Soil Sampling and Houston's Project 11

Naomi Yoder, GIS Manager
naomi.yoder@tsu.edu

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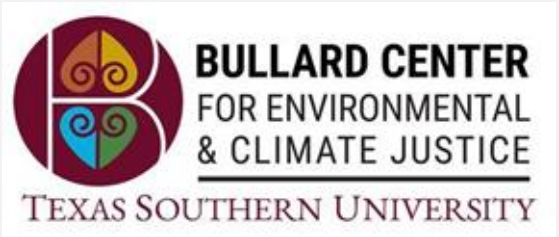


Project 11

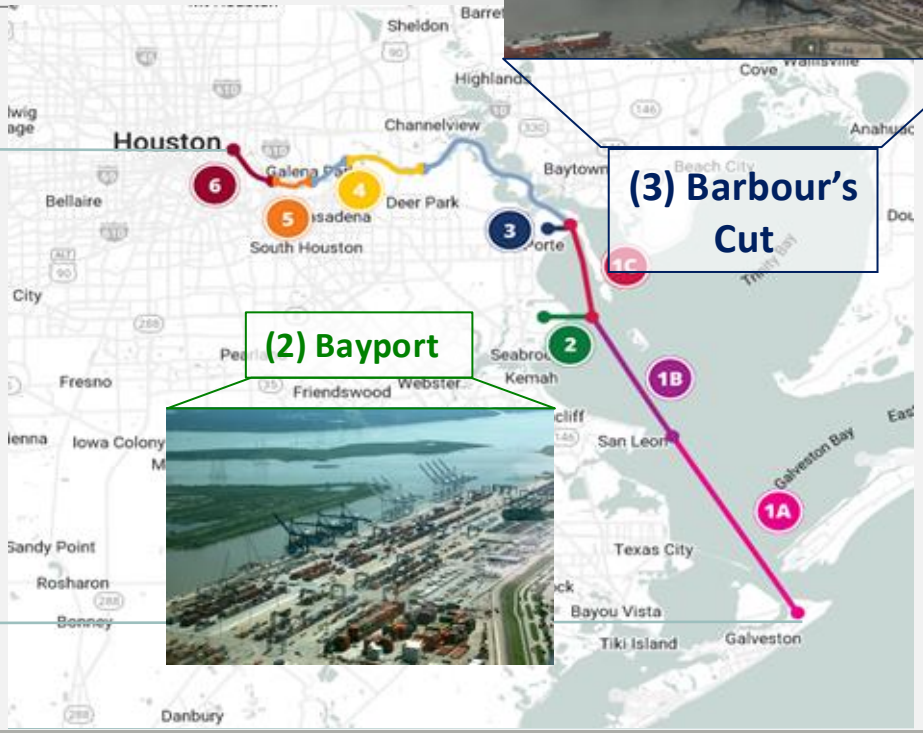
Background

Houston Ship Channel

- From mouth of Galveston Bay to Turning Basin (4 mi east of downtown) ~ 50 mi

- Two major container ports:
  - Bayport
  - Barbour's Cut

- After the hurricane of 1900, in 1910, dredging in earnest began



What is Project 11?

Segment	Dredge Dumps
4	E2 Clinton, Beltway 8
5+6	Glendale, Filterbed

- US Army Corps of Engineers (**USACE**) major modification of the channel – 6 segments
  - With the **Port** of Houston
- 11th time the Army Corps of Engineers has deepened and widened the Houston Ship Channel
- This is separate from USACE "operations and maintenance" dredging
- Dredging: deposit sediment in "dredge spoil material placement areas" DMPAs
- Segments with DMPAs in neighborhoods, already vulnerable communities
  - 4 – Widen to 530 ft, Deepen 5.5 ft (to 46.5 ft)
  - 5 – Deepen 4.5 ft (to 41.5ft)
  - 6 – Deepen 2 ft (to 39 ft)

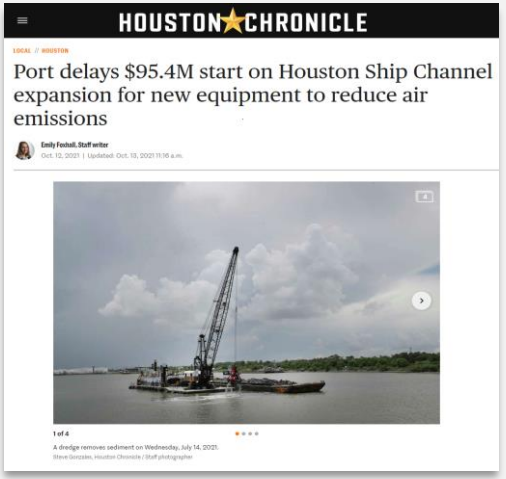
Project 11 Community Demands

- Port: authority for segments 2, 3
  - Agreed to use lower emissions cleaner dredges as requested by Healthy Ports Communities Coalition
- USACE on the other hand…none
- Demands:
  - Sampling in the DMPAs
  - Public process for placing sediments with toxins/pollutants
  - Full accounting of the toxicology of the sediments coming out of the Ship Channel


HOUSTON CHRONICLE

As Houston Ship Channel expands, a historic community prepares to fight yet another health hazard

https://www.houstonchronicle.com/news/houston-texas/houston/article/As-Houston-Ship-Channel-expands-a-historic-16446861.php

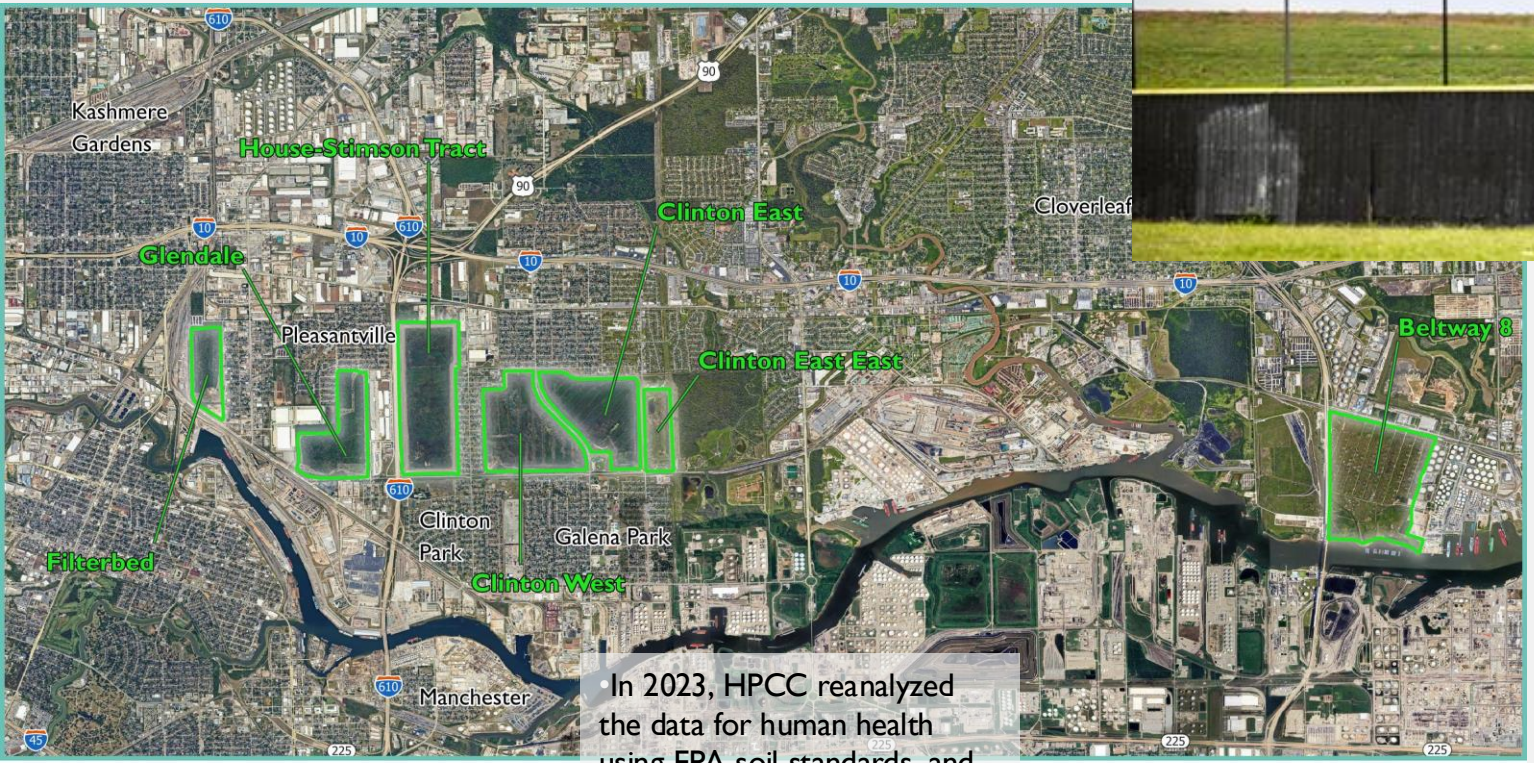

HOUSTON CHRONICLE

Port delays $95.4M start on Houston Ship Channel expansion for new equipment to reduce air emissions

https://www.houstonchronicle.com/news/houston-texas/houston/article/Port-approves-95-4M-contract-for-Houston-Ship-16528528.php

DMPAs

Berm at Clinton East Site in Galena Park
© A. Mulligan, Environmental Defense Fund



Dredge Material Placement Areas
Upper Reaches Houston Ship Channel, Project 11

In 2023, HPCC reanalyzed the data for human health using EPA soil standards, and conducted new sampling around DMPA berms

Project 11: 3,000,000 + cubic yards of sediment

Segment	Dredge Dumps
4	E2 Clinton, Beltway 8
5+6	Glendale, Filterbed

Project 11 Community Demands

- DMPAs for segments 1 – 3 = Galveston Bay, islands in the Ship Channel area
- Upper reaches 4 – 6, USACE is the responsible party; no agreement to clean dredge equipment
- HPCC and others' requests (since at least 2018):
  - Sampling in the DMPAs in communities; full risk profile
  - Chance to comment on the findings and be part of the decision-making for placing sediments with toxins/pollutants
    - Appendix T in FEIS, e.g. – this was only analyzed for aquatic organisms health. Found: "no concern" despite exceedances even for aquatics
  - Full accounting of the toxicology of the sediments coming out of the Ship Channel
  - Revision of the flood modeling for DMPAs to account for City, County and other local planning for stormwater runoff and flooding
  - Supplemental Environmental Impact Statement…?
- In 2023, HPCC reanalyzed the data for human health using EPA soil standards
  - (Spoiler alert: Houston, We Have a Problem)

Photo: © NJY. Glendale and Pleasantville (looking north)

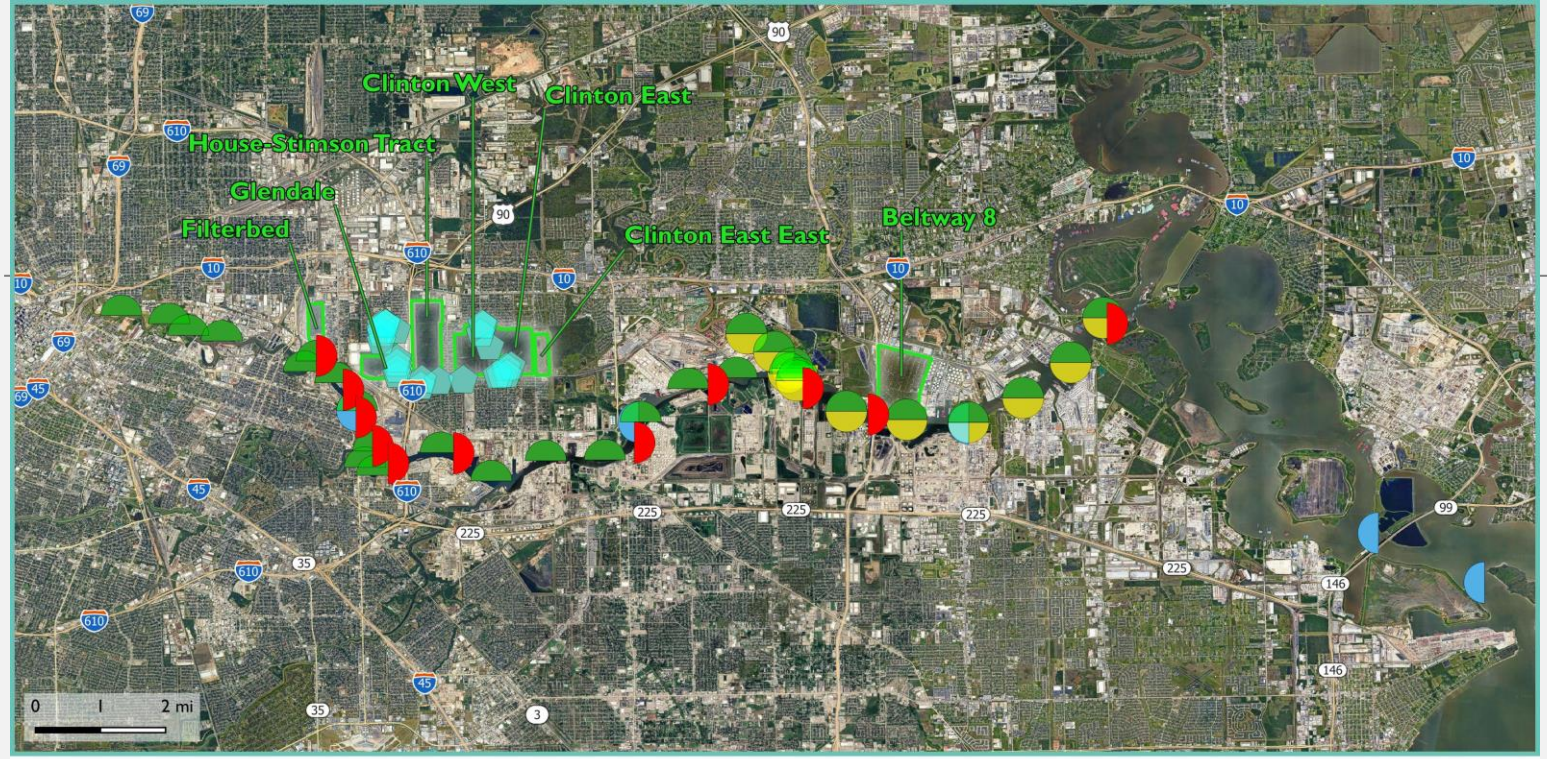
Soil Sampling Efforts

Dataset	Locations	Who Did the Sampling?	Number of Sites	Years
USACE - Project 11 Samples for Final Environmental Impact Statement (FEIS)	Upper Houston Ship Channel - in channel	USACE	11	2018
USACE - Maintenance and Operations	Upper Houston Ship Channel - in channel	USACE	5 31 12	2023 2020 2012
Community Soil Sampling	Right of Way outside the dump site berms (Filterbed, Glendale, Clinton E+W)	Healthy Port Communities Coalition*	25	2023

*other partners include: Lone Star Legal Aid, Superneighborhood 57, City of Houston, Environmental Defense Fund. Sampling by I2M

Note: all samples were analyzed in 2023-2024

Photo: © NJY. Glendale and Pleasantville (looking north)



Upper Houston Ship Channel, Toxicity Sampling Sites

Soil Samples
- Healthy Port Communities Coalition (25)
- Dredge Material Placement Area

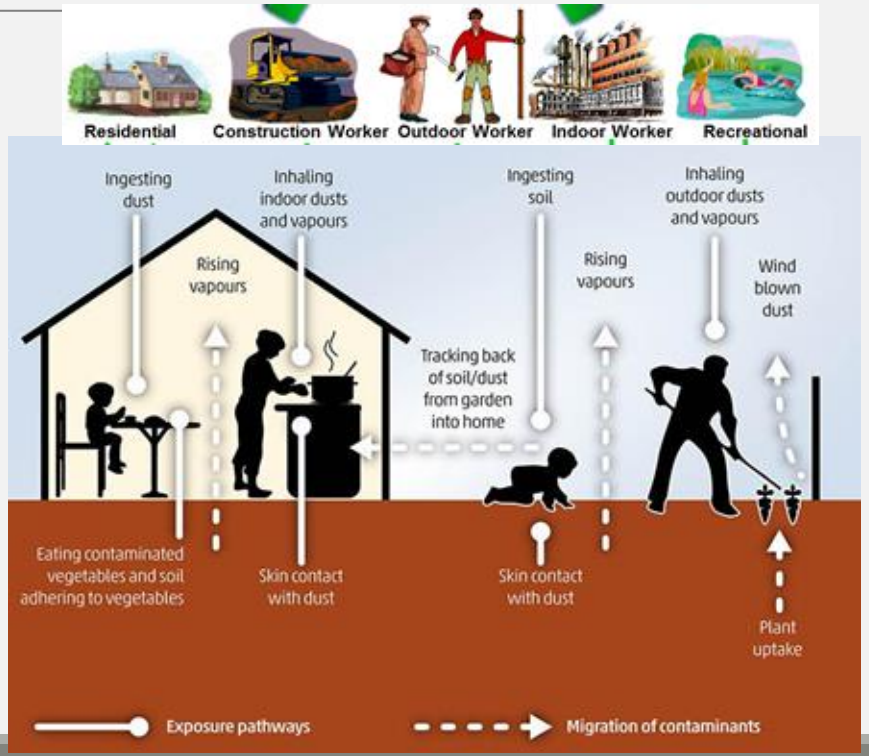
USACE
- 2012 (12)
- 2018, Project 11 FEIS (11)
- 2020 (29)
- 2023 (5)

Houston Area Locator

Regional Area Locator

Notes: Soil Toxicology

- How are we exposed to soil pollution?
  - "Exposure pathways" (residential)
  - Safe limits? There's no such thing as zero risk
  - EPA defines **acceptable risk for carcinogens** as concentration below which will result in at most 1 in 1M people getting cancer
- We used: Residential Soil (carcinogenic and non) screening levels - **RSLs**
- TCEQ values? We chose EPA because those levels are more protective*



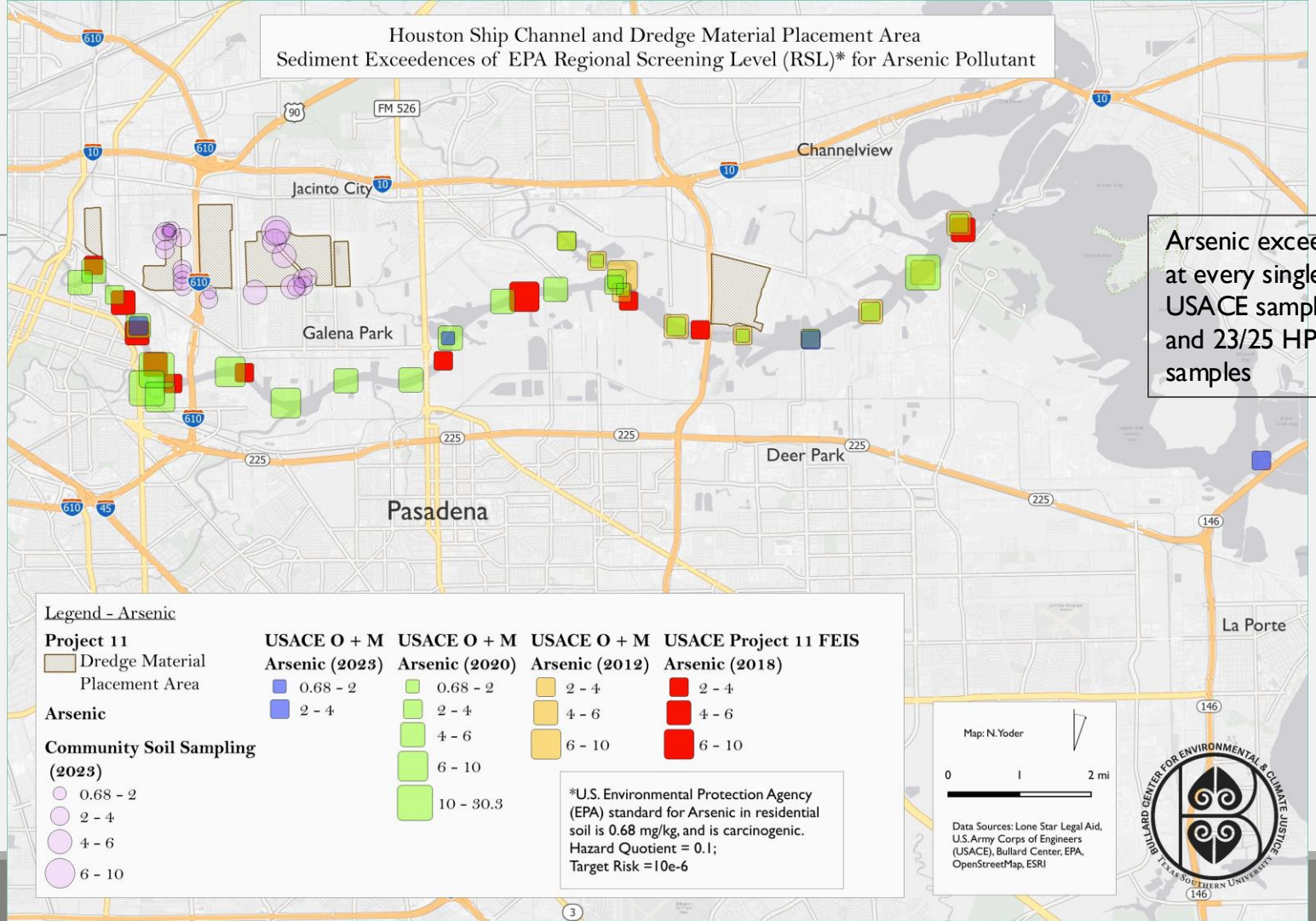
*Except in the few cases where no RSLs are available and TCEQ did have standards/limits listed

Results

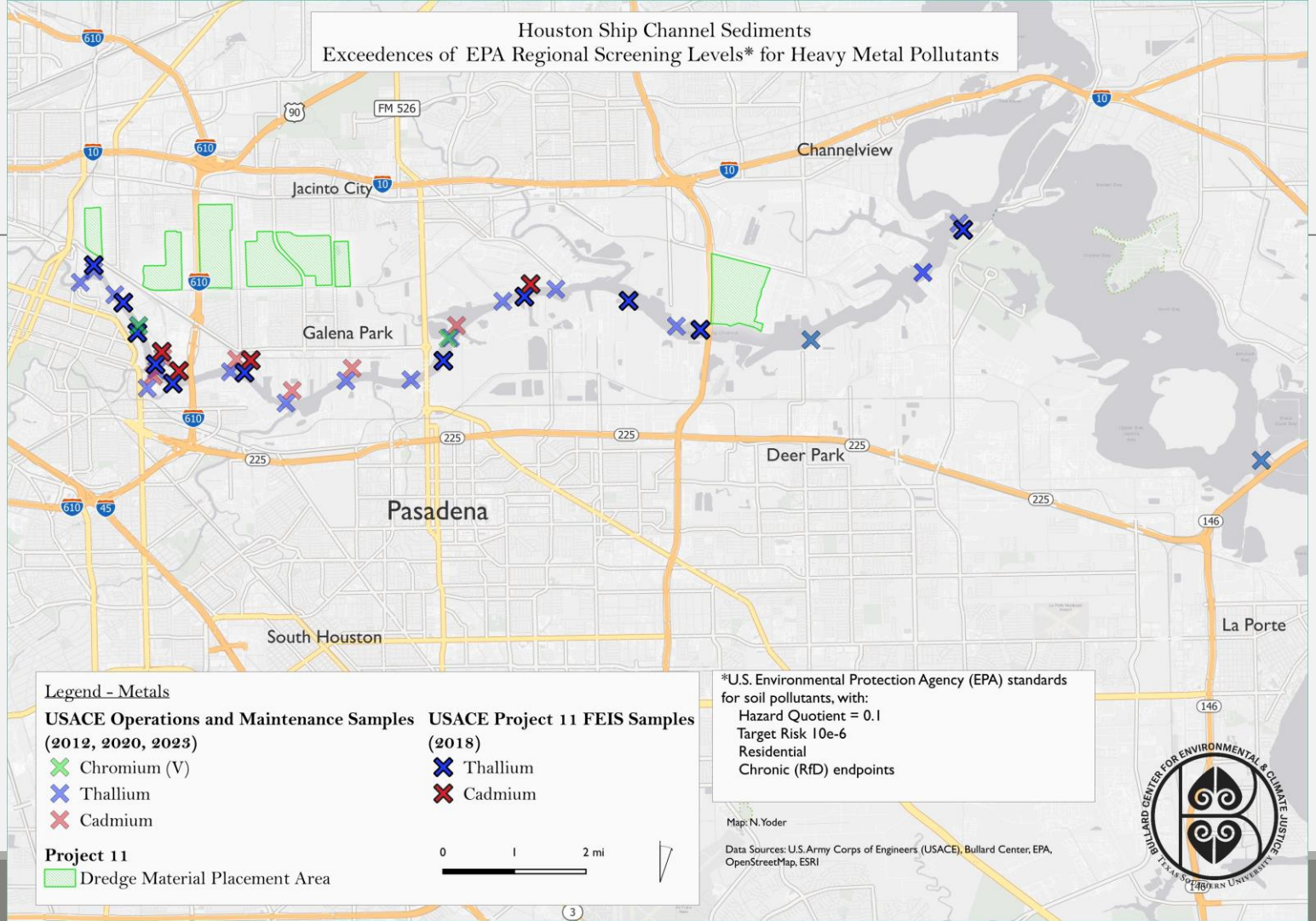
In-channel DMPAs

Dataset	Number of Analytes
USACE - Project 11 Samples for FEIS	152
USACE - Maintenance and Operations	53
Community Soil Sampling	56

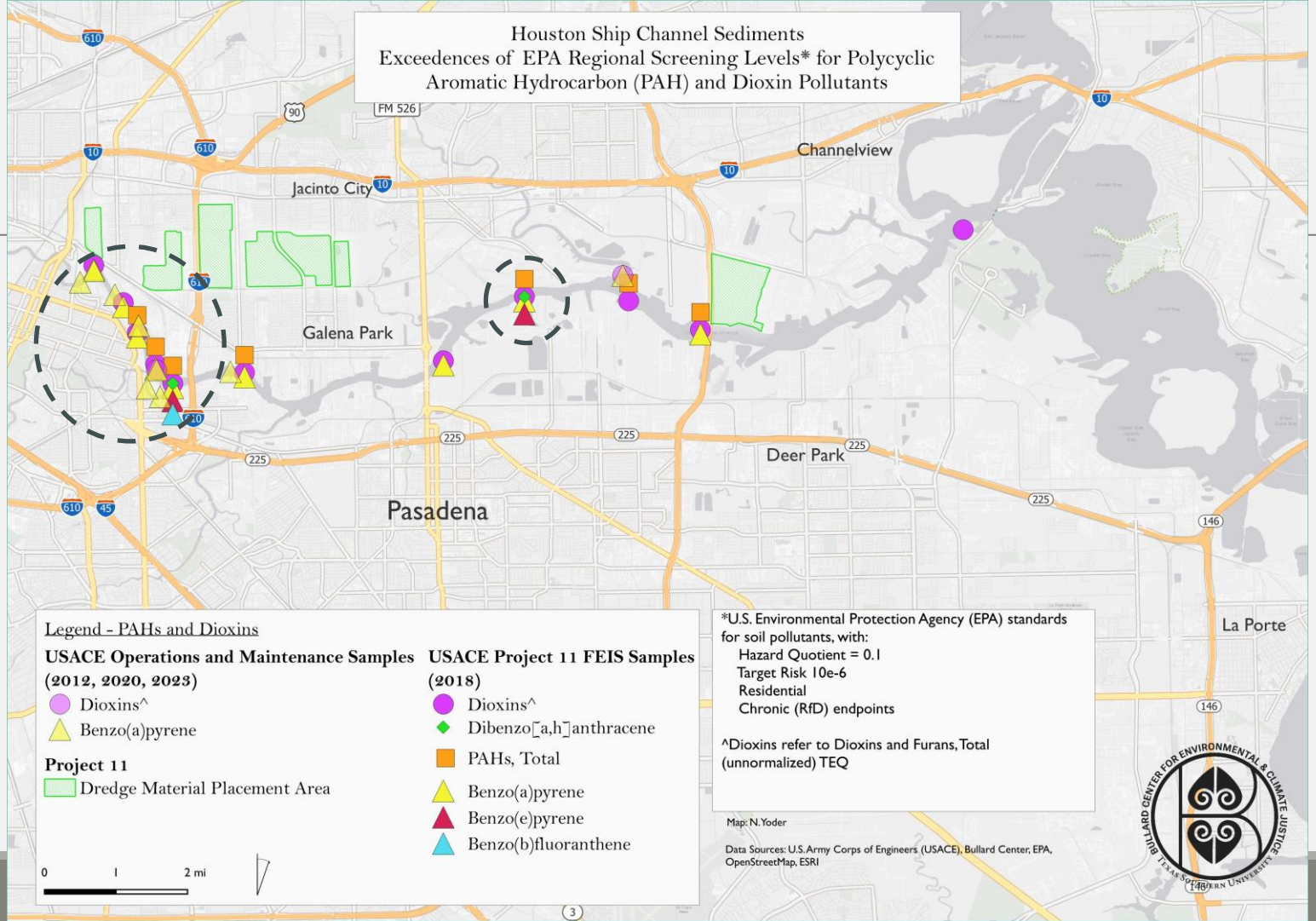
Arsenic


Houston Ship Channel and Dredge Material Placement Area
Sediment Exceedences of EPA Regional Screening Level (RSL)* for Arsenic Pollutant
Channelview
Jacinto City
Galena Park
Deer Park
Pasadena
La Porte
Arsenic exceedance at every single USACE sample site and 23/25 HPCC samples
Legend - Arsenic
Project 11
Dredge Material Placement Area
Arsenic
Community Soil Sampling (2023)
0.68 - 2
2 - 4
4 - 6
6 - 10
USACE O + M Arsenic (2023)
0.68 - 2
2 - 4
USACE O + M Arsenic (2020)
0.68 - 2
2 - 4
4 - 6
6 - 10
10 - 30.3
USACE O + M Arsenic (2012)
2 - 4
4 - 6
6 - 10
USACE Project 11 FEIS Arsenic (2018)
2 - 4
4 - 6
6 - 10
*U.S. Environmental Protection Agency (EPA) standard for Arsenic in residential soil is 0.68 mg/kg, and is carcinogenic. Hazard Quotient = 0.1; Target Risk =10e-6
Map: N. Yoder
0
1
2 mi
Data Sources: Lone Star Legal Aid, U.S. Army Corps of Engineers (USACE), Bullard Center, EPA, OpenStreetMap, ESRI
Bullard Center for Environmental & Climate Justice
Texas Southern University

Metals


Houston Ship Channel Sediments
Exceedences of EPA Regional Screening Levels* for Heavy Metal Pollutants
Channelview
Jacinto City
Galena Park
Deer Park
Pasadena
South Houston
La Porte
FM 526
610
10
90
225
45
146
Legend - Metals
USACE Operations and Maintenance Samples (2012, 2020, 2023)
Chromium (V)
Thallium
Cadmium
USACE Project 11 FEIS Samples (2018)
Thallium
Cadmium
Project 11
Dredge Material Placement Area
0
1
2 mi
*U.S. Environmental Protection Agency (EPA) standards for soil pollutants, with:
Hazard Quotient = 0.1
Target Risk 10e-6
Residential
Chronic (RfD) endpoints
Map: N. Yoder
Data Sources: U.S. Army Corps of Engineers (USACE), Bullard Center, EPA, OpenStreetMap, ESRI
BULLARD CENTER FOR ENVIRONMENTAL & CLIMATE JUSTICE
TEXAS SOUTHERN UNIVERSITY

PAH's and Dioxins



In Channel Results

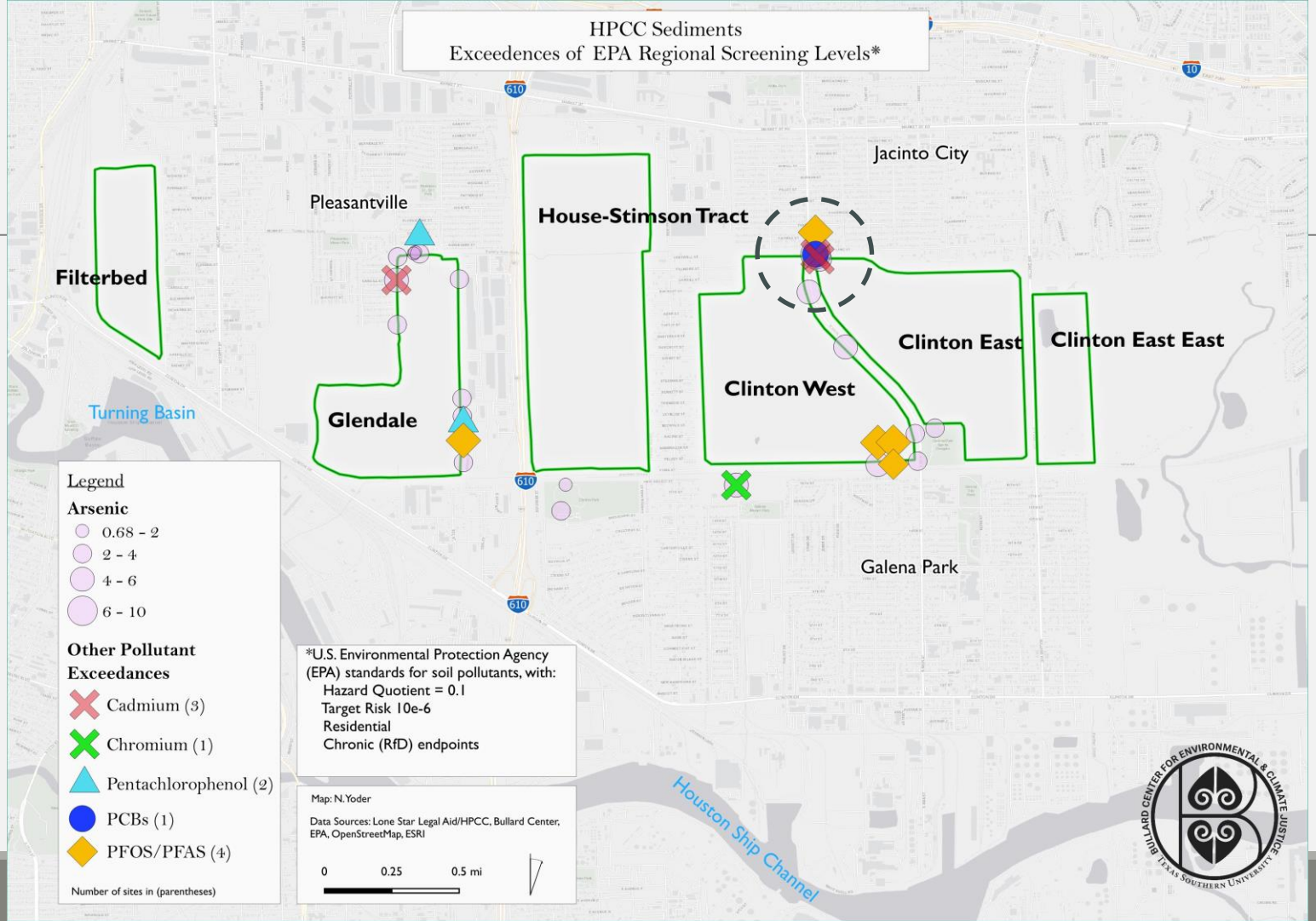
- **Arsenic** exceedance in EVERY sample location, every year
- **PAHs**, other **heavy metals** also common exceedances
- Dioxins and furans exceed RSL at EVERY station in FEIS (2018) sampling
  - USACE used NOAA levels own results reported Yet USACE found no "concern"?
- Sampling methodology:
  - compositing samples essentially averages the actuals
  - NOAA and EPA Marine levels were used; elutriate was used instead of sediment. Elutriate = for water column and measuring pollutants that become mobilized in dredging. "No screening levels" for dioxins/furans in elutriate (p. 65, Appendix Ta FEIS)

"Hazardous, Toxic and Radioactive Waste (HTRW) concer[n]s were addressed under various NEPA documents for the construction or modification of the channels covered under this DMMP. ***HTRW issues were not found to be a concern.*** *The sediments dredged during construction and or maintenance of the authorized footprints of the HSC, BSC, BCC and Greens Bayou Channels are regularly tested by the Galveston District for a range of chemical compounds of concern to the EPA as well as the Texas Commission on Environmental Quality (TCEQ). Specific information regarding HTRW concerns can be found in Appendix G of the main FIFR-EIS."*
- p. 5-8, Appendix R FEIS

"The total TEQ [Dioxins and Furans] ranged from 2.8 pg/g (2.8×10^{-6}) to 1,370 pg/g (1.37×10^{-3}) with a mean of 161 pg/g."
- p. 58, Appendix Ta FEIS

EPA RSL Dioxins and Furans = 4.8×10^{-6} the highest concentration is three orders of magnitude higher than

Community Samples



DMPA Berm Results

- **Arsenic** exceedance in 23/25 sample locations
- Other **heavy metals** again
- No dioxins and furans exceedances, but did identify **PCBs** exceedance
  - Small "hotspot" at the north end of East/West Clinton, on Mercury Drive
- PFOS/PFAS second-most number of sites with exceedances

DMPAs East Clinton (left) and West Clinton (right) looking south. Photo: NJY

Soil Sampling Conclusions

Results across the board in all three sampling schemes:

- **Arsenic** - the prevalence of it makes it easy to conclude that this is from industrial sources
- **Other metals** - all of these are concerning and many have links to cancer and other debilitating disease
- **PCBs** - whenever there's an occurrence, we usually sit up and pay attention because they're "forever" chemicals and very toxic to us
  - PFAS have newly set RSLs but are also "forever" chemicals
- **Dioxins and furans** - very low amounts are considered limits on health, meaning that these are very toxic chemicals
- **PAHs** - also from industrial sources, likely still incoming

Pollutant	Health Risks
Arsenic[1]	- Cancers (lung, skin, bladder, liver, kidneys) - Skin lesions
Other metals[3]	- Cancers - Bone problems, Nervous system issues, Kidney problems, Digestion problems
PCBs[2] and Dioxins[4]	- Cancers - Endocrine system affect - Reproductive issues - Immune system problems

[1]https://www.atsdr.cdc.gov/csem/arsenic/physiologic_effects.html
[2]https://www.atsdr.cdc.gov/csem/polychlorinated-biphenyls/adverse_health.html
[3]https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=307&toxid=49; https://pmc.ncbi.nlm.nih.gov/articles/PMC10537762/
[4]https://www.who.int/news-room/fact-sheets/detail/dioxins-and-their-effects-on-human-health

Soil Sampling Conclusions

- HPCC/Bost analysed soil and water samples for TCEQ PCLs for groundwater and found MANY additional exceedances of metals:
    - Barium, Lead, Mercury, Selenium, Silver
- Hot-spots, to investigate further:
    - Upper reaches, especially between Turning Basin and I-610
    - Greensport, by the hazardous waste landfills between Greens Bayou and Washburn Tunnel
    - Drainage off from DMPAs East and West Clinton or why is there a hot-spot at Mercury Dr.?
- For the Port of Houston and USACE to be the "good neighbors" they want to/claim to be, they need to test and make data available / accessible to the public, and act in protection of the communities who receive these sediments
- Arsenic exposure awareness, remediation?

Project 11 and Soil Analysis

bullardcenter@tsu.edu

Thank You!

Questions?

naomi.yoder@tsu.edu