“Evaluation of Elevated Background Concentrations of Lead in Urban Fill in the City of Boston, Massachusetts”

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INTRODUCTION

- This purpose of this project was to evaluate the presence or absence of Lead concentrations in Urban Fill soils throughout the city of Boston
- This project included a review and tabulation of lead concentrations in urban fill soils in waste sites regulated under the Massachusetts Contingency Plan (MCP)

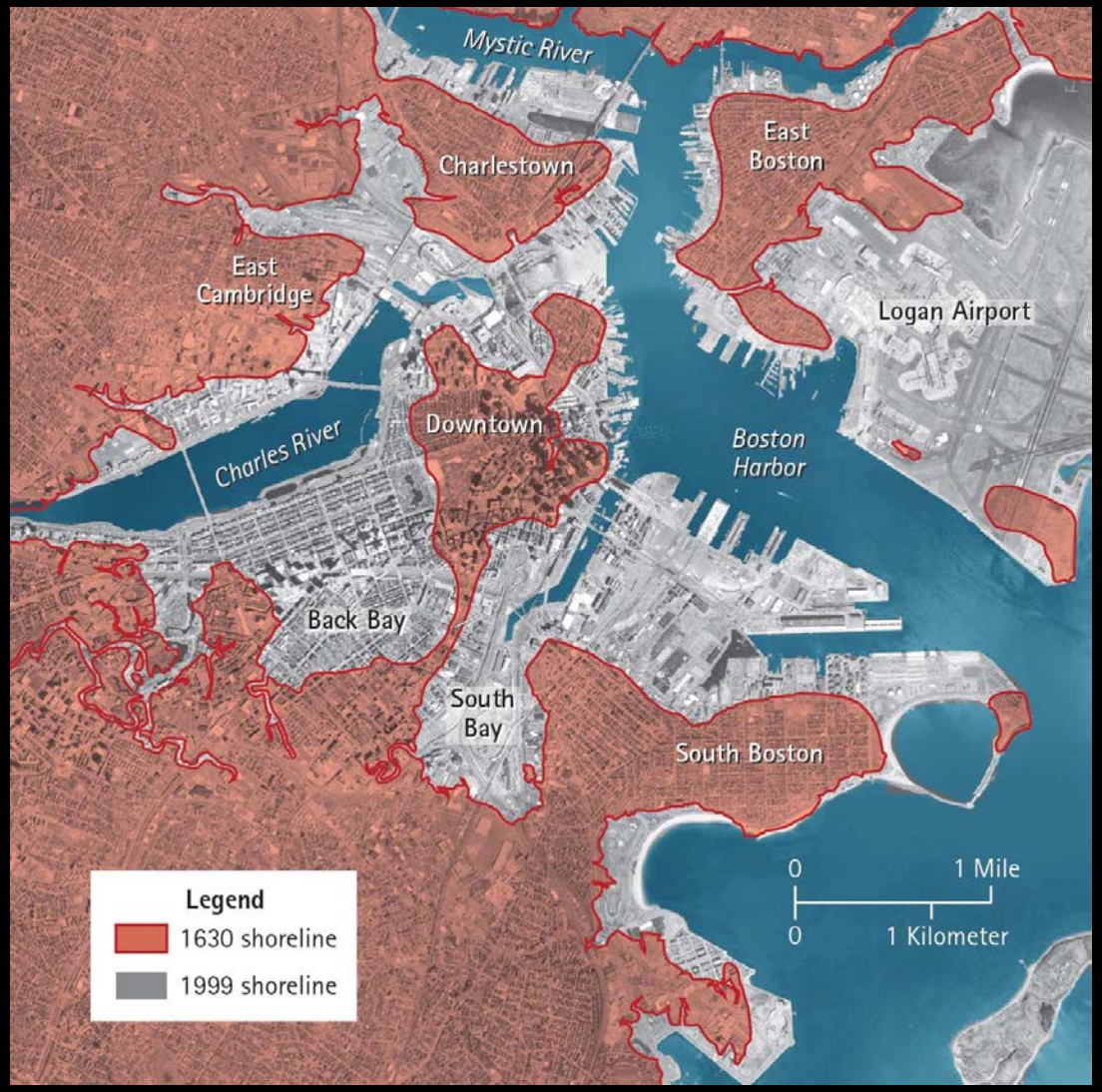
CURRENT MASSDEP POLICY FOR BACKGROUND LEVELS

- MassDEP's policy is that fill soils containing coal or coal ash can be considered as background if the site maximum concentration of lead is less than or equal to 600 mg/kg based upon the 90TH percentile value for lead

HYPOTHESIS

- Based on the results the level of anthropogenic lead in urban fill soils in the sites within the MassDEP database listed as “Boston-Boston” would exhibit a higher 90TH percentile value for lead

BACKGROUND INFORMATION



A Bold Idea for Addressing Sea Level Rise. (2016, March 28). Retrieved April 06, 2018, from http://www.resilientdesign.org/a-bold-idea-for-addressing-sea-level-rise/

- GEOLOGY OF THE BOSTON BASIN
- GLACIAL DRUMLINS SURROUNDING LOW LYING FLOOD PLAINS
- SETTLERS RAN OUT OF BUILDABLE LAND AND BEGAN TO FILL IN LOW LYING AREAS TO EXPAND THE CITY (THE AREAS SHOWN IN GREY INDICATE FILL)

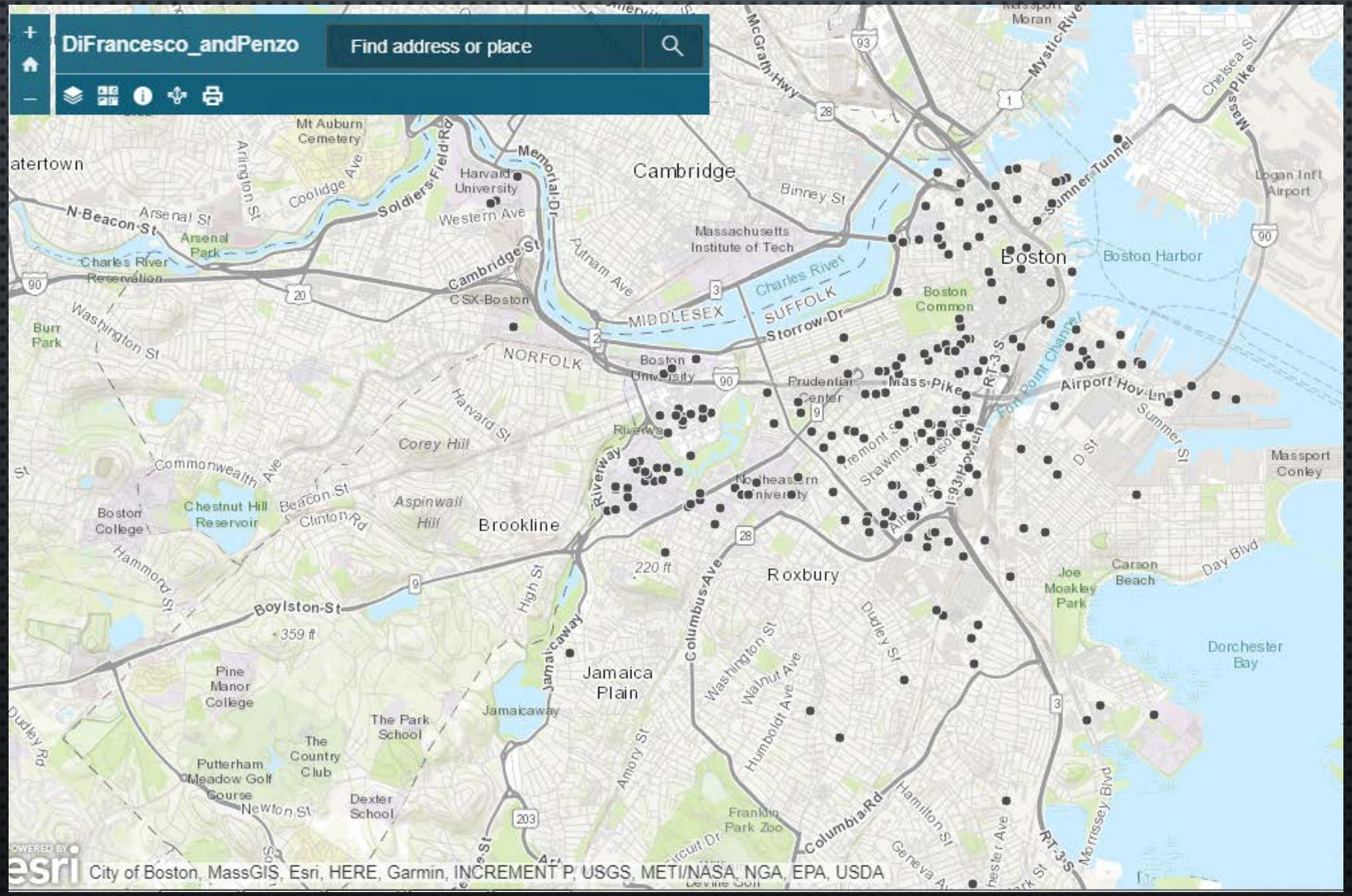
Factors that contributed to high levels of lead

- Urban Fill contained coal ash and construction debris, and trash
- Deposition of exhaust from vehicles using Leaded gasoline and gasoline spills on the surface or subsurface via UST's
- Paint chips that contained Lead

Research Method

- All data retrieved from Massachusetts Department of Environmental Protection's website listed as "Boston-Boston"
- Mass.gov
- All data inputted into a spreadsheet, headings included the site address, site history, coordinates, release tracking number, columns for lead concentrations (low, high, mean, # of samples), and notes applicable to urban fill data.

GEO-COORDINATE MAP - HTTP://ARCG.IS/18JW5Z



RESULTS – ALL URBAN FILL SITES

- Number of Samples: 5325 (280 sites)
- Mean: 527
- Median: 290
- Minimum: ND (1/2 detection limit)
- 50TH Percentile: 290 (median)
- 90TH Percentile: 1163
- 95TH Percentile: 1663
- Maximum: 8300

RESULTS – SITES WITH ≥ 25 SAMPLES

- Number of Samples: 3437 (65 sites)
- Mean: 458
- Median: 318
- Minimum: ND (1/2 detection limit)
- 50TH Percentile: 318 (Median)
- 90TH Percentile: 929
- 95TH Percentile: 1289
- Maximum: 2653

RESULTS – SHALLOW SAMPLES (0-3’)

- Number of Samples: 1618 (63 sites)
- Mean: 459
- Minimum: ND (1/2 detection limit)
- 50TH Percentile: 297 (Median)
- 90TH Percentile: 1159
- 95TH Percentile: 1819
- Maximum: 2844

PREVIOUS RESEARCH ON URBAN FILL*

DEP 1995
Number of Samples: 141
Geometric Mean or Median: 19.5
Minimum: 1
50th Percentile: 19.1
90th Percentile: 98.7
95th Percentile: 158
Maximum: 326

CA/T
Number of Samples: 850
Geometric Mean or Median: 51
Minimum: 0.05
50TH Percentile: 53
90TH Percentile: 570
95TH Percentile: 1100
Maximum: 11,000

LSPA Project
Number of Samples: 457
Geometric Mean or Median: 83
Minimum: ND (5)
50th Percentile: 83
90th Percentile: 640
95th Percentile: NC
Maximum: 10,600

H&A 2001
Number of Samples: 583
Geometric Mean or Median: 15
Minimum: ND
50th Percentile: 24.4
90th Percentile: 78.9
95th Percentile: 112
Maximum: 300

*Technical Update "Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil", MassDEP, 2002

SUMMARY

The current background limit of Lead in Urban Fill soil is 600 mg/kg

Previous research had a Median or geometric mean in the range of (15-83) mg/kg

Our research had a Median in the range of (290-318) mg/kg

SUMMARY (90TH PERCENTILE)

- Previous research had a 90TH percentile in the range of (78.9-640) mg/kg
- Our research had a 90TH percentile in the range of (929-1163) mg/kg

Conclusions

- Based on the results the 90TH percentile concentration anthropogenic lead in urban fill in the sites within the MassDEP database listed as "Boston-Boston" is in fact higher than 600 mg/kg
- This information may be a useful reference to LSPs supporting their assertion that concentrations of lead above 600 mg/kg should be considered anthropogenic background at sites in the City of Boston.

Recommendations for Future Work

- Perform additional work on the 3,754 additional sites listed in the MassDEP database for the Boston neighborhoods of Allston, Brighton, Charlestown, Dorchester, East Boston, Hyde Park, Jamaica Plain, Mattapan, Readville, Roslindale, Roxbury, South Boston, and West Roxbury
- Based upon our results, the authors request that MassDep evaluate the data generated in this study. If MassDEP agrees with the findings, then we respectfully request that they consider changing the background concentration of lead in Urban Fill from 600 mg/kg to 900 mg/kg for the City of Boston

THANK YOU TO..

- LSP Association's Wes Grant Foundation
- Michael A. Penzo
- Kianna Warner