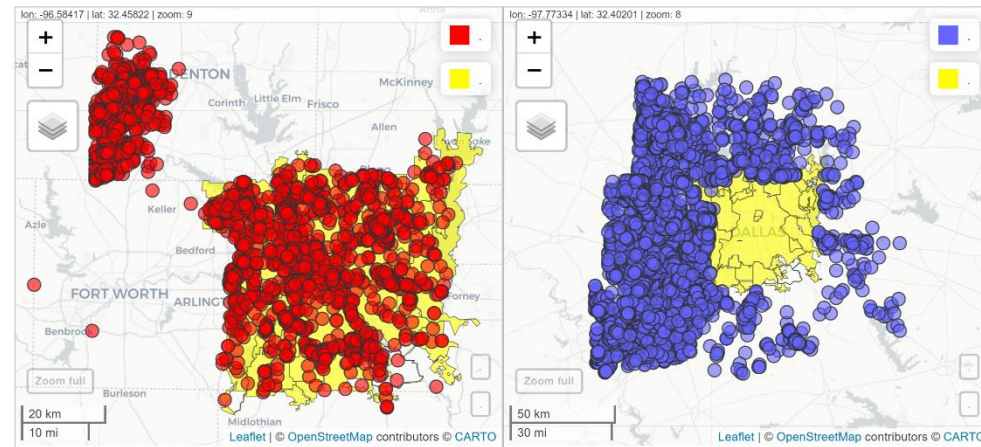


Other Cities

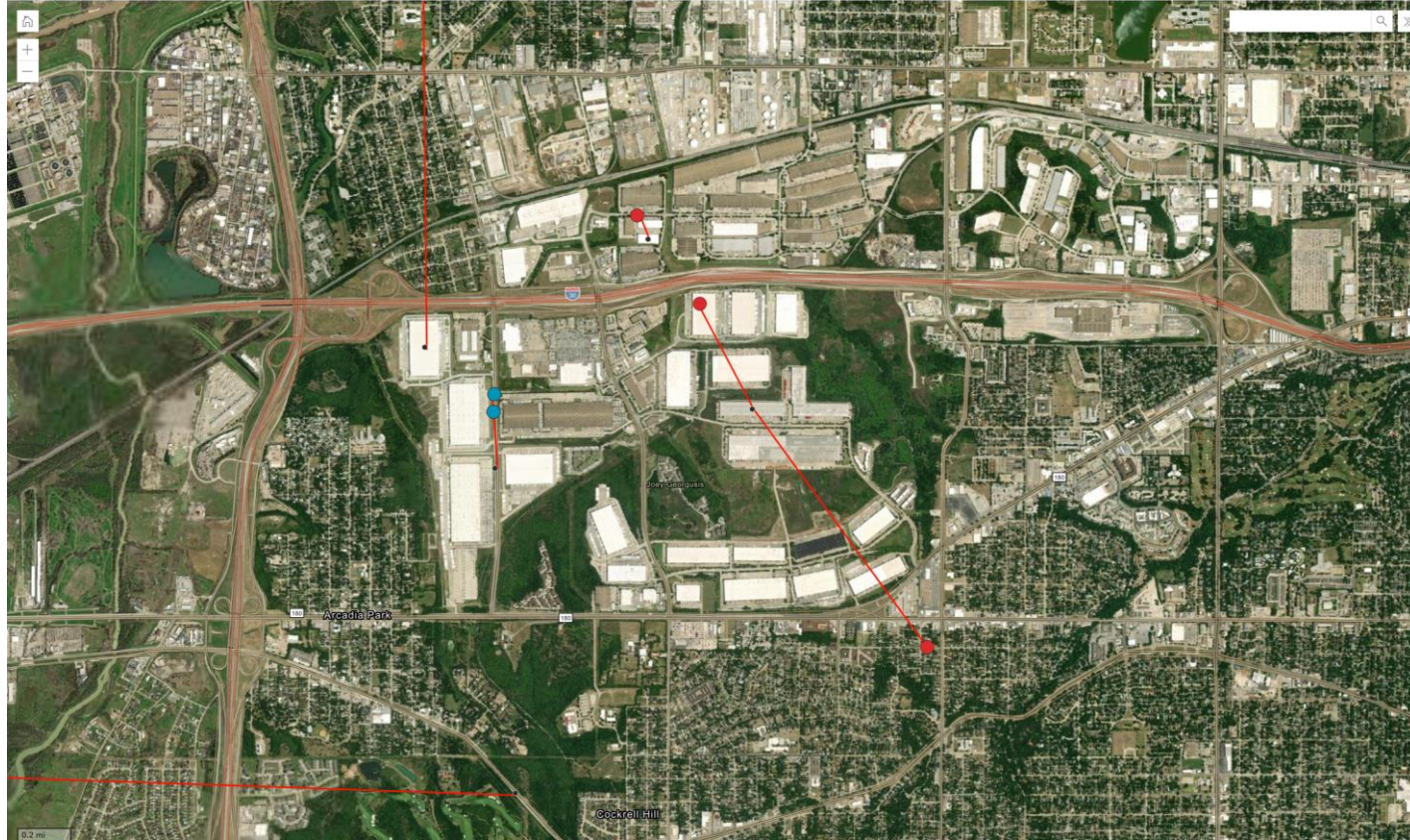
Wellpads with "Dallas" for city



bring other shapefiles



TIER II Location Verification



Reason

- Off Site
- Street Center Line
- Parking Lot
- Off Site/Parking Lot
- Unable To Verify
- Clarification Needed
- Discrepancy-Google Shows The Coordinates Fall On A Smaller Shed, But Arcgis Shows Point Falls On A Larger Building
- Discrepancy/Off/Google States The Address Belongs To Petco Distribution Center
- Garbage Section
- Lands On Field
- Other

Facility Priority Score

Priority Score Factors:

- Data Score
- Hazard Group
- Weight Group
- Vulnerability Index
- Number of Occupants
- Total Chemical Count
- Federal Program Enrollment
- Higher Score = Higher Priority
- Highest Score: 21 out 24
- Lowest Score: 7

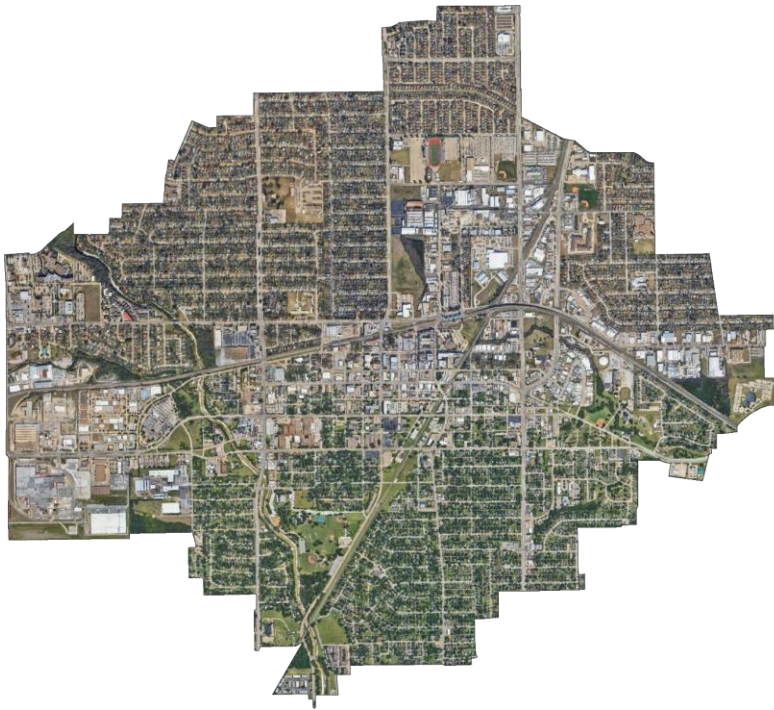
	A	B	C	D	E	F	G
1	priorityScore	STATION	ADMIN_AREA	SHIFT	SHIFT_RES	Name	
2	21	22		1 B	22-1 B SHIFT	AIR LIQUIDE ELECTRONICS U.S. LP DCC	
3	21	52		3 A	52-3 A SHIFT	MWWF OPERATING COMPANY WHITEWAVE FOODS OPEF	
5	20	42		2 C	42-2 C SHIFT	HEMPEL USA DALLAS	
6	20	43		1 B	43-1 B SHIFT	PETRA DALLAS PLANT	
7	20	57		2 C	57-2 C SHIFT	UNIVAR SOLUTIONS USA INC - DALLAS BEKAY ST TX	
13	19	38		1 B	38-1 B SHIFT	VERSUM MATERIA	
14	19	43		3 A	43-3 A SHIFT	TXI - SPANGLER RE	
15	19	43		3 A	43-3 A SHIFT	LATTIMORE MATE	
16	19	49		3 A	49-3 A SHIFT	TYSON PREPARED	
18	18	6		1 B	06-1 B SHIFT	LATTIMORE MATE	DY I
19	18	6		1 B	1 B SHIFT	TXI CORINTH ST READY MIX	
20	18	22		1 B	1 B SHIFT	TEXAS INSTRUMENTS NORTH CAMPUS	
28	17	16		1 B	16-1 B SHIFT	HARCROS CHEMICALS DALLAS BRANCH	
29	17	26		1 B	26-1 B SHIFT	TAYLOR FARMS TEXAS, INC.	
30	17	43		3 A	43-3 A SHIFT	REDI-MIX CONCRETE NORTH DALLAS	
31	17	47		3 A	47-3 A SHIFT	LABATT FOOD SERVICE DALLAS	
32	17	52		3 A	52-3 A SHIFT	REDDY ICE-DALLAS (311)	
33	17	30		2 C	30-2 C SHIFT	HENSLEY INDUSTRIES	
39	17					CENTRAL REGIONAL WASTEWATER SYSTEM	
42	16	9		3 A	09-3 A SHIFT	SOUTHSIDE WASTEWATER TREATMENT PLANT	
43	16	16		2 C	16-2 C SHIFT	RINCHEM	
44	16	22		1 B	22-1 B SHIFT	DRS NETWORK AND IMAGING SYSTEMS, LLC ELECTRO O	
45	16	22		1 B	22-1 B SHIFT	AIR LIQUIDE ELECTRONICS US LP TI BLVD GAS PLANT	
46	16	26		1 B	26-1 B SHIFT	TAYLOR FARMS TEXAS DELI FACILITY	
47	16	36		1 B	36-1 B SHIFT	GAF ROOFING MATERIALS	
48	16	36		1 B	36-1 B SHIFT	QUALITY SAUSAGE COMPANY	

Operations –
Responsibility
Zones

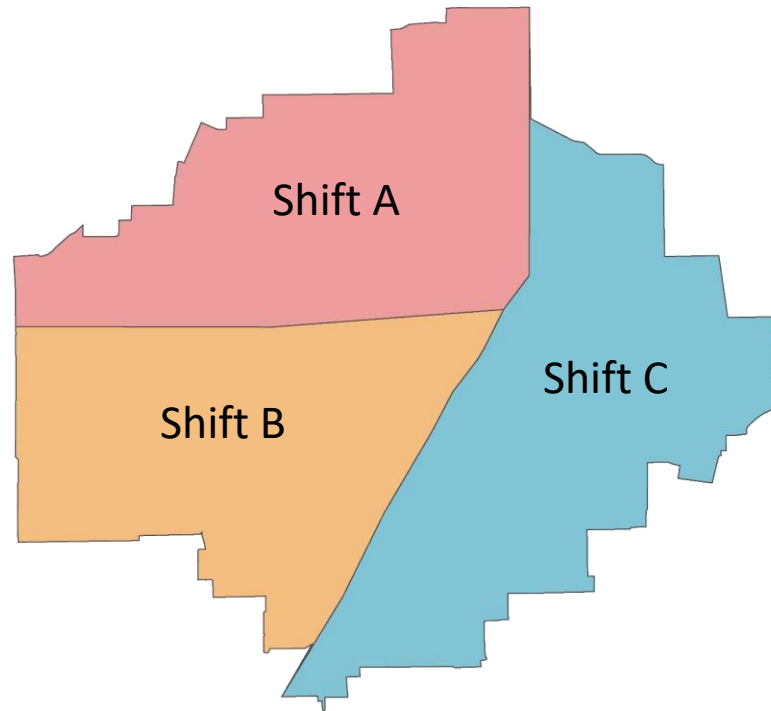
Prevention

Facility Priority Score

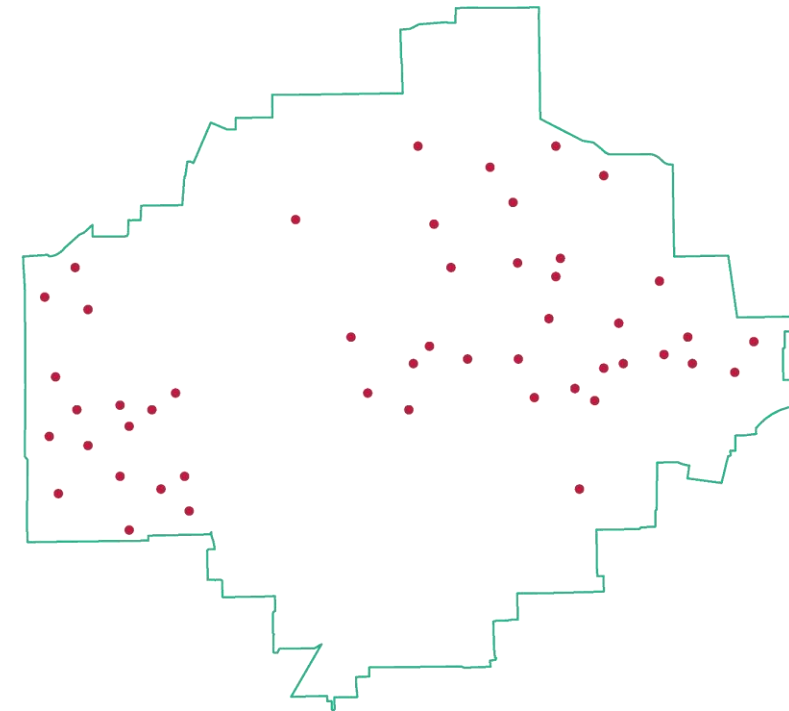
Fire District



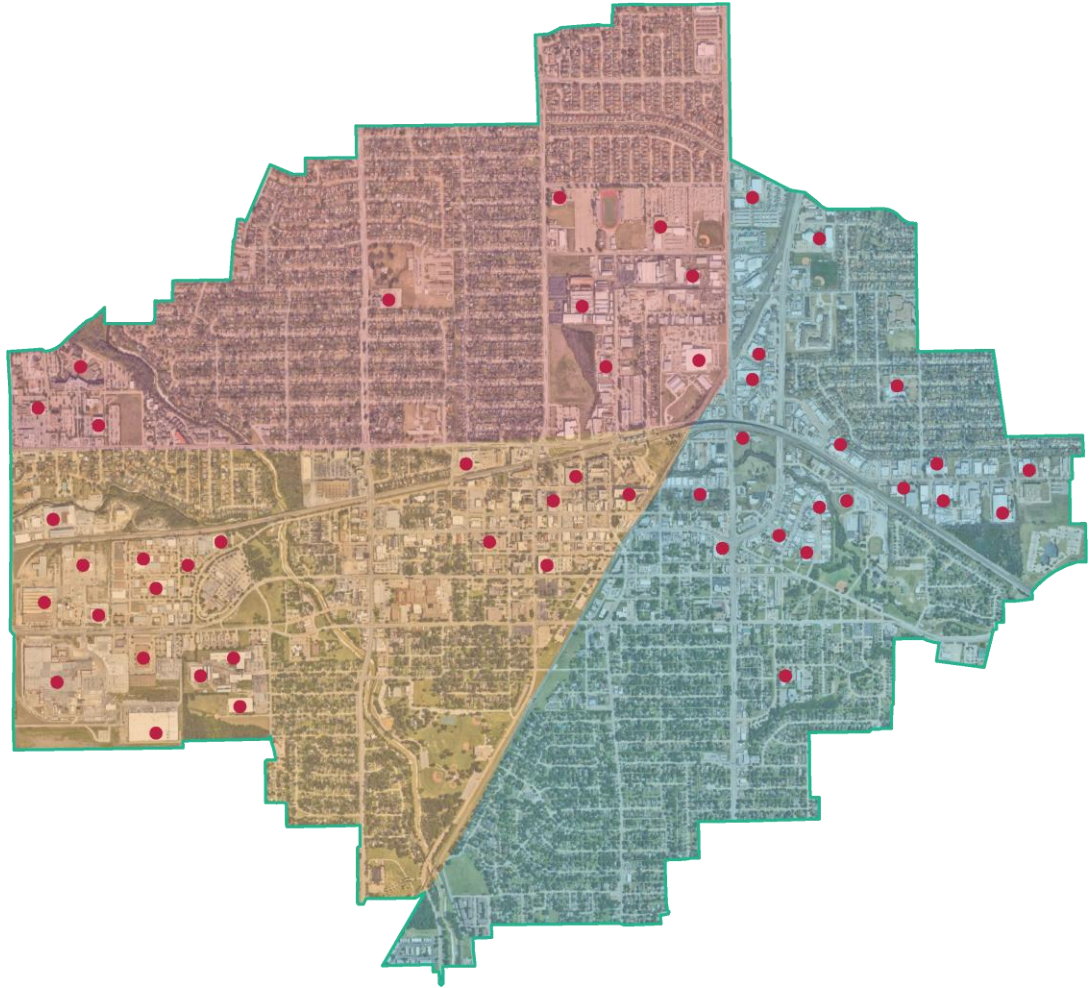
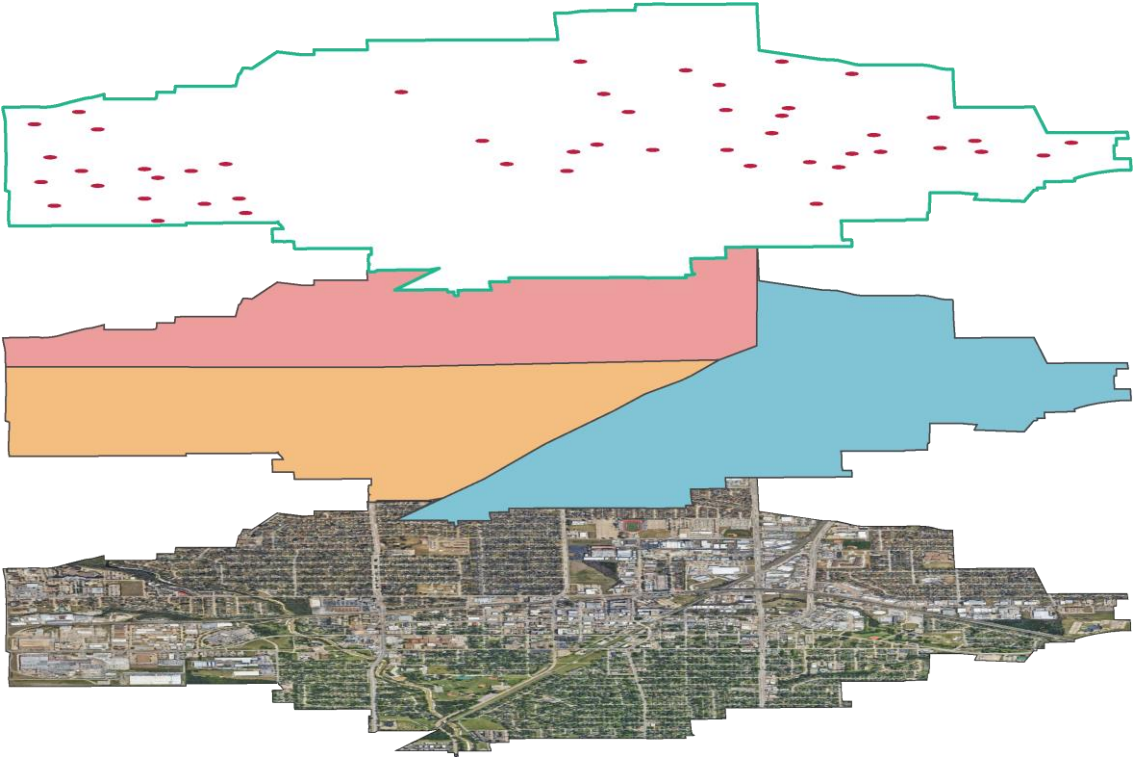
Responsibility Zones



Chemical Facilities



Facility Priority Score



Computer-Aided Dispatch Integration



Annie Anand (Dallas GIS), Capt. Ryan Thornton (Dallas Hazmat), and Lt. Ron Vaughn (Dallas Fire) reviewing the Computer Aided Dispatch Software

Computer-Aided Dispatch Integration

- Quickly provide information about location
- Example:

Facility contains Toxic Inhalation Hazards. Please see TIER II Report in PREM

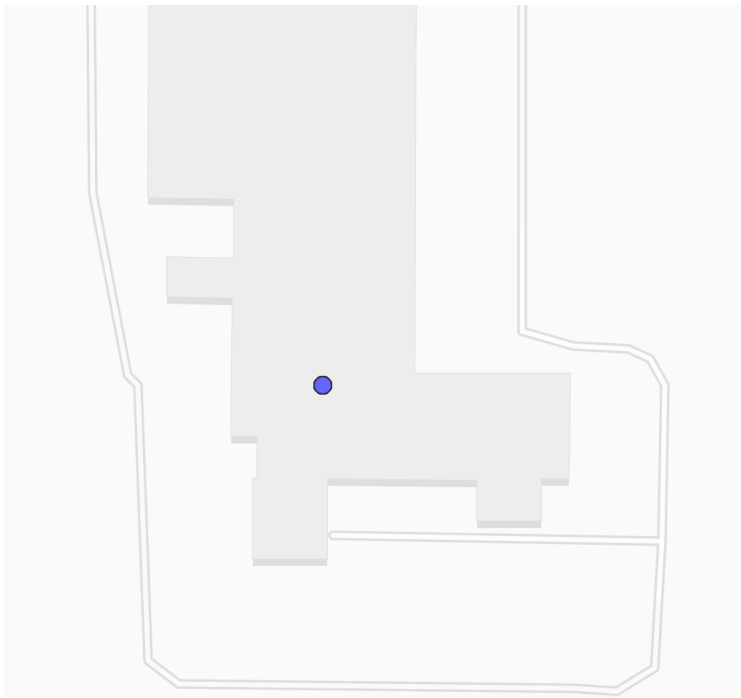
- The PREM Tab provides links to files
 - Preincident Plans
 - PDF files

Time/Date	Performed By	Conf	Comments
14:37:1...	028313	Y	
14:35:2...	028313	Y	
14:35:2...	028313	Y	

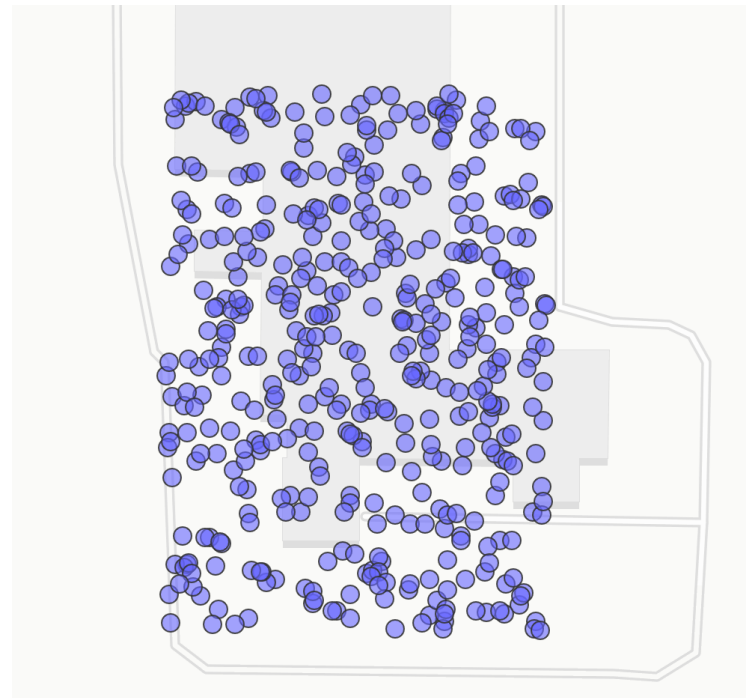
570 N MALCOLM X BLVD UNNAMED STREET

TIER II: Mapping Chemicals by Groups

- Problem: Chemical records (8,728) inherit their facility's coordinates
- Solution: Adding spatial noise

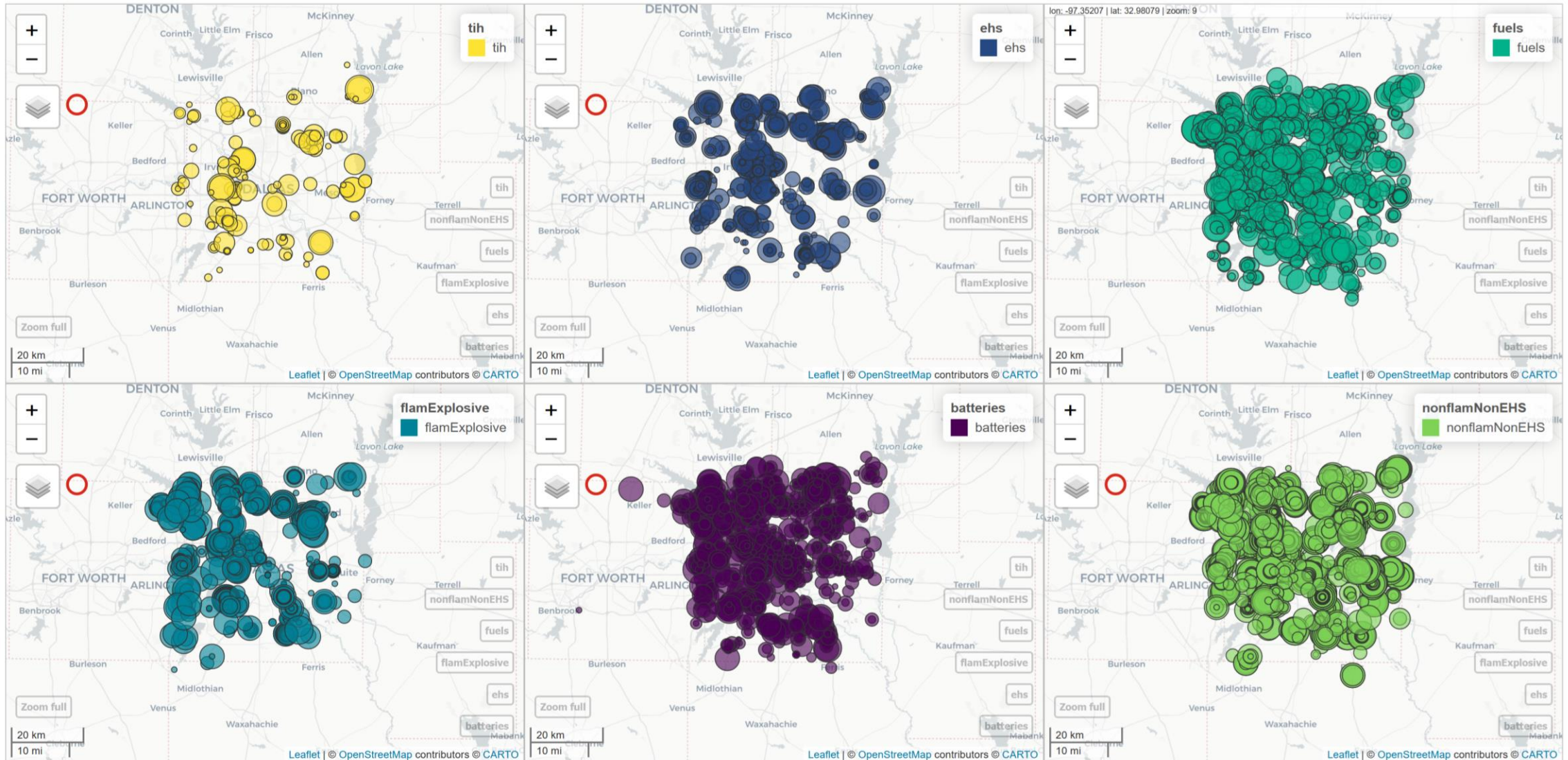


Facility with 438 Chemicals

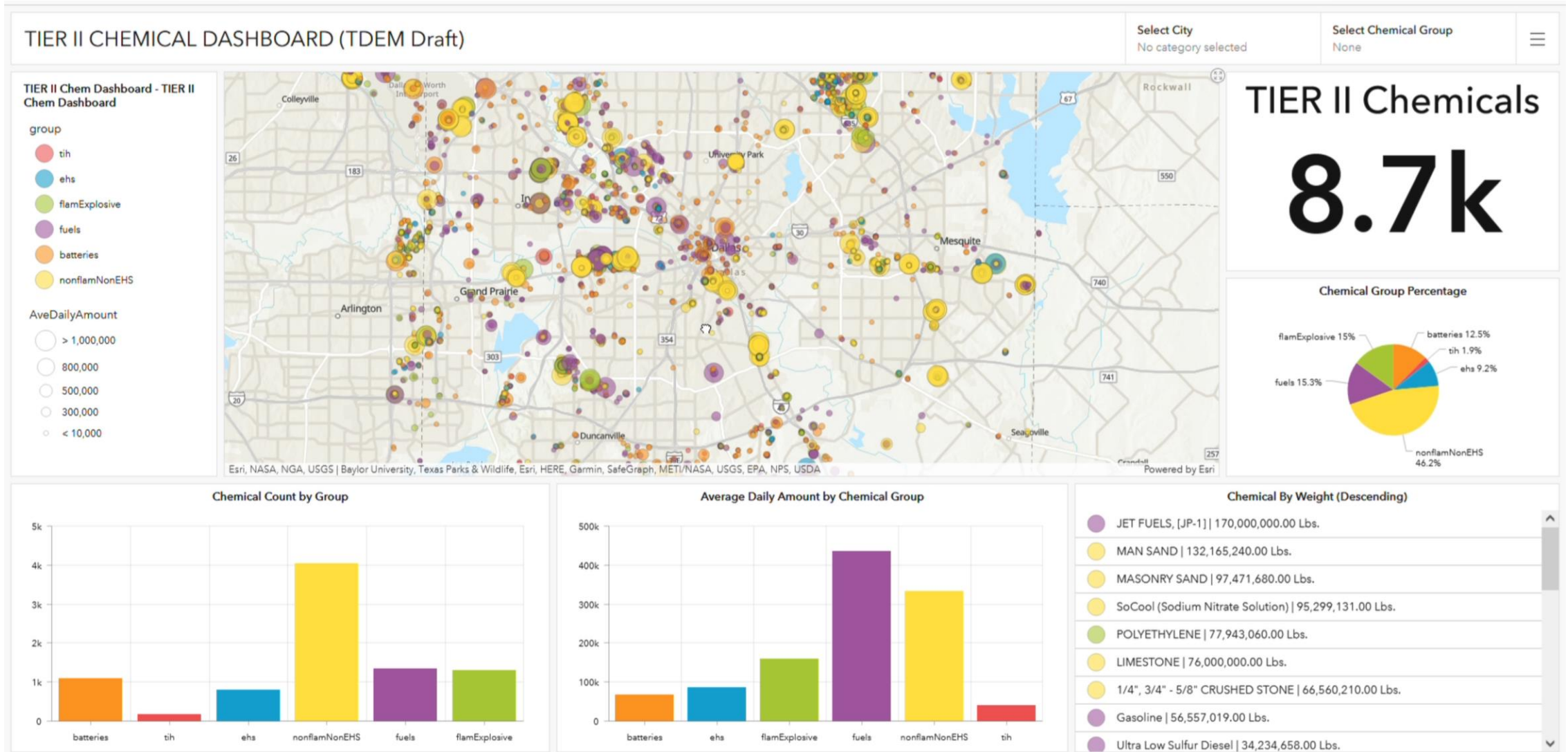


Same facility but with spatial 'noise'

TIER II: Mapping Chemicals by Groups



TIER II: Chemical Dashboard





Questions / Comments

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