

# Brownfield Contaminants and Human Health

February 29, 2024

Presented By:



**Joseph M. Reiner**

Brownfield Redevelopment Specialist

*NJIT Technical Assistance to Brownfield Communities*









# Thank you for joining us today!

## This webinar will be starting soon.

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### But first, some helpful information:

-  Today's session will be recorded.
-  The recording for this session will be available on our website: <https://www.njit.edu/tab/>
-  Use the Q&A box to queue up questions. Use the chat to share your thoughts.
-  Experiencing technical issues? Reach out to [fm392@njit.edu](mailto:fm392@njit.edu)
-  We want to know your thoughts! Fill out our feedback survey after today's session.
-  Continue the conversation on our LinkedIn page! <https://bit.ly/3UYkHPR>



# Brownfield Contaminants & Human Health



**TAB**

Technical Assistance to  
Brownfield Communities

Joseph M. Reiner  
Brownfield Redevelopment Specialist  
Center for Community Systems

# Agenda

- Background on Brownfields
- Brownfield Contaminants
- Exposure and Health Risks
- Community Screening Tools
- Takeaways/Discussion



**“A brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.”**



## **Overview of EPA's Brownfields Program**



# Brownfield Sites

Designation not determined by size of site or contaminant type.

Brownfield sites can be urban, industrial, or rural.



**“A pollutant or contaminant is any element, substance, compound, or mixture, which after release into the environment and upon exposure...into any organism, either directly from the environment or indirectly by ingestion...will or may reasonably be anticipated to cause death, disease, etc.”**

**CERCLA hazardous substances, pollutants, and contaminants as defined in CERCLA sections 101(14) and 101(33)**



# Examples of Brownfield Contaminants



Non-Point  
Pollution



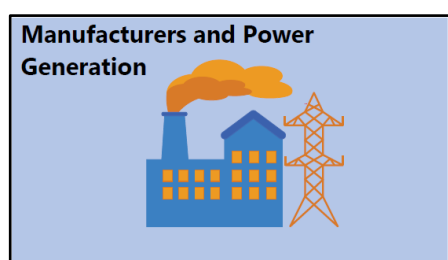
Emerging  
Contaminants



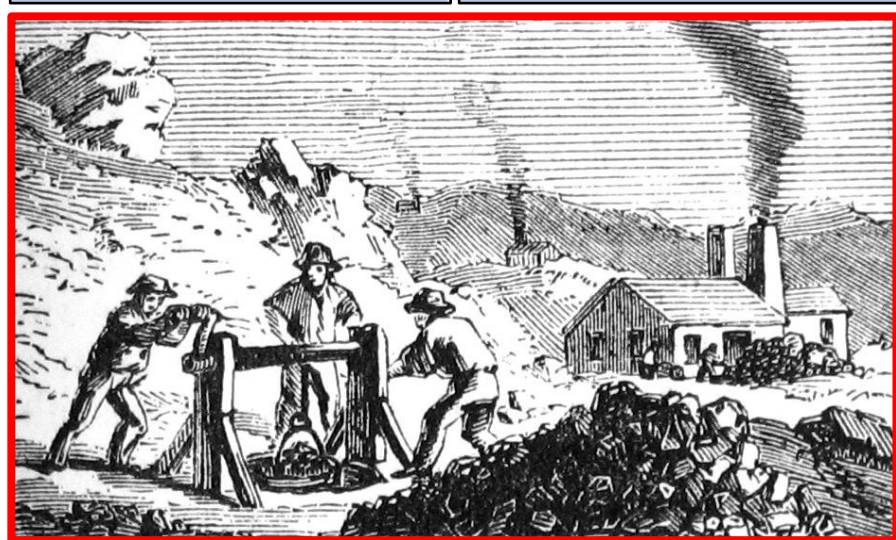
Legacy  
Pollutants

Environmental Contaminants Often Found at Brownfield Sites



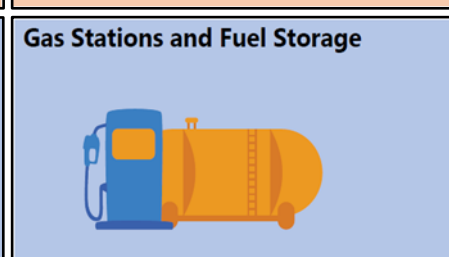


# Lead (Pb)



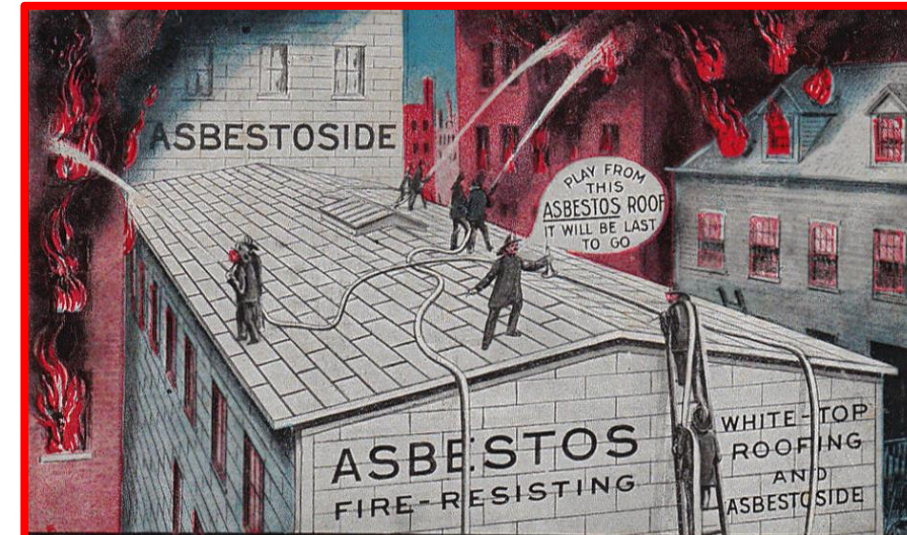
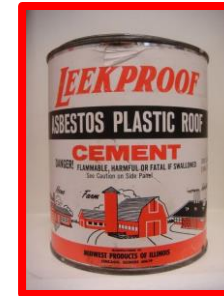
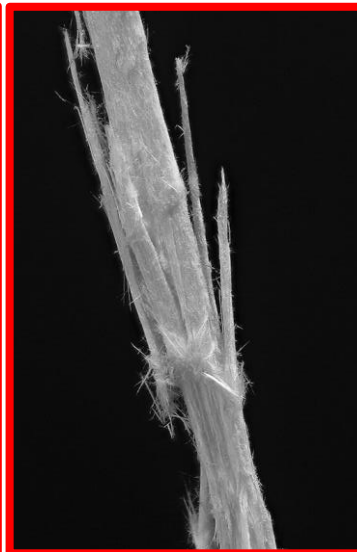
Some sources:

- Mining and processing
- Lead-based paints
- Leaded gasoline (TEL)
- Corroded plumbing






# Asbestos



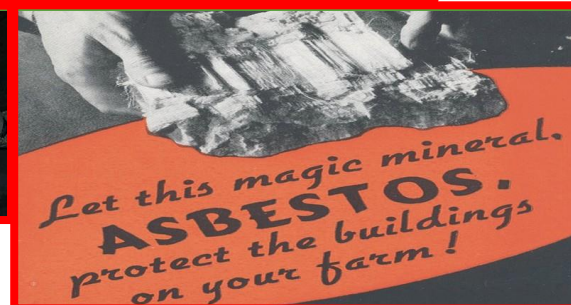

Some sources:

- Insulation, roofing
- Construction
- Old vehicle brakes
- Mining

**Mines and Mining Operations**



**Automotive Repair**



Housing and Residential Areas



Agricultural Land and Facilities



Public and Commercial Buildings

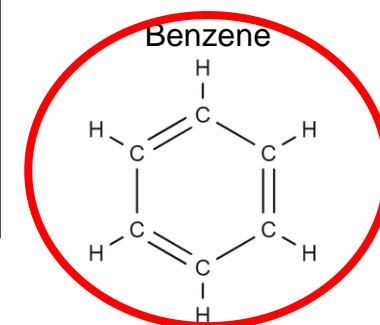
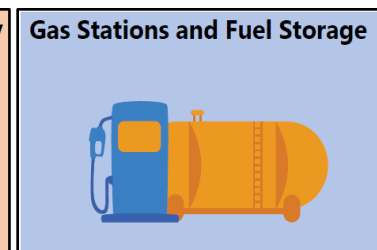
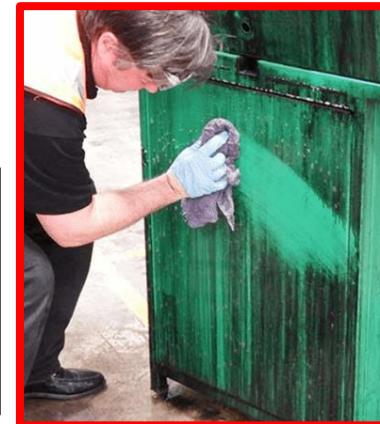
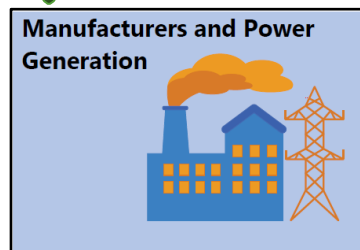
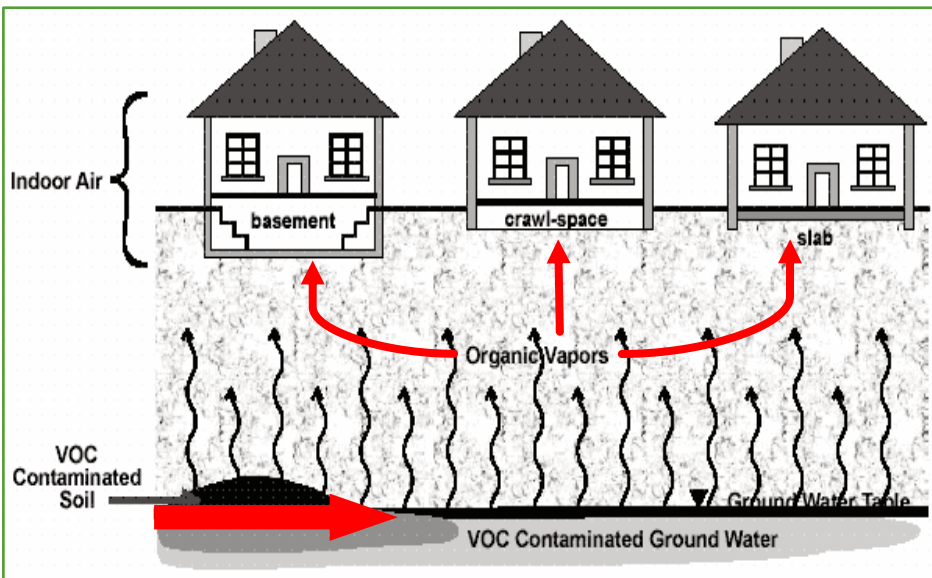
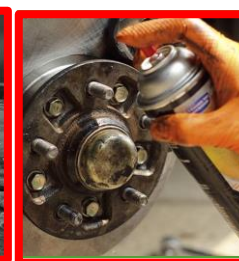






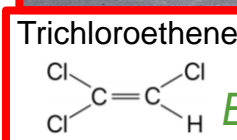


# Volatile Organic Compounds (VOCs)



Some sources:

- Drycleaning solvents
- Petroleum products
- Leaking sewer pipes
- Stormwater runoff
- Pesticides
- Paint, paint thinners



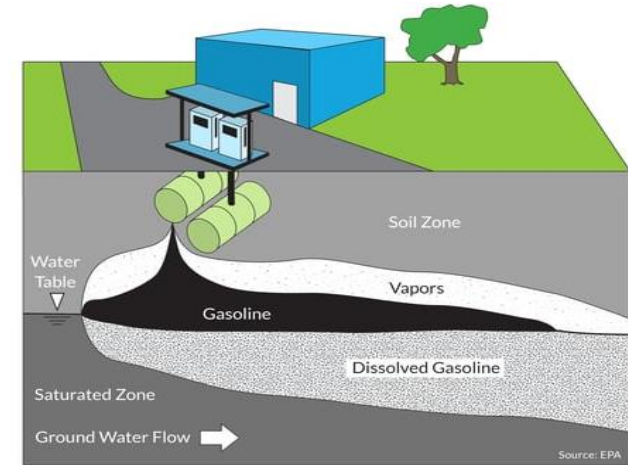
*Brownfield Contaminants, 12*



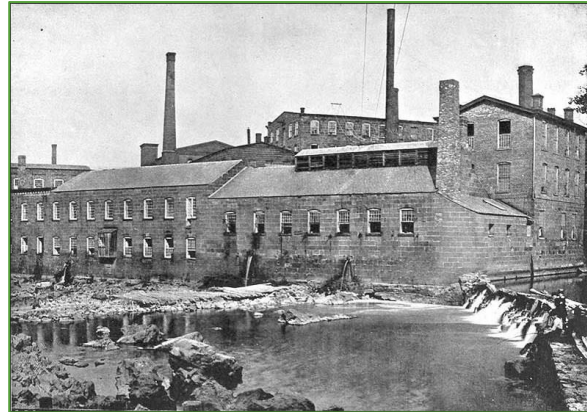
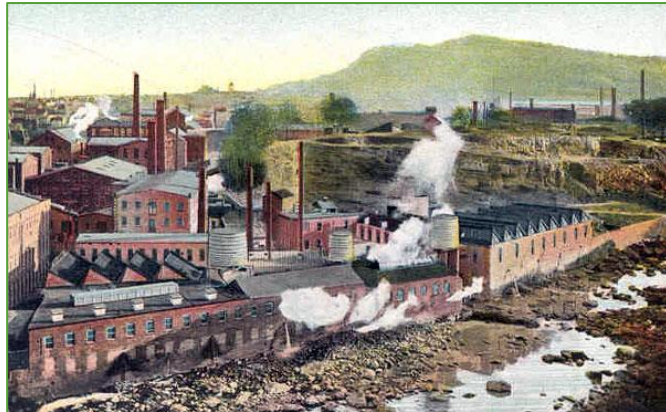
# Site History & Past Uses



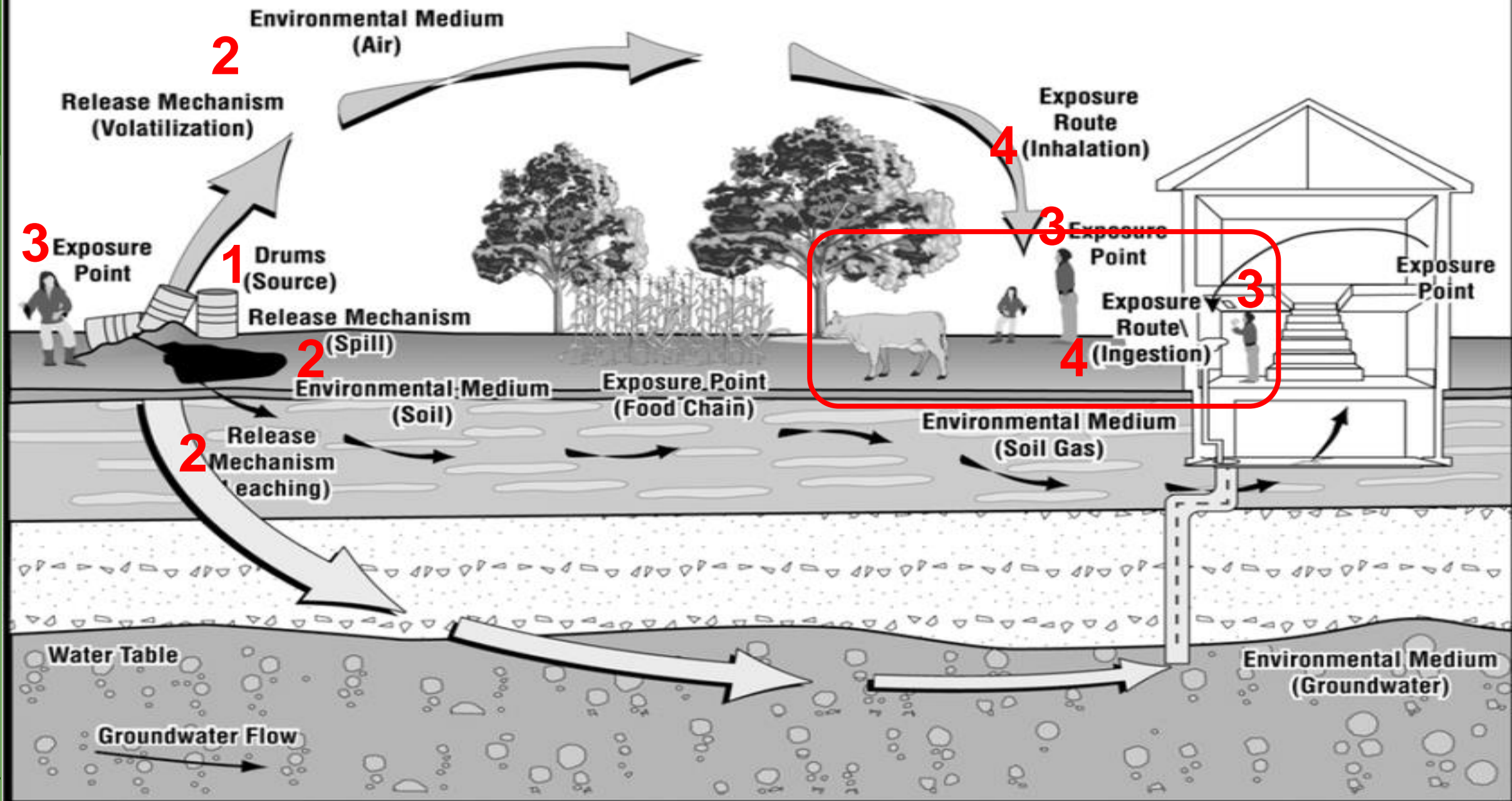
- Environmental contamination can be complex and costly to address.
- One site can have multiple types of contamination present.
- Site history informs what contamination type may be present, what risks may be posed.



Past Property Uses May Result in a Brownfield



Prevailing Wind Direction →

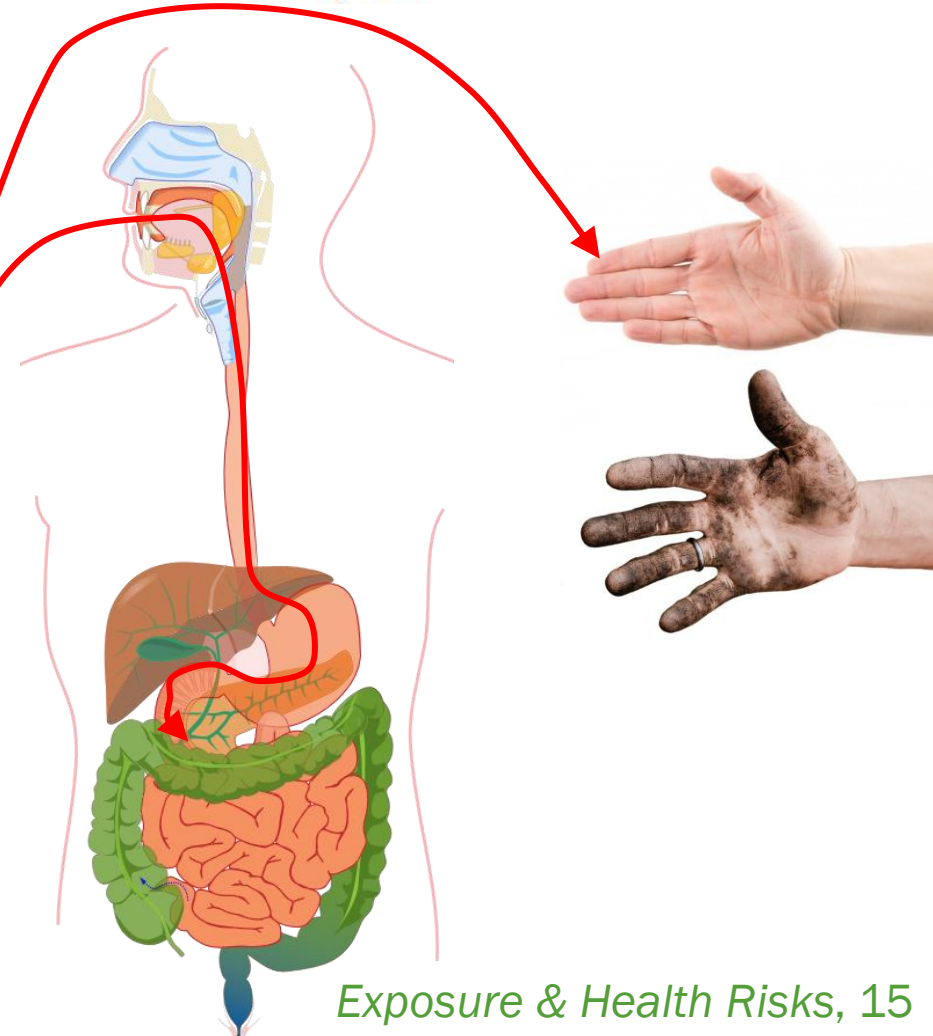
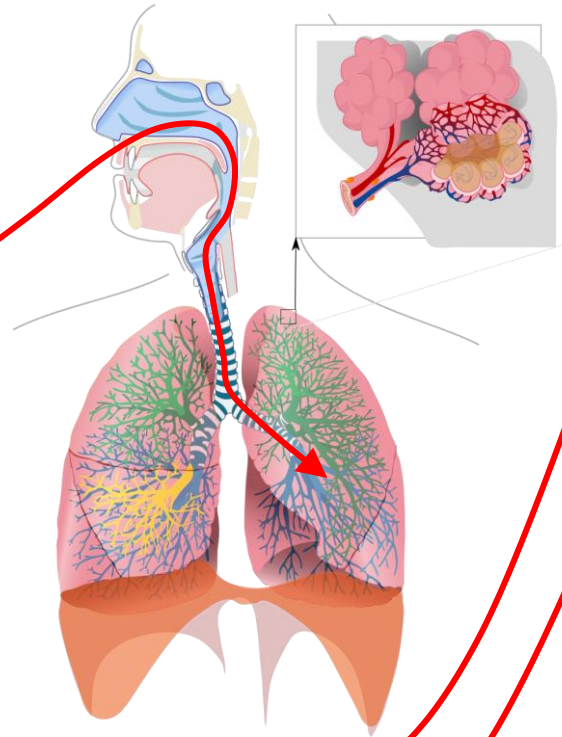
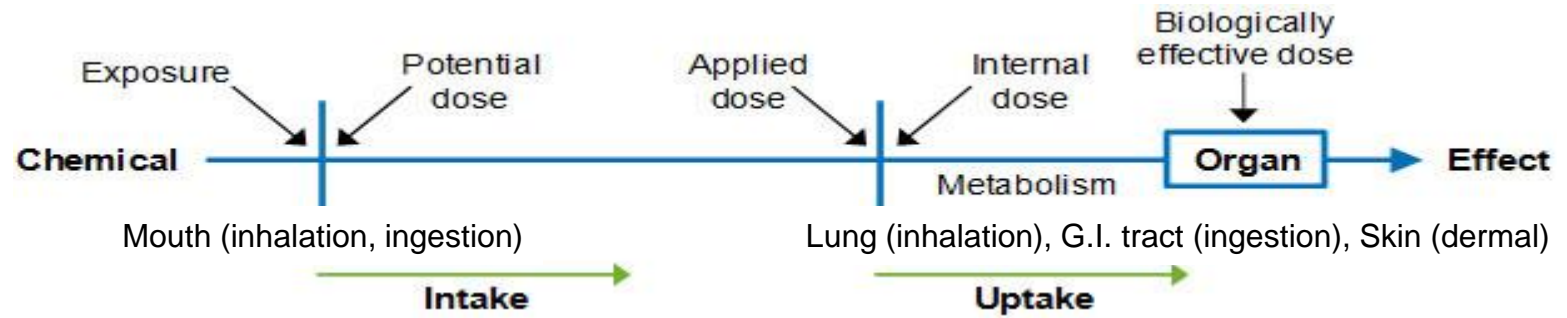
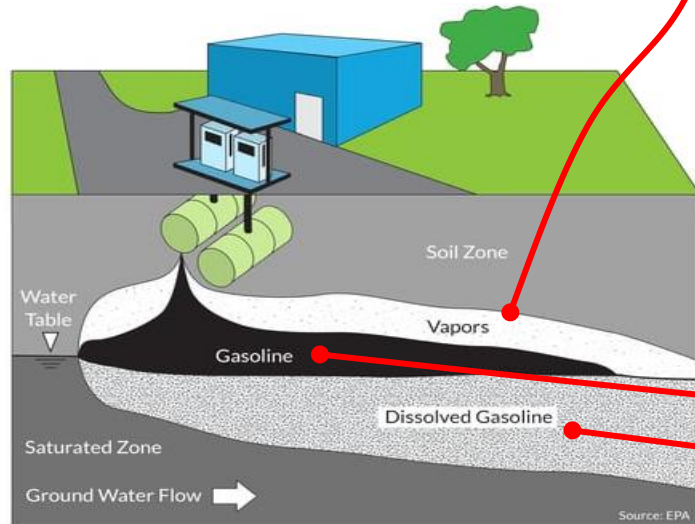




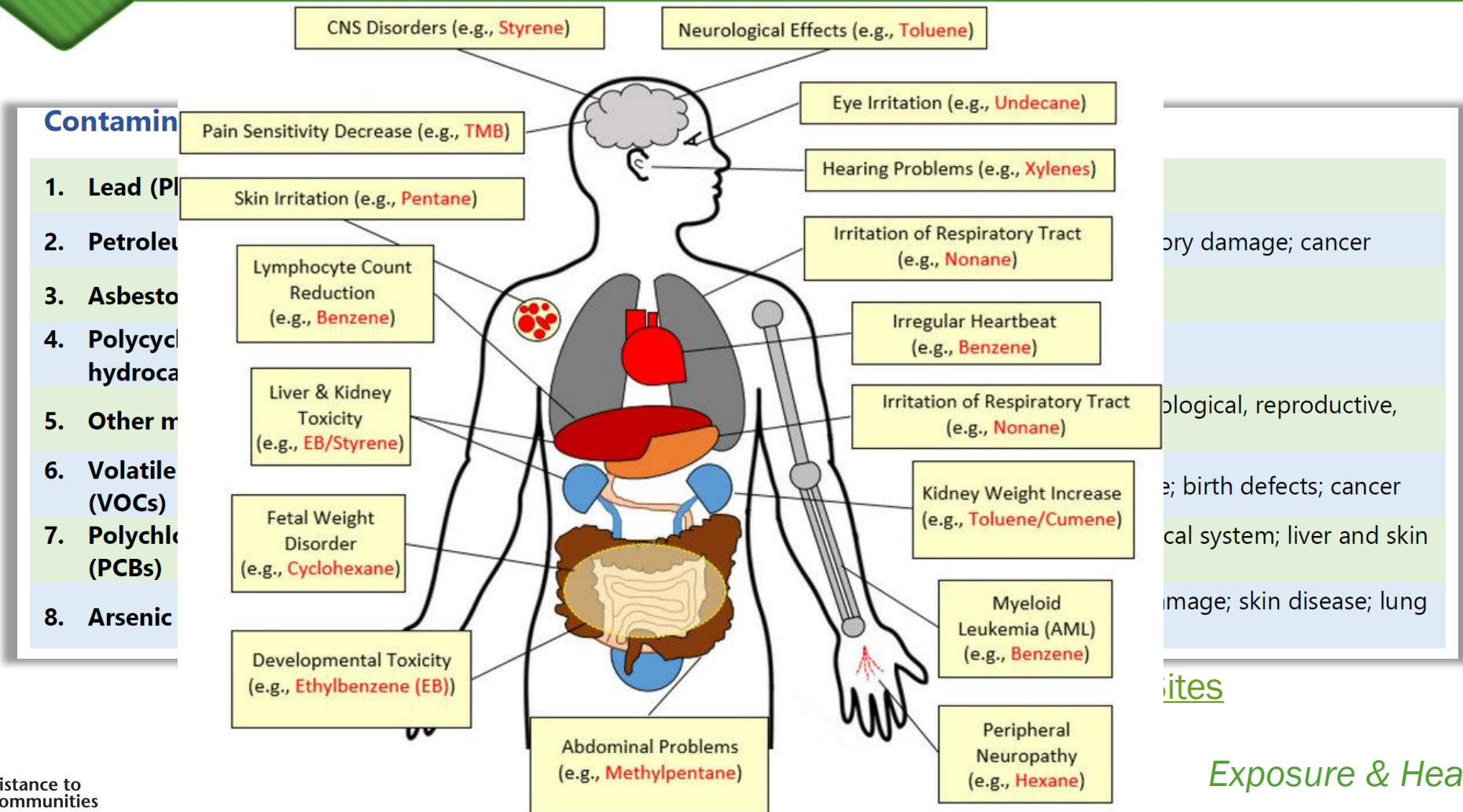
# Exposure Routes



- Inhalation (*breathing*)
- Ingestion (*drinking or eating*)
- Dermal Contact (*touching*)



# Health Risks of Brownfield Contaminants



# Sensitive Populations



Children



People who live in institutional settings



Older Adults



Pregnant Women



People with Disabilities



People with Chronic Conditions



People with Pharmacological Dependency



People with Limited Access to Transportation



Limited English Proficiency and Non-English Speakers



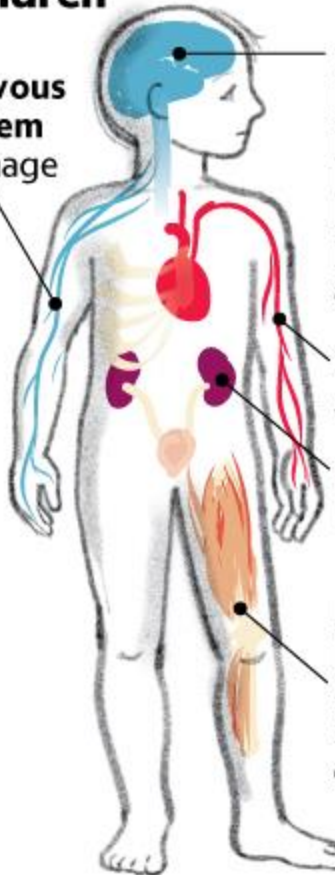
People of Low Socioeconomic Status



Individuals Experiencing Homelessness

## Children

**Nervous system**  
Damage



**Brain**

Behavior problems, lower IQ, hearing loss, learning disabilities

**Blood**

Anemia

**Kidneys**

Damage

**Body**

Decreased bone and muscle growth

- Usually, the amount of contamination we are exposed to is far less than the amount that causes health problems.
- Some people can't tolerate chemical exposure as well. These groups are known as **sensitive populations**.



Sensitive Populations & Chemical Exposure

*Exposure & Health Risks, 17*



# Health impacts are not equally felt by all.

*Spatial relationships between lead sources and children's blood lead levels in the urban center of Indianapolis (USA)*

**Deborah Morrison, Qing Lin, Sarah Wiehe, Gilbert Liu, Marc Rosenman, Trevor Fuller, Jane Wang & Gabriel Filippelli**

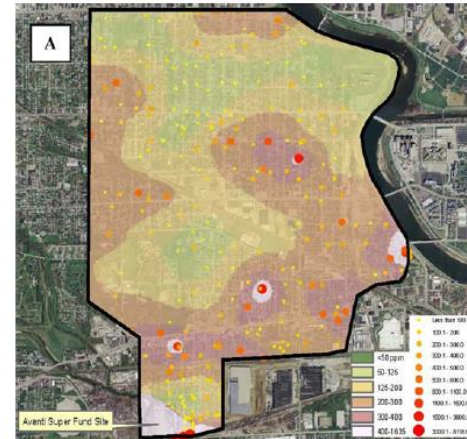
**Environmental Geochemistry and Health**  
Official Journal of the Society for Environmental Geochemistry and Health

ISSN 0269-4042  
Volume 35  
Number 2

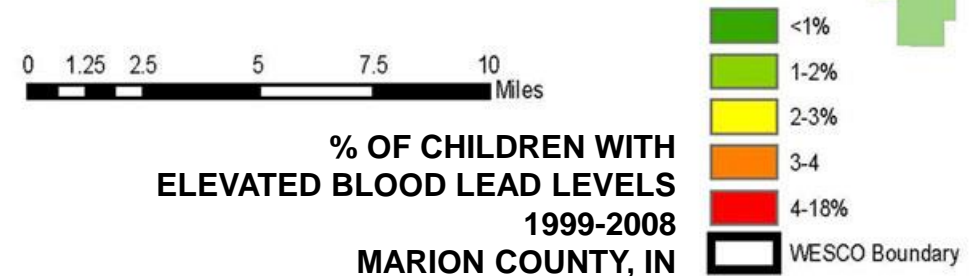
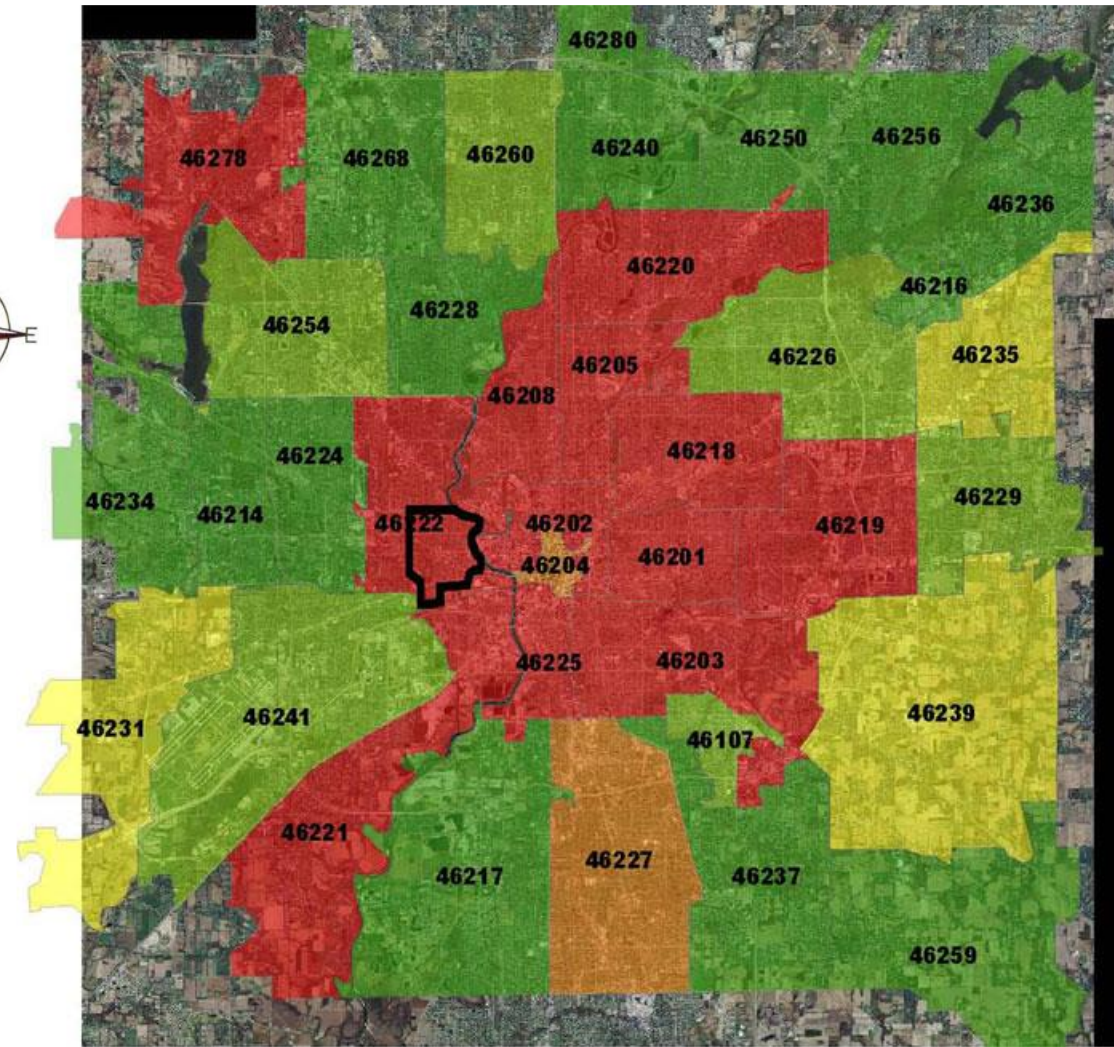
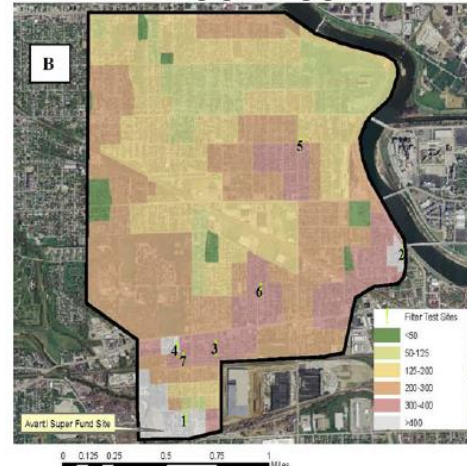
Environ Geochem Health (2013)  
35:171-183  
DOI 10.1007/s10653-012-9474-y



**NEIGHBORHOOD SOILS**



**INDOOR DUST**



*Exposure & Health Risks, 18*



# Morrison et al. Study Findings

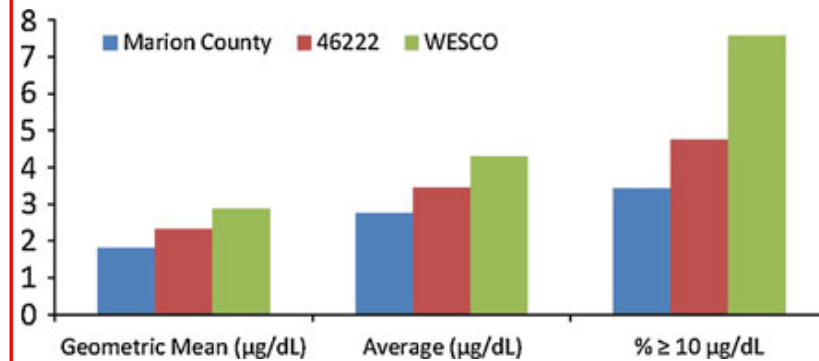


## Spatial relationships between lead sources and children's blood lead levels in the urban center of Indianapolis (USA)

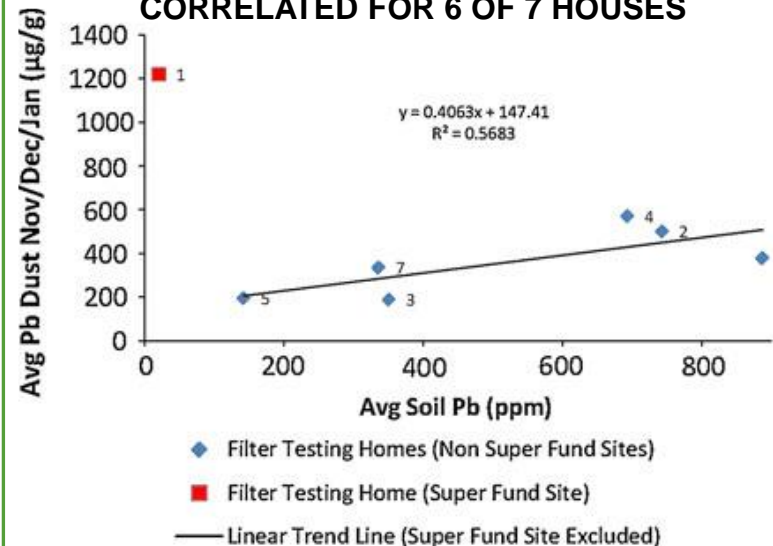
Deborah Morrison • Qing Lin • Sarah Wiehe •  
Gilbert Liu • Marc Rosenman • Trevor Fuller •  
Jane Wang • Gabriel Filippelli



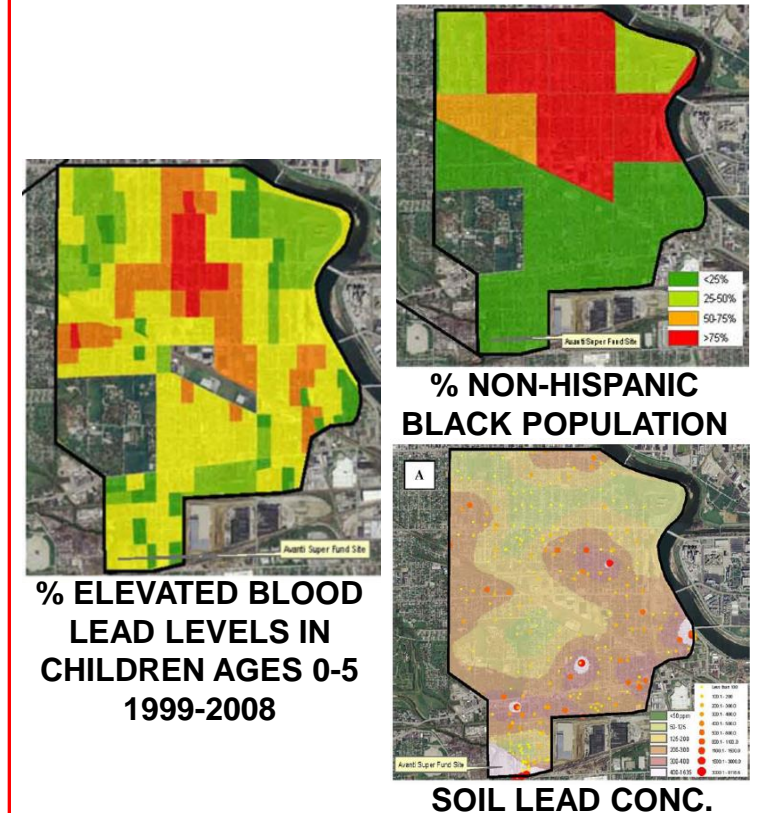
### BLOOD LEAD LEVELS ABOVE COUNTY & ZIP AVERAGE FOR NEIGHBORHOOD CHILDREN



### INDOOR DUST & SOIL LEAD LEVELS ARE CORRELATED FOR 6 OF 7 HOUSES



### RACE INDICATED HIGH BLOOD LEAD LEVEL MORE THAN SOIL LEAD CONCENTRATIONS AT BLOCK/BLOCK GROUP SCALE



Please note: Territory data (except Puerto Rico) is not available as comparable to the US. It is only comparable to the territory itself by using the 'Compare to S



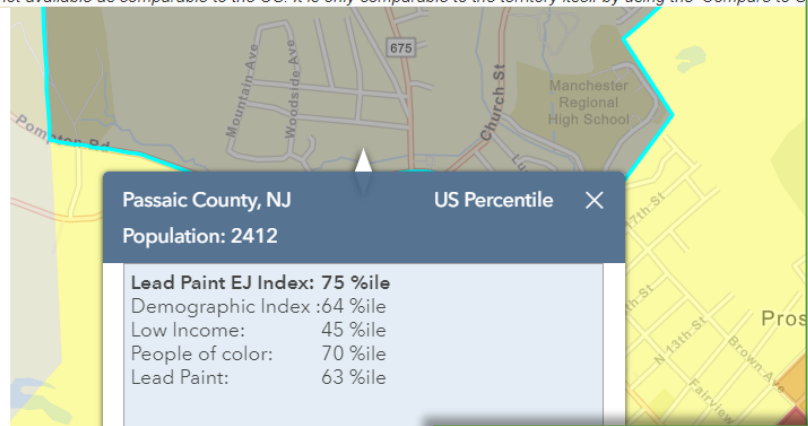
Compare to US Compare to State

Environmental Justice Indexes

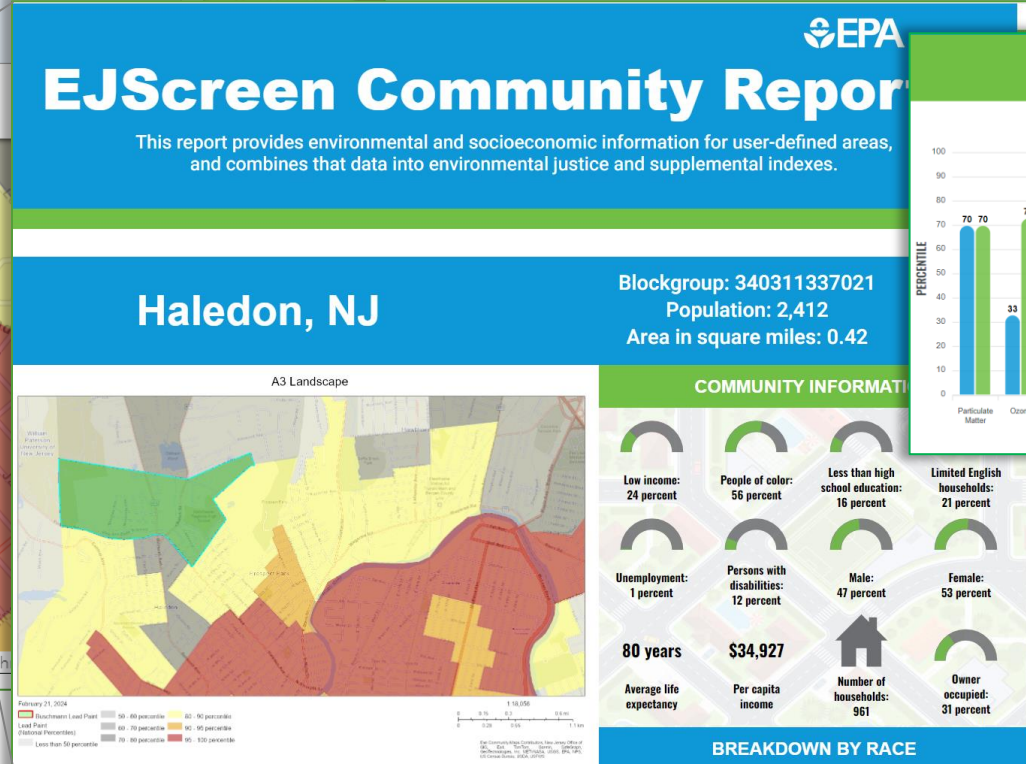
- Particulate Matter 2.5
- Ozone
- Diesel Particulate Matter
- Air Toxics Cancer Risk
- Air Toxics Respiratory HI
- Toxic Releases to Air
- Traffic Proximity
- Lead Paint
- Superfund Proximity
- RMP Facility Proximity
- Hazardous Waste Proximity
- Underground Storage Tanks
- Wastewater Discharge

Supplemental Indexes

- Pollution and Sources
- Socioeconomic Indicators
- Health Disparities
- Climate Change Data
- Critical Service Gaps
- Additional Demographics
- Threshold Map

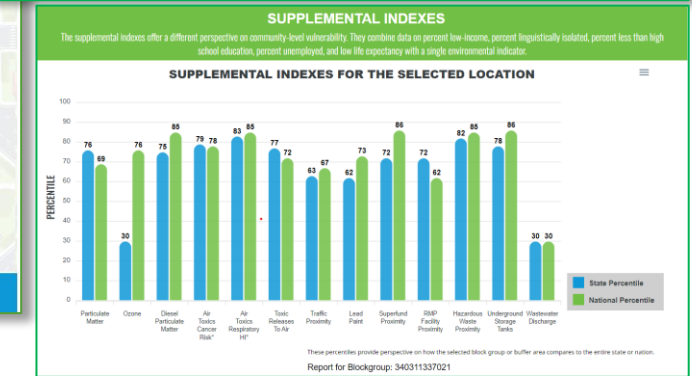
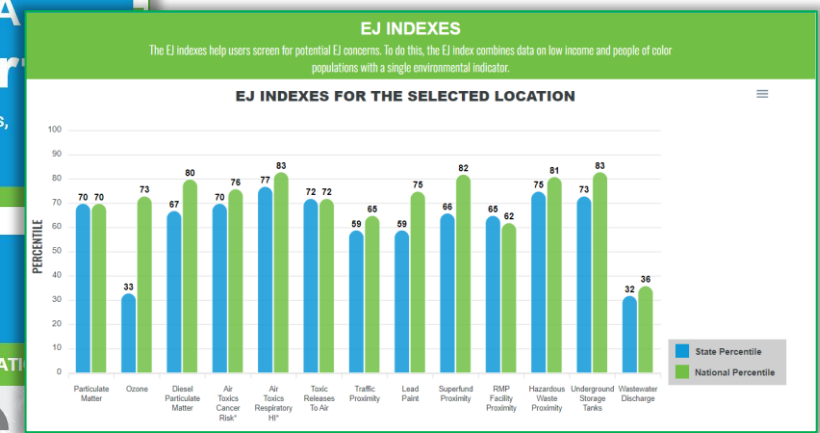


Generate Report



# EPA's EJScreen

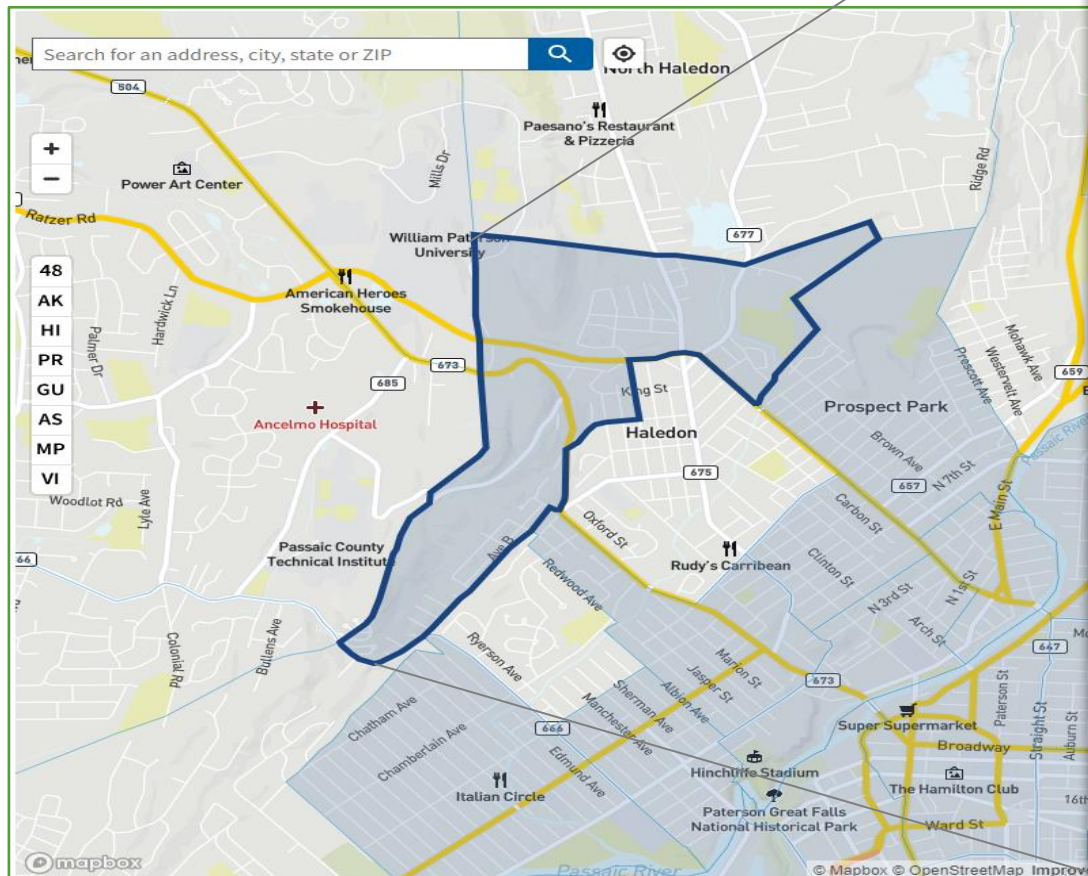
<https://ejscreen.epa.gov/mapper/>





# CEQ's Climate and Economic Justice Screening Tool (CEJST)

<https://screeningtool.geoplatform.gov/>



## Tract information

Number: 34031133702  
County: Passaic County  
State: New Jersey  
Population: 3,282

## Tract demographics

Race / Ethnicity ([Hide ^](#))

White	46%
Black or African American	13%
American Indian and Alaska Native	0%
Asian	1%
Native Hawaiian or Pacific Islander	0%
Other	5%
Two or more races	3%
Hispanic or Latino	36%

Age ([Hide ^](#))

Children under 10	12%
Ages 10 - 64	71%
Elderly over 65	15%

Identified as disadvantaged?

**YES**

This tract is considered disadvantaged because it meets 1 burden threshold **AND** the associated socioeconomic threshold.

## Legacy pollution

### Abandoned mine land

Presence of one or more abandoned mine land within the tract

No

### Formerly Used Defense Sites

Presence of one or more Formerly Used Defense Site within the tract

--  
missing data

### Proximity to hazardous waste facilities

Count of hazardous waste facilities within 5 kilometers

89th  
not above 90th percentile

### Proximity to Risk Management Plan facilities

Count of Risk Management Plan (RMP) facilities within 5 kilometers

56th  
not above 90th percentile

### Proximity to Superfund sites

Count of proposed or listed Superfund (or National Priorities List (NPL)) sites within 5 kilometers

86th  
not above 90th percentile

## AND

### Low income

People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in

40th  
not above 65th percentile

## Workforce development

### Linguistic isolation

Share of households where no one over age 14 speaks English very well

90th  
above 90th percentile

### Low median income

Comparison of median income in the tract to median incomes in the area

68th  
not above 90th percentile

### Poverty

Share of people in households where income is at or below 100% of the Federal poverty level

45th  
not above 90th percentile

### Unemployment

Number of unemployed people as a part of the labor force

57th  
not above 90th percentile

## AND

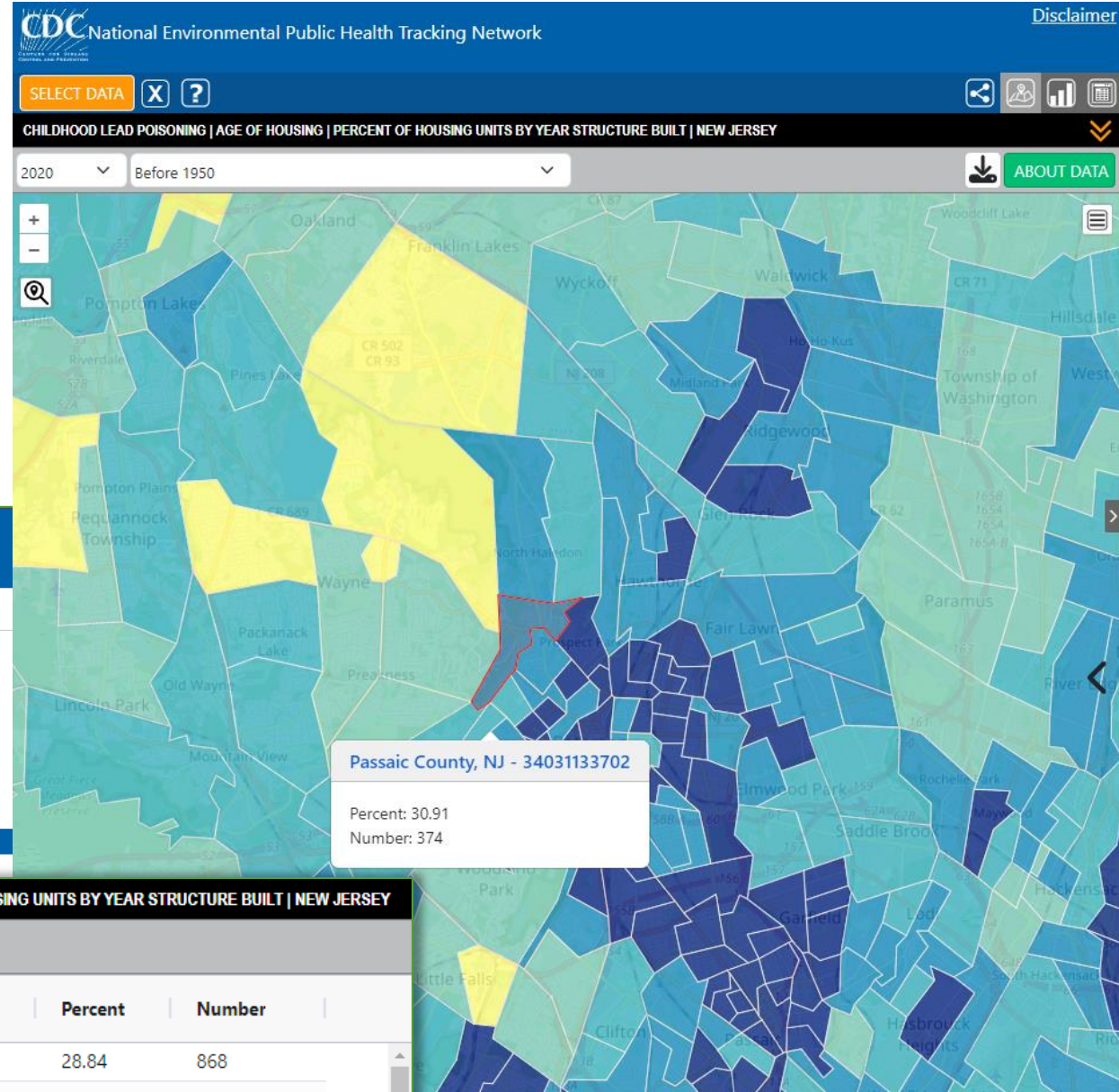
### High school education

Percent of people ages 25 years or older whose high school education is less than a high school diploma

12%  
above 10th percent

# CDC's Environmental Public Health Tracking Network

<https://www.cdc.gov/nceh/tracking/>



CDC Query Panel

STEP 1: CONTENT ?

Select Content Area

Select Content Area

- Air Quality
- Asthma
- Biomonitoring: Population Exposure
- Birth Defects
- Cancer
- Childhood Cancers
- Childhood Lead Poisoning**
- Chronic Obstructive Pulmonary Disease
- Community Characteristics
- Community Design
- COVID-19
- Developmental Disabilities
- Drinking Water
- Drought
- Environmental Justice
- Heart Disease & Stroke
- Heat & Heat-related Illness (HRI)
- Hormone Disorders
- Lifestyle Risk Factors

STEP 1: CONTENT ?

Childhood Lead Poisoning

Age of Housing

Percent of Housing Units by Year Structure Built

STEP 3: GEOGRAPHY ?

- ☐ Michigan
- ☐ Minnesota
- ☐ Mississippi
- ☐ Missouri
- ☐ Montana
- ☐ Nebraska
- ☐ Nevada
- ☐ New Hampshire
- ☒ New Jersey
- ☐ New Mexico

STEP 2: GEOGRAPHY TYPE ?

State By Census Tracts

## CHILDHOOD LEAD POISONING | AGE OF HOUSING | PERCENT OF HOUSING UNITS BY YEAR STRUCTURE BUILT | NEW JERSEY

County (Census Tract) ▾	Stratification	Percent	Number
Passaic County, NJ - 34031116500	Before 1950	28.84	868
Passaic County, NJ - 34031124201	Before 1950	49.64	629
Passaic County, NJ - 34031124202	Before 1950	41.31	530
Passaic County, NJ - 34031124311	Before 1950	15.28	249
Passaic County, NJ - 34031124312	Before 1950	8.95	144



# More Screening Tools



<https://enviro.epa.gov/>

Update facilities on map

Copy CSV Excel Print JSON

FACILITY INFORMATION ↓	ICIS-Air ↓	ACRES ↓	BR ↓	SEMS ↓	GHG ↓	ICIS-NPDES ↓	RCRA ↓	TRI ↓
248 GOFFLE ROAD LLC 248-270 GOFFLE RD, HAWTHORNE, NJ, 07506 Latitude:40.94266, Longitude:-74.16413 <a href="#">Summary Report</a> <a href="#">Facility Report</a> <a href="#">Compliance Report</a>							<a href="#">View Report</a>	
377 N 11TH ST 377 N 11TH ST, PROSPECT PARK, NJ, 07508 Latitude:40.937, Longitude:-74.17162 <a href="#">Summary Report</a> <a href="#">Facility Report</a> <a href="#">Compliance Report</a>							<a href="#">View Report</a>	



<https://www.census.gov/programs-surveys/acs>

Populations and People Income and Poverty Education Employment Housing **Health** Families and Living Arrangements Race and Ethnicity

## Health

**Disability**  
 11.6% ± 2.8%  
 Disabled Population in Haledon borough, New Jersey  
 11.2% ± 0.2%  
 Disabled Population in New Jersey  
 S1810 | 2022 American Community Survey 5-Year Estimates

**Types of Disabilities**  
 in Haledon borough, New Jersey

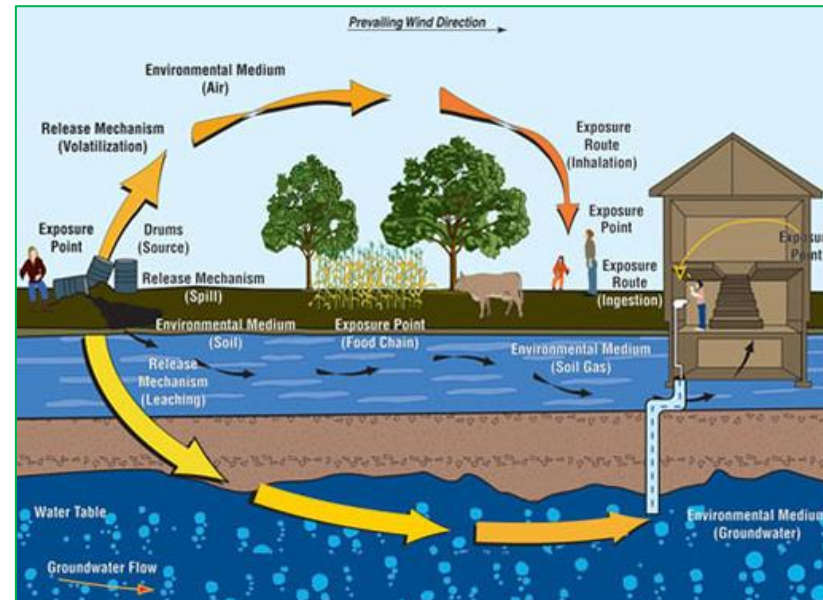
Disability Type	Percentage
Hearing difficulty	1.3%
Vision difficulty	3.3%
Cognitive difficulty	4.1%
Ambulatory difficulty	4.7%
Self-care difficulty	1.5%
Independent living difficulty	6.6%

Show Table Display Margin of Error

S1810 | 2022 American Community Survey 5-Year Estimates

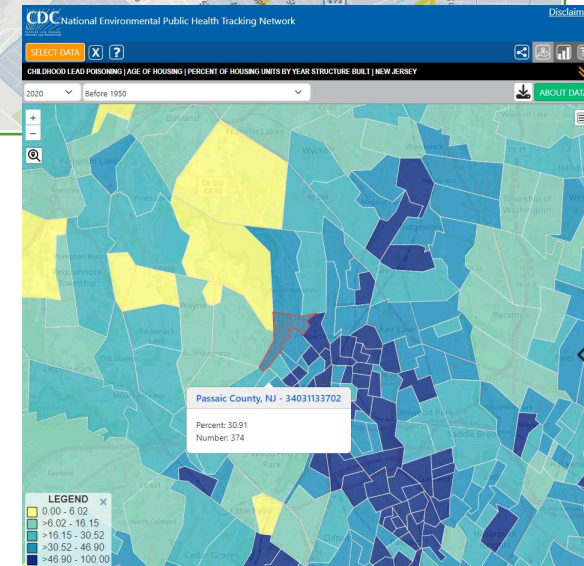
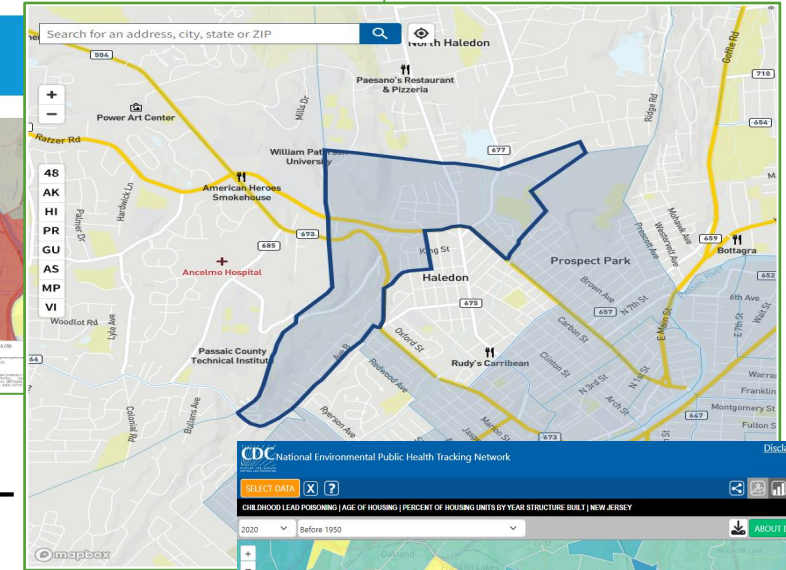
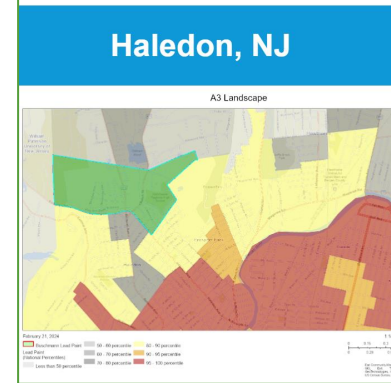


# Takeaways



## EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.





# TAB can help!

NJIT

EPA Region 2

TAB

Technical Assistance to  
Brownfield Communities

EPA Region 4



**NJIT TAB** serves as an independent resources to state, territory, regional, county, tribal, and local government entities, and non-profits attempting to learn about, identify, assess, cleanup, and redevelop brownfields.



# Thank you!



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<https://www.njit.edu/tab/>



**TAB**  
Technical Assistance to  
Brownfield Communities



# Upcoming Events 2024



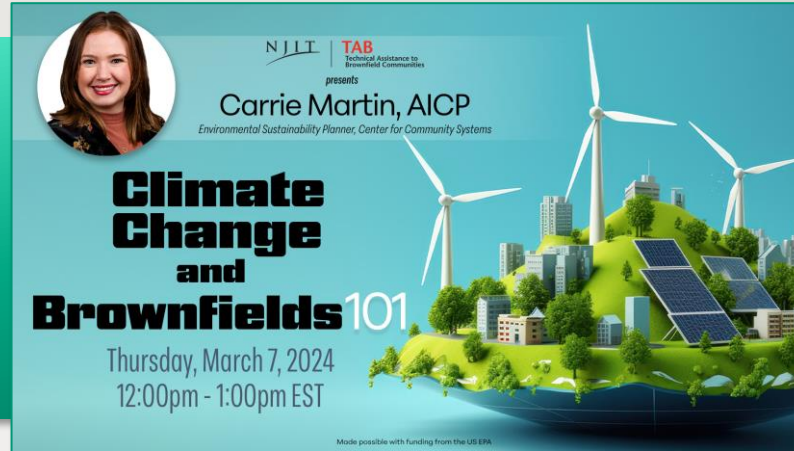
**Brownfield Contaminants and Human Health**

Thursday, February 29, 2024  
1:00pm - 2:00pm EST

Made possible with funding from the US EPA.

February 29, 2024

LinkedIn Event Page  
<https://bit.ly/3UYkHPR>



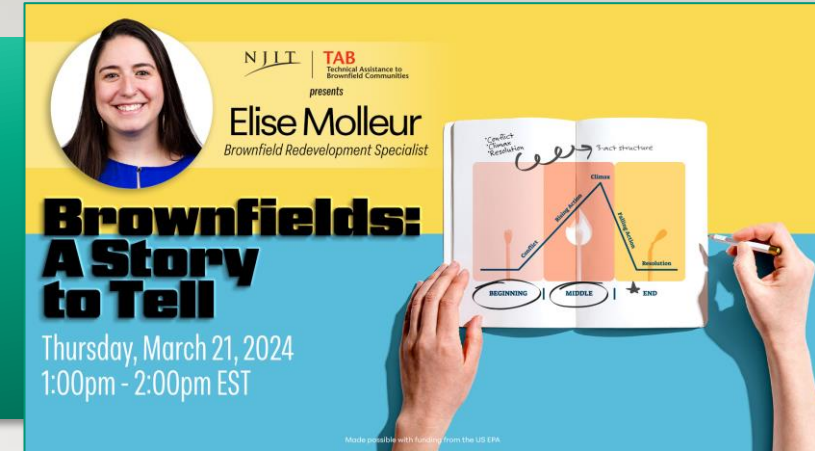
**Climate Change and Brownfields 101**

Thursday, March 7, 2024  
12:00pm - 1:00pm EST

Made possible with funding from the US EPA.

March 7, 2024

LinkedIn Event Page  
<https://bit.ly/3lg1Qbt>



**Brownfields: A Story to Tell**

Thursday, March 21, 2024  
1:00pm - 2:00pm EST

Made possible with funding from the US EPA.

March 21, 2024

LinkedIn Event Page  
<https://bit.ly/30X08zJ>

# What is



**TAB**

Technical Assistance to  
Brownfield Communities



NJIT provides free technical assistance to state, regional, county, tribal, and local government entities and nonprofit organizations interested in learning about, identifying, assessing, cleaning up, and redeveloping brownfield sites in EPA Regions 2 & 4.

## Contact Us



[tab@njit.edu](mailto:tab@njit.edu)



(973) 642-4165



[www.njit.edu/tab](http://www.njit.edu/tab)



[www.linkedin.com/company/101101593](https://www.linkedin.com/company/101101593)