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Update on Formaldehyde Monitoring

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EPA Grant Details

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- EPA Community Air Toxics Monitoring Grant awarded to Environmental Division

- $494,024.00 total over 18 month period

- Partners:
  - UH- additional equipment and monitoring
  - Air Alliance Houston- community awareness
  - Environmental Integrity Project- community capacity to engage in regulatory changes

Introduction- Formaldehyde (HCHO)

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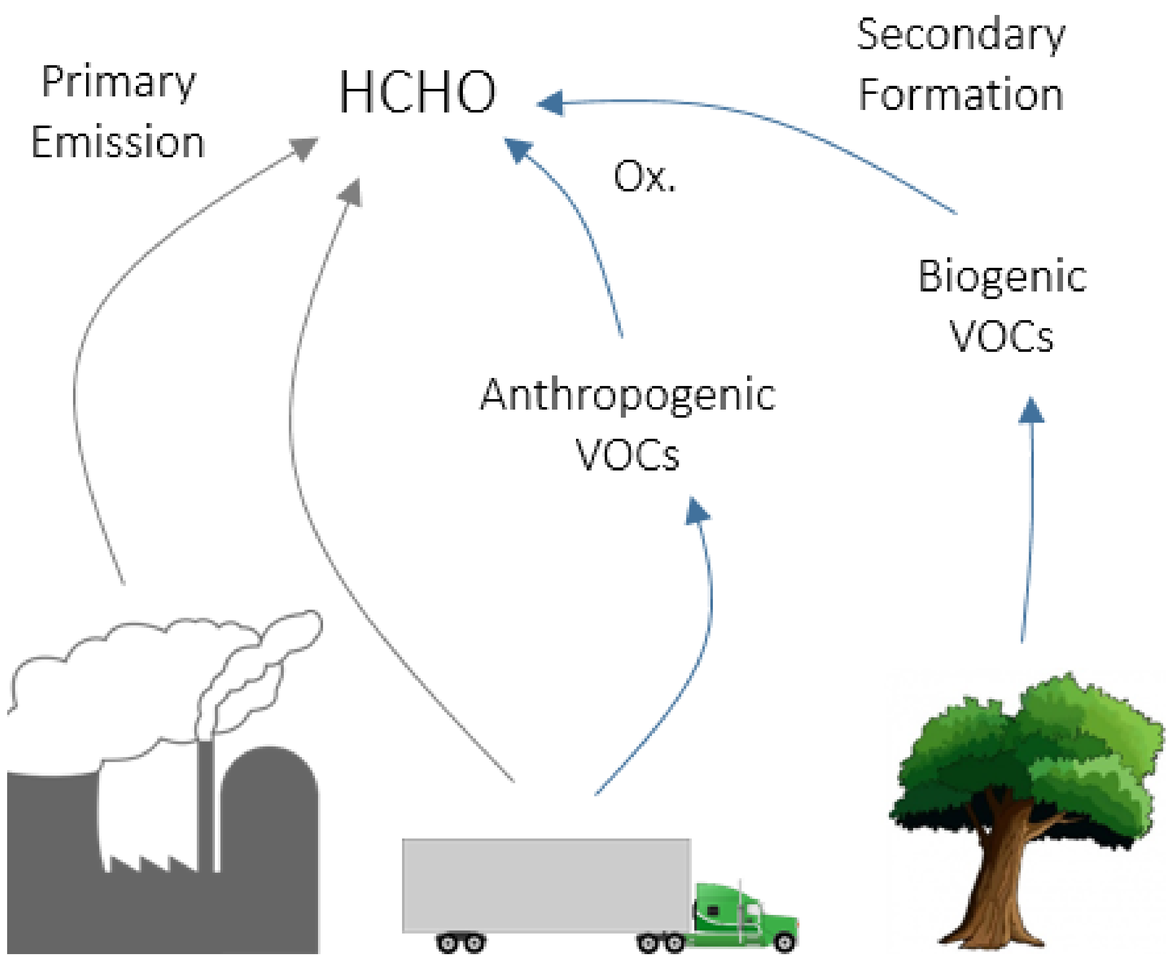
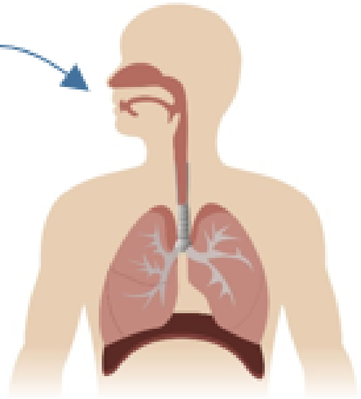
Major Sources



Health Effects

Direct

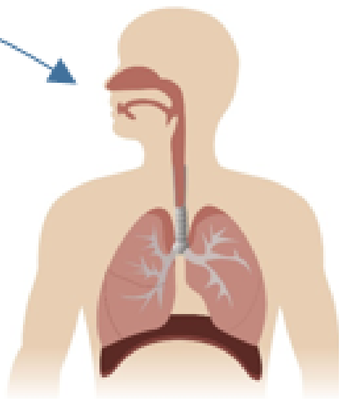
HCHO



- Classified as carcinogenic in 2011
- Acute and chronic respiratory effects

Indirect

HCHO O_3



- Enhances ozone formation

National Air Toxics Assessment

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According to a previous National Air Toxics Assessment, the contiguous census tracts directly north of the Houston Ship Channel have some of the highest cancer risk from air pollution in the city.

Numerous point sources of hazardous air pollutants are located in close proximity to these neighborhoods, contributing to this risk.

National Air Toxics Assessment

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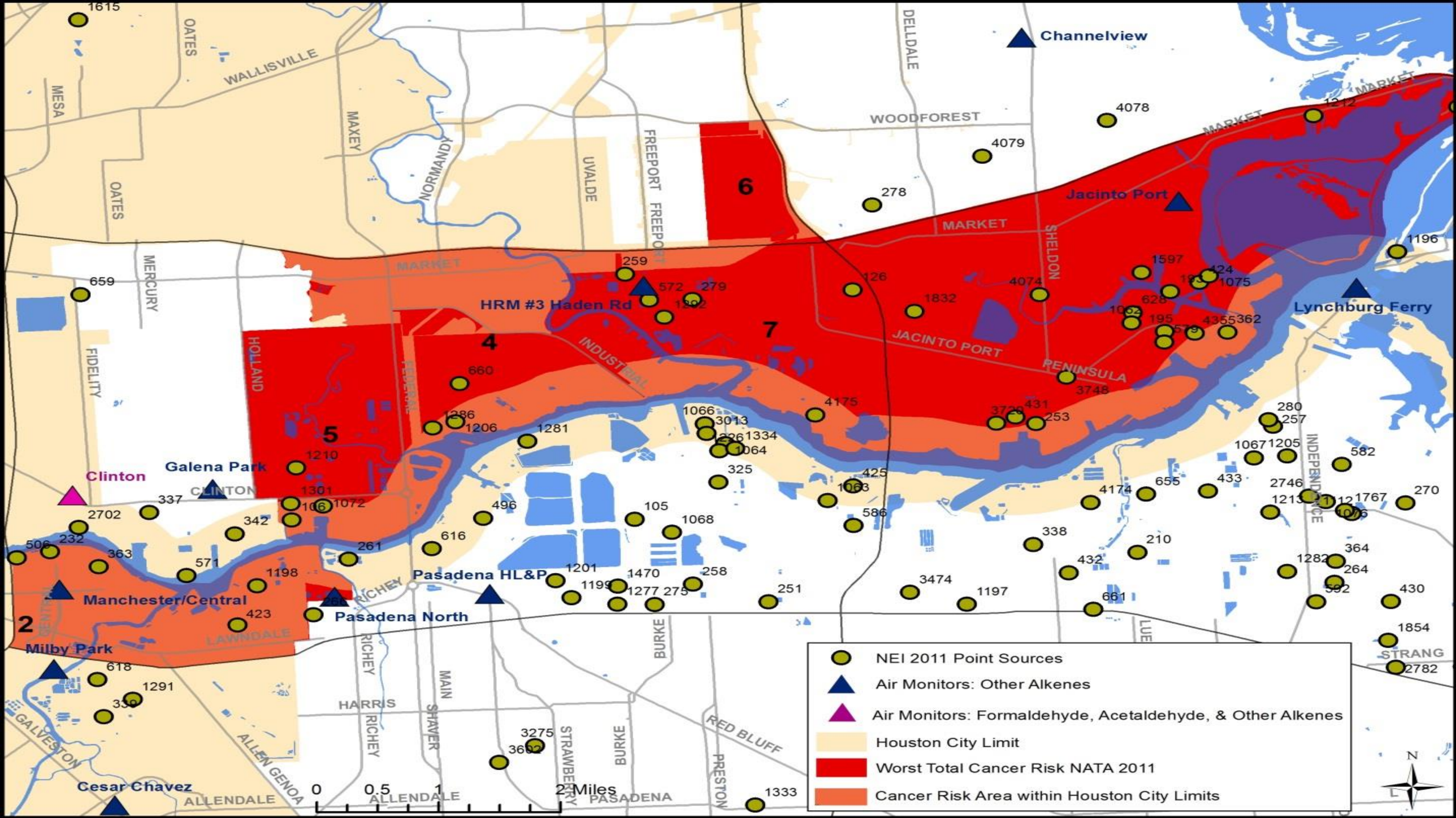
Of the ten census tracts with the highest cancer risk in Houston, census tracts ranked 2, 4, 5, 6 and 7 are contiguous (highest risk =1) and represent the neighborhoods of:

- Harrisburg,
- Manchester,
- Meadowbrook,
- Allendale,
- Northshore and
- Galena Park

Air pollution concentrations in the census tracts collectively pose a population cancer risk ranging from 61 to 63 additional cases per million people


Channelview
Jacinto Port
Lynchburg Ferry
HRM #3 Haden Rd
Clinton
Galena Park
Manchester/Central
Milby Park
Pasadena HL&P
Pasadena North
Cesar Chavez
2
4
5
6
7
WALLISVILLE
WOODFOREST
MARKET
JACINTO PORT
PENINSULA
INDUSTRIAL
HOLLAND
FIDELITY
MERCURY
OATES
MESA
MAXEY
NORMANDY
UVALDE
FREEPORT
DELLDALE
SHELDON
CLINTON
LAWNDALE
RICHEY
HARRIS
MAIN
SHAVER
BURKE
STRAWBERRY
RED BLUFF
PRESTON
ALLENDALE
PASADENA
GALVESTON
ALLEN GENOA
INDEPENDENCE
STRANG
NEI 2011 Point Sources
Air Monitors: Other Alkenes
Air Monitors: Formaldehyde, Acetaldehyde, & Other Alkenes
Houston City Limit
Worst Total Cancer Risk NATA 2011
Cancer Risk Area within Houston City Limits
0
0.5
1
2 Miles
N

Chemical Contributions to Risk in Project Area Census Tracts

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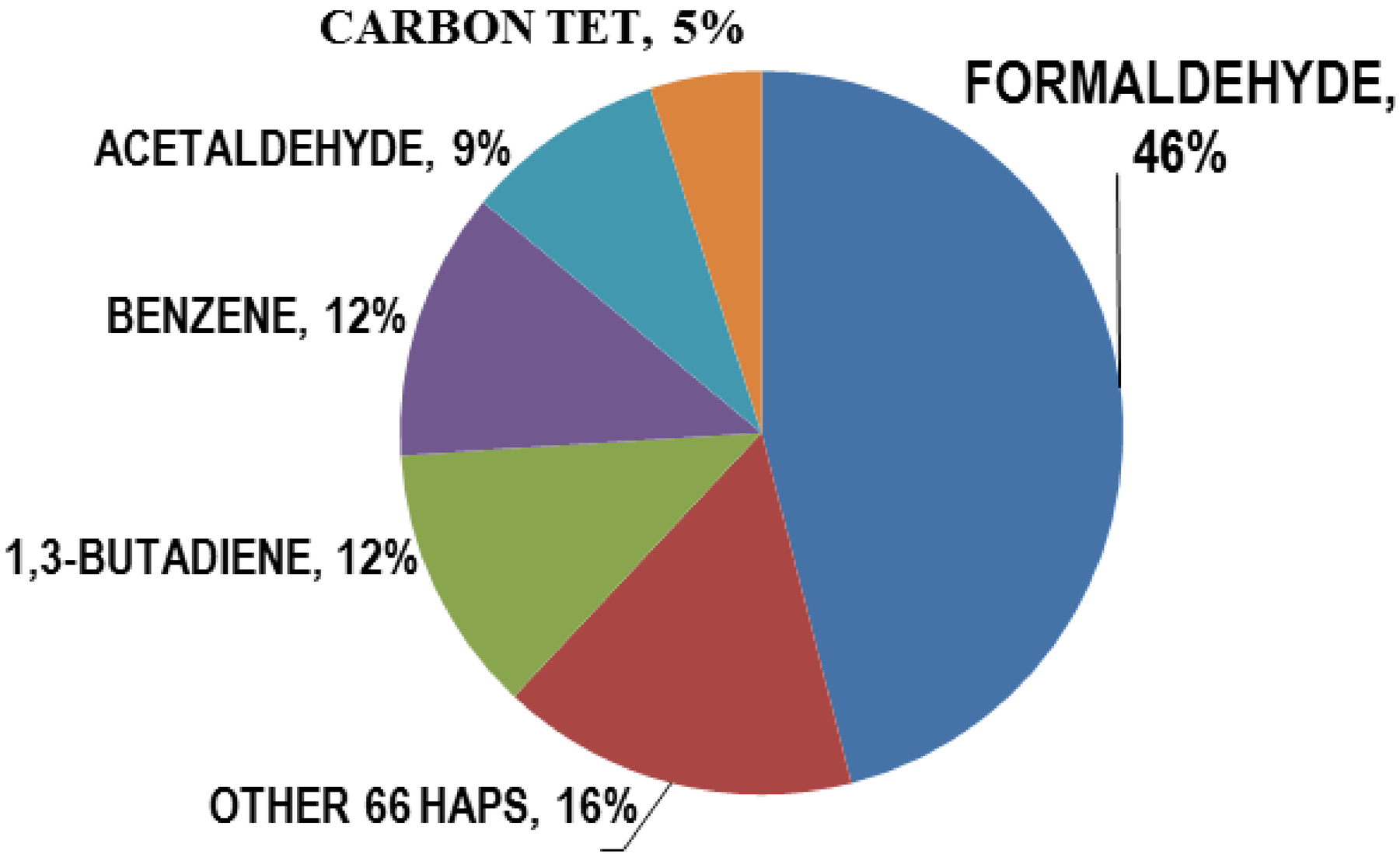

Formaldehyde Risk in Houston

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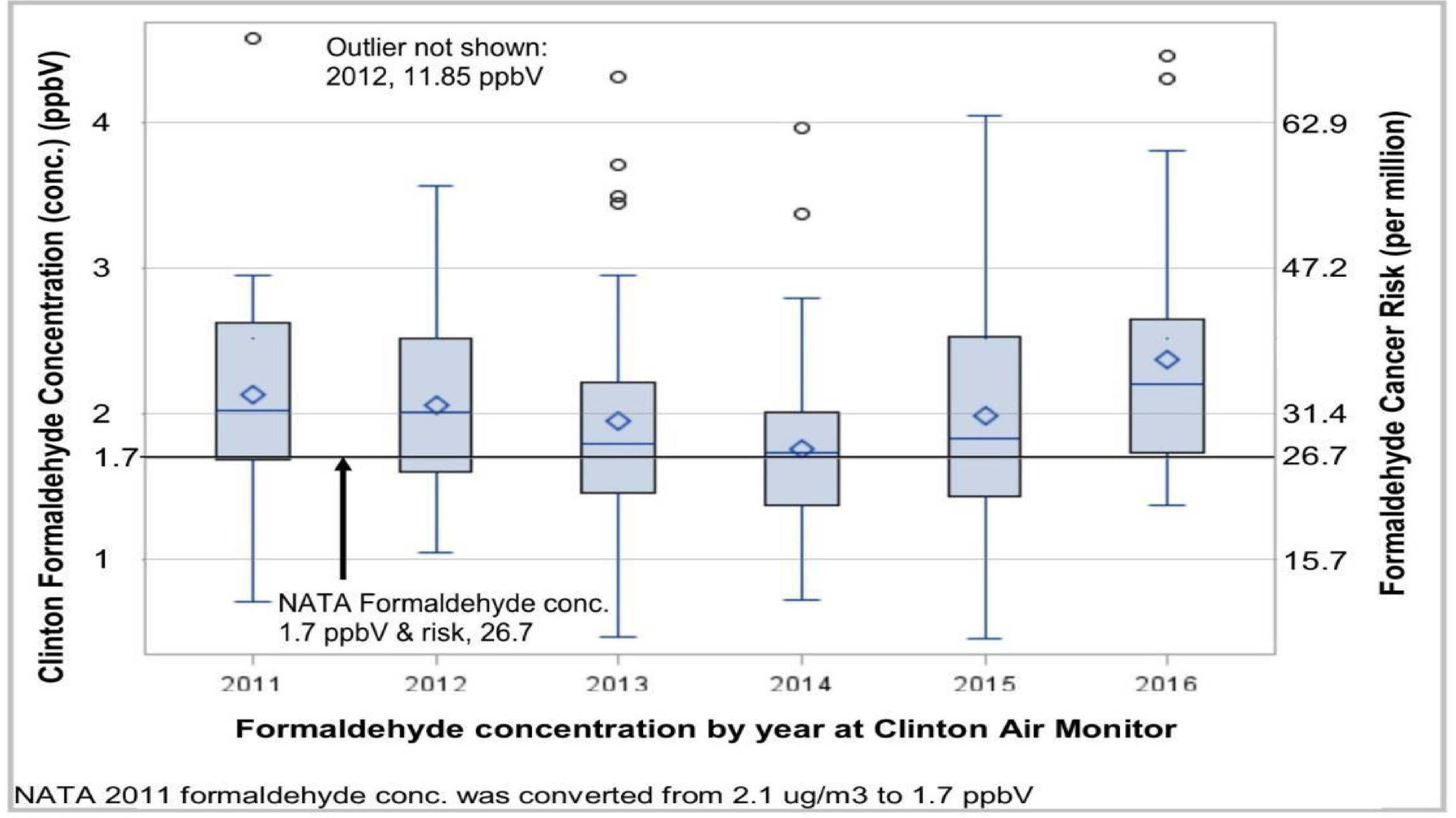
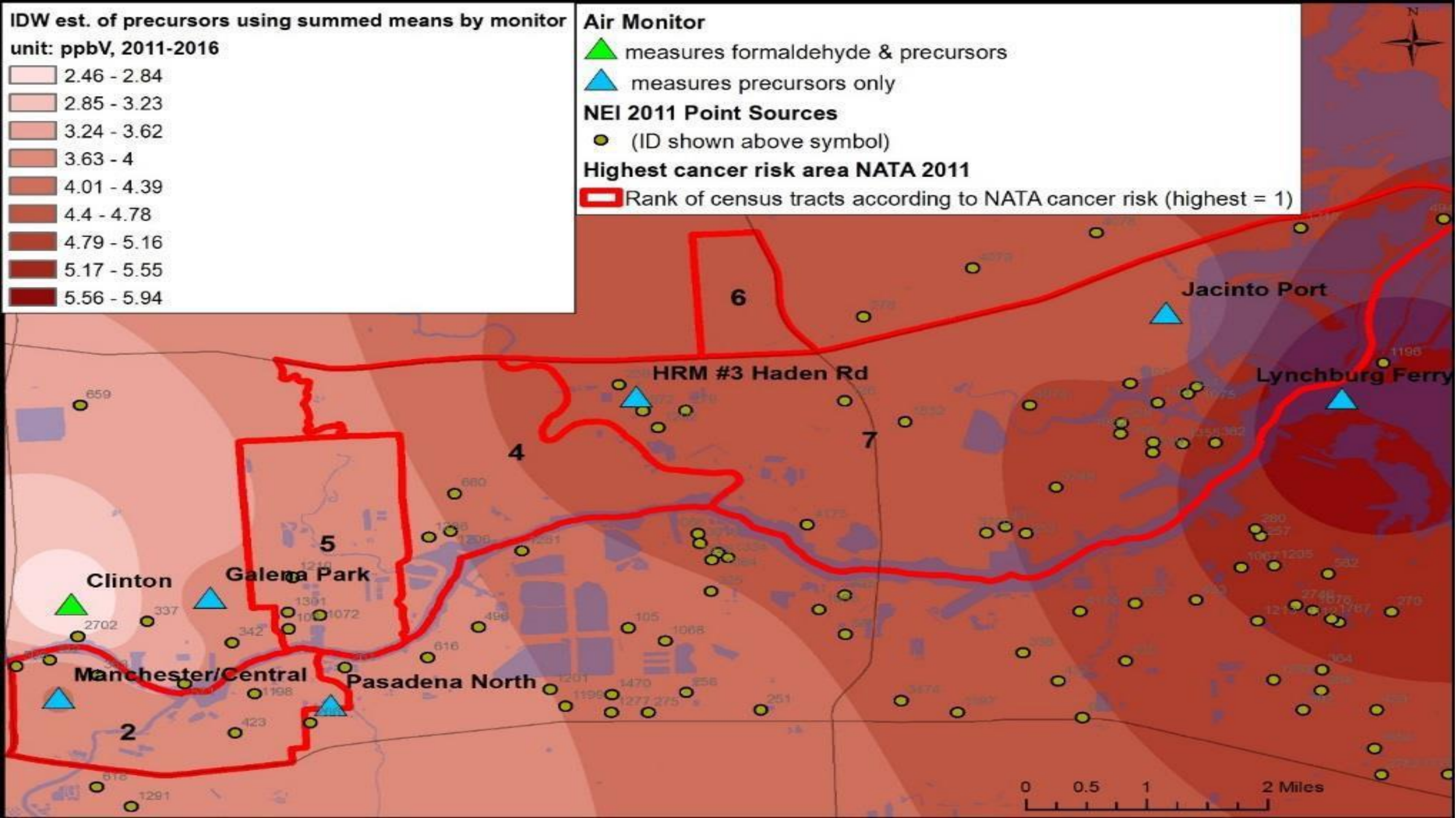
How well do we understand the Formaldehyde Risk?

Not well…



NATA 2011 formaldehyde conc. was converted from 2.1 ug/m3 to 1.7 ppbV


IDW est. of precursors using summed means by monitor
unit: ppbV, 2011-2016
2.46 - 2.84
2.85 - 3.23
3.24 - 3.62
3.63 - 4
4.01 - 4.39
4.4 - 4.78
4.79 - 5.16
5.17 - 5.55
5.56 - 5.94
Air Monitor
measures formaldehyde & precursors
measures precursors only
NEI 2011 Point Sources
(ID shown above symbol)
Highest cancer risk area NATA 2011
Rank of census tracts according to NATA cancer risk (highest = 1)
N
6
Jacinto Port
HRM #3 Haden Rd
Lynchburg Ferry
4
7
5
Clinton
Galena Park
Manchester/Central
Pasadena North
2
0
0.5
1
2 Miles

Formaldehyde Risk in Houston

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Why is Formaldehyde so high?

Houston's Formaldehyde

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- Formaldehyde can be emitted directly or formed during the atmospheric oxidation of certain VOCs.

- 95% of the formaldehyde in Houston is from secondary oxidation of VOCs, *and* almost all of the VOCs that are oxidized to form formaldehyde come from point sources.

- The biggest sources of reactive VOCs (like the sources subject to the HRVOC regulations) would be the biggest contributors to the ambient formaldehyde levels that drive the risk numbers.

- A study of formaldehyde in Houston identified formation linked to ethene, propene and isoprene.

Houston's Formaldehyde

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Formaldehyde is regulated as a HAP under the federal Clean Air Act,

Federal standards do not address formaldehyde precursors, which are the predominant source of this toxic in Houston.

Formaldehyde Solution for Houston

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Given that control of only primary formaldehyde emission appears to be insufficient,

this research would support development of new and strengthened standards to account for secondary formation and increased controls of its alkene precursors as an effective regulatory strategy for reducing formaldehyde concentrations in Houston.

Project Aims

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a) To identify and profile air toxics sources posing the highest population risk in Houston, Texas Census tracts according to National Air Toxics Assessment (NATA)

b) To evaluate the impact of emission reduction measures

Technical Approach

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1.
Significantly increase the spatial/temporal information on formaldehyde levels in the study area (Quarter 2, 2018 through end of Quarter 1, 2019)

2.
Evaluate and verify the relationship between formaldehyde levels measured using the TCEQ formaldehyde monitor at Clinton Drive with levels measured with the Aero Laser monitor to be used in the study (Quarter 1, 2018)

Technical Approach

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3.
Statistically assess the spatial/temporal relationship between the new formaldehyde concentration information and the formaldehyde precursors (Quarter 2, 2018 through of Quarter 2, 2019)

4.
Identify locations, which are likely contributing to the excess risk, for detailed formaldehyde and formaldehyde precursor source characterization (Quarter 3, 2018 through Quarter 2, 2019)

Technical Approach

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5.
Conduct more detailed evaluations of emission sources identified in 4) above using the Solar Occultation Flux (SOF) (Quarter 2, 2019)

6.
Conduct community outreach, collaboration and education and engage community in the regulatory process (e.g., fact sheets in Spanish and English, community/neighborhood educational meetings regarding the project, the results and the effectiveness of controls). (Quarter 1 and Quarter 2, 2019)

Thank you!

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