A case for evaluating lead exposure risk using Incremental Sampling (IS)

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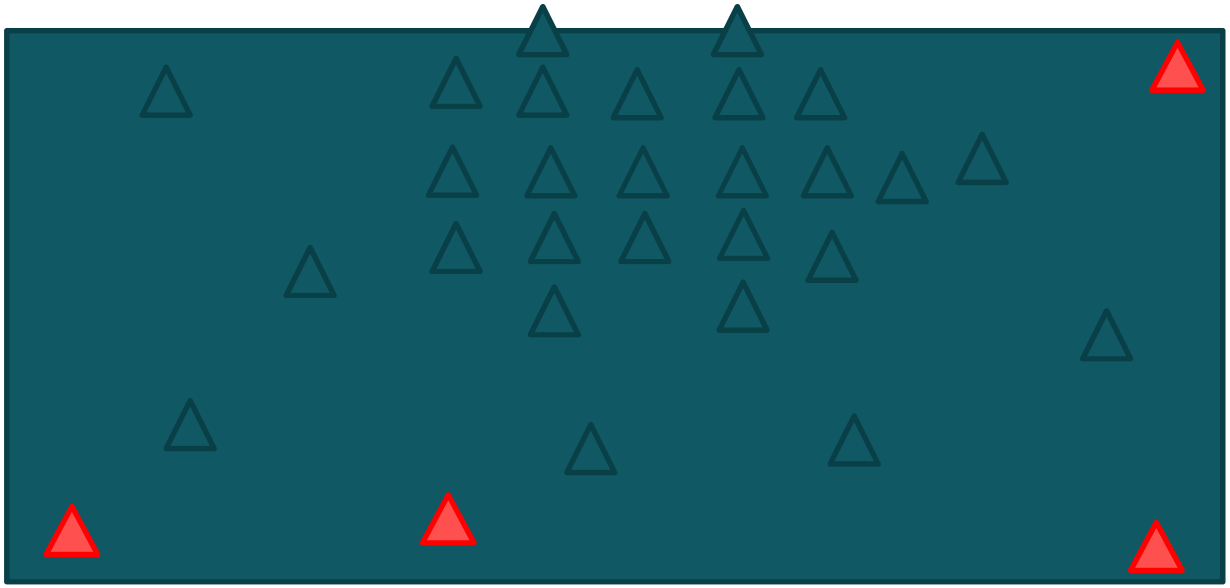
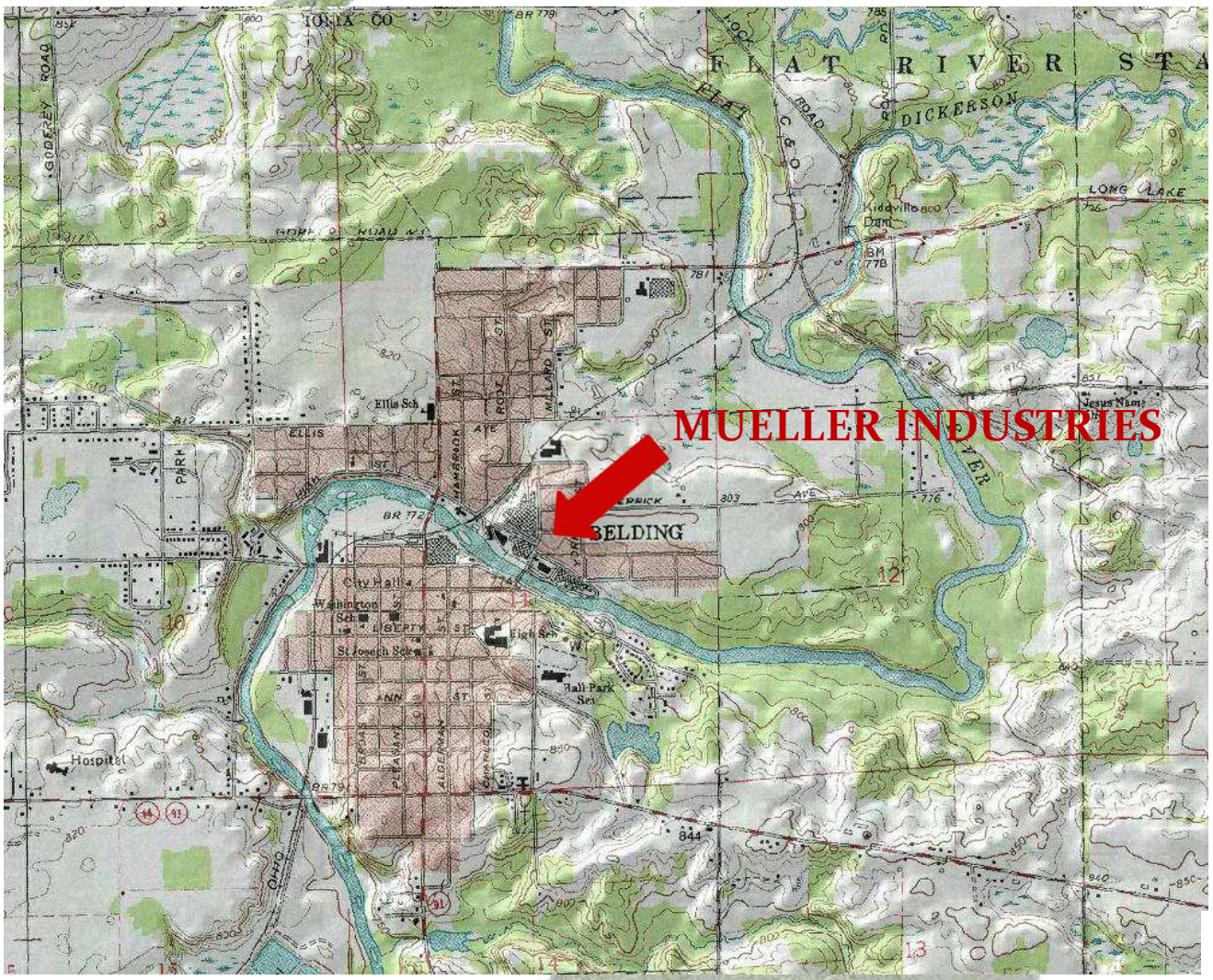
How do we currently sample?

How do we currently evaluate risk?

What does it represent?

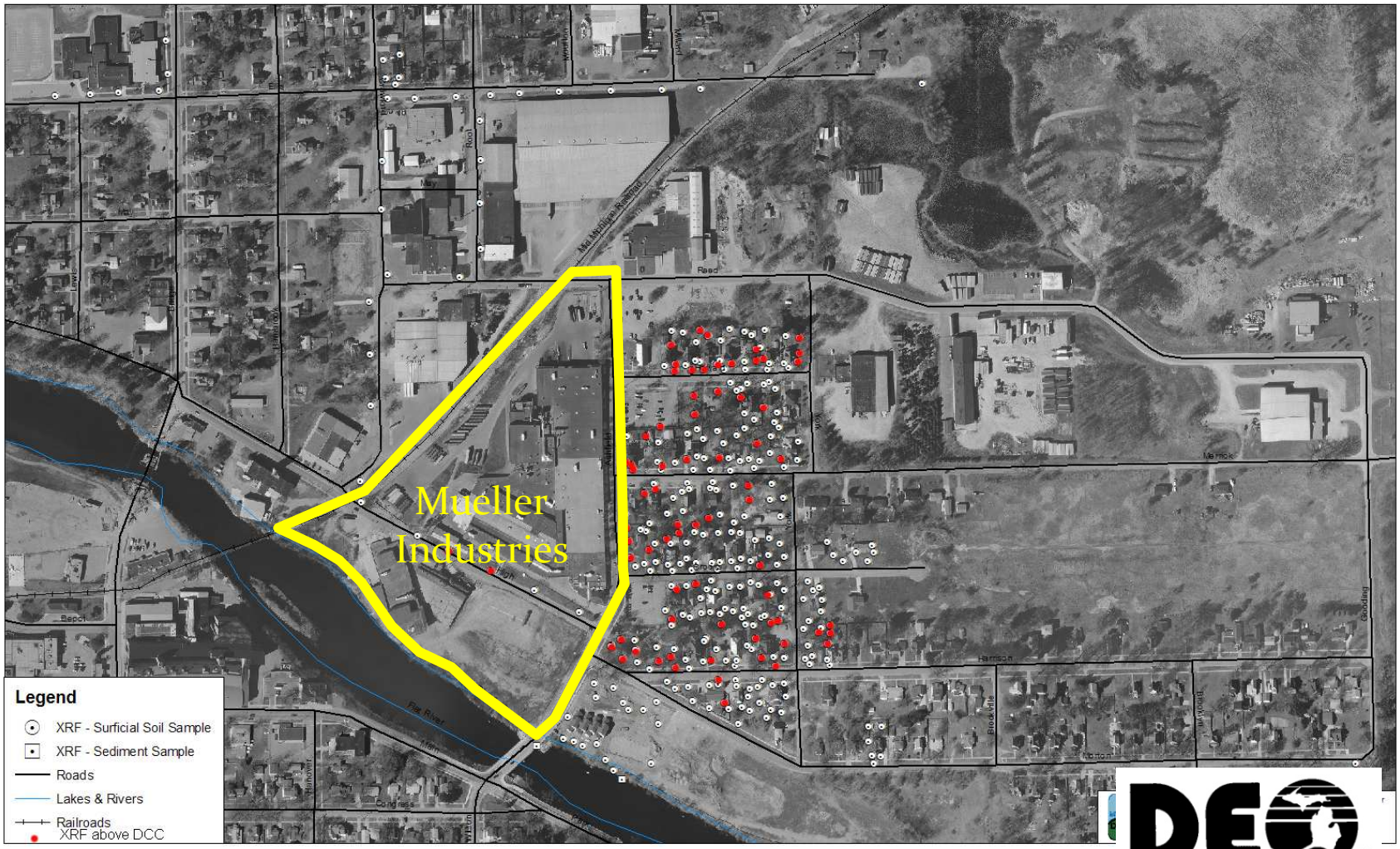


Mueller Industries

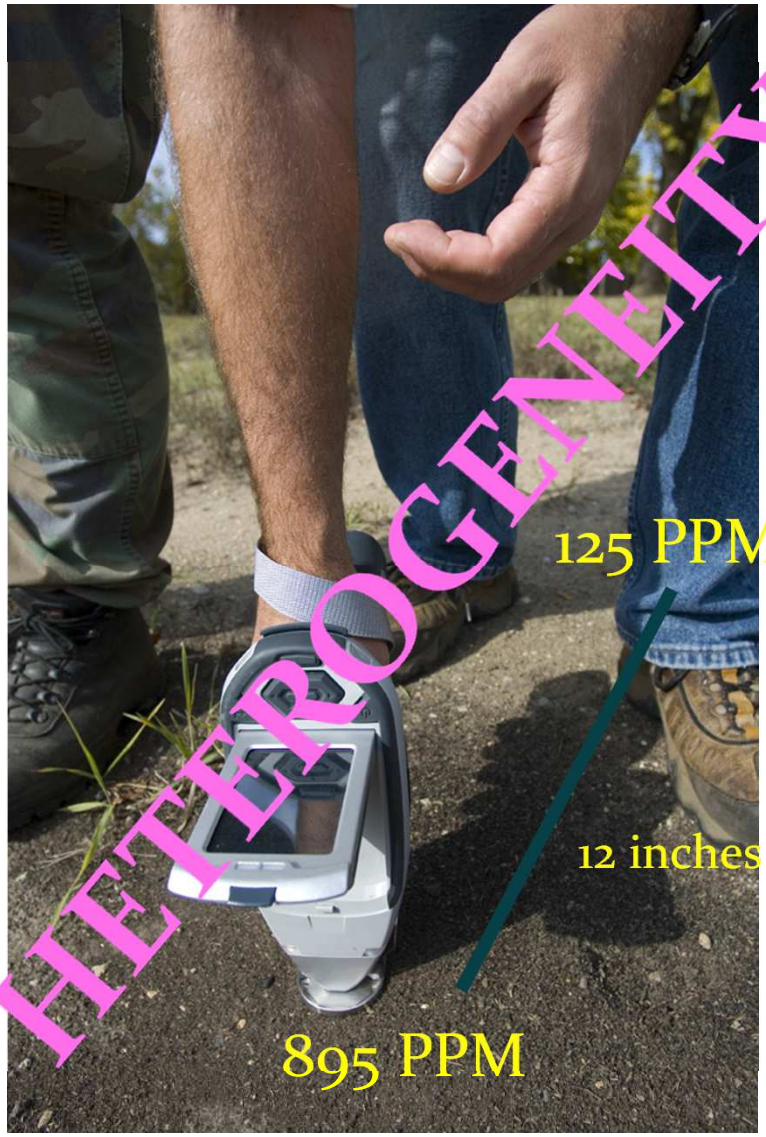


Air Deposition of Lead

Mueller Brass
XRF Sample Locations



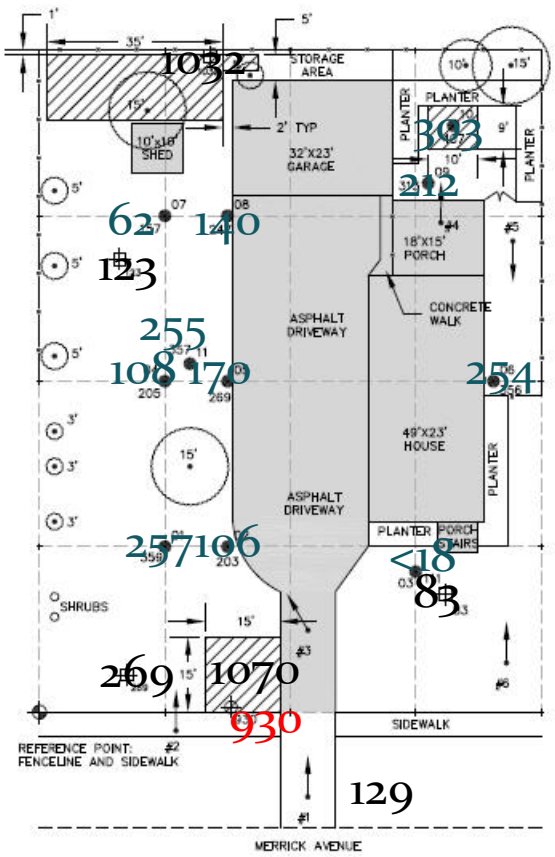
532 Harrison XRF Sampling



DEQ XRF DEQ Lab Liable Party Lab

1032
123
83
129
1070
269

62
149
108
170
212
303
254
<18
106
257
255



ADDRESS: 516 MERRICK AVENUE
APPROX. TOTAL AREA: 13,200 (EXCL ROW)
IMPERVIOUS AREA: 4,690 SF
PERVIOUS AREA: 8,510 SF
MEAN Pb CONC.: 328.6 PPM (PRE-REMEDIATION)
95TH UCL Pb CONC.: 426.6 PPM (PRE-REMEDIATION)
EXCAVATION AREA: 790 SF
EXCAVATION VOLUME: 198 CF

LEGEND

- PROPOSED 3" SOIL EXCAVATION
- PHOTOGRAPH LOCATION AND DIRECTION
- IMPERVIOUS AREA (STRUCTURE, CONCRETE, OR DRIVEWAY)
- APPROXIMATE LOCATION OF TREE WITH DIAMETER OF DRIP LINE
- 224 XRF TEST LOCATION WITH CORRECTED LEAD VALUE (mg/kg)
- 224 XRF TEST LOCATION (MDEQ) (mg/kg)
- 224 LABORATORY DATA (mg/kg)

PROPERTY SPECIFIC REMEDIATION PLAN
516 MERRICK AVENUE
EXTRUDED METALS RESIDENTIAL

PROJECT MANAGER: PGS
CHECKED BY: KG
DRAWN BY: SJC
SCALE: 1" = 20'
PROJECT NUMBER: 2011-2665
DATE: 09-02-11

ADVANCED GeoServices

Figure 1
1 OF 2

DEQ

Why IS?

- Provides representative, reproducible, and defensible data
- Reduces chances of missing or underestimating significant contamination
- QC built into the process (DQOs)
- Simplifies statistical analysis of data
- Widely accepted

EPA Seven Step DQO Process

Step 1 State Problem

Step 2 Identify Decision

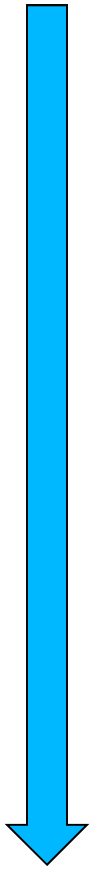
Step 3 Identify Decision Inputs

Step 4 Define Study Boundaries

Step 5 Develop Decision Rules

Step 6 Specify Performance Criteria

Step 7 Optimize Design



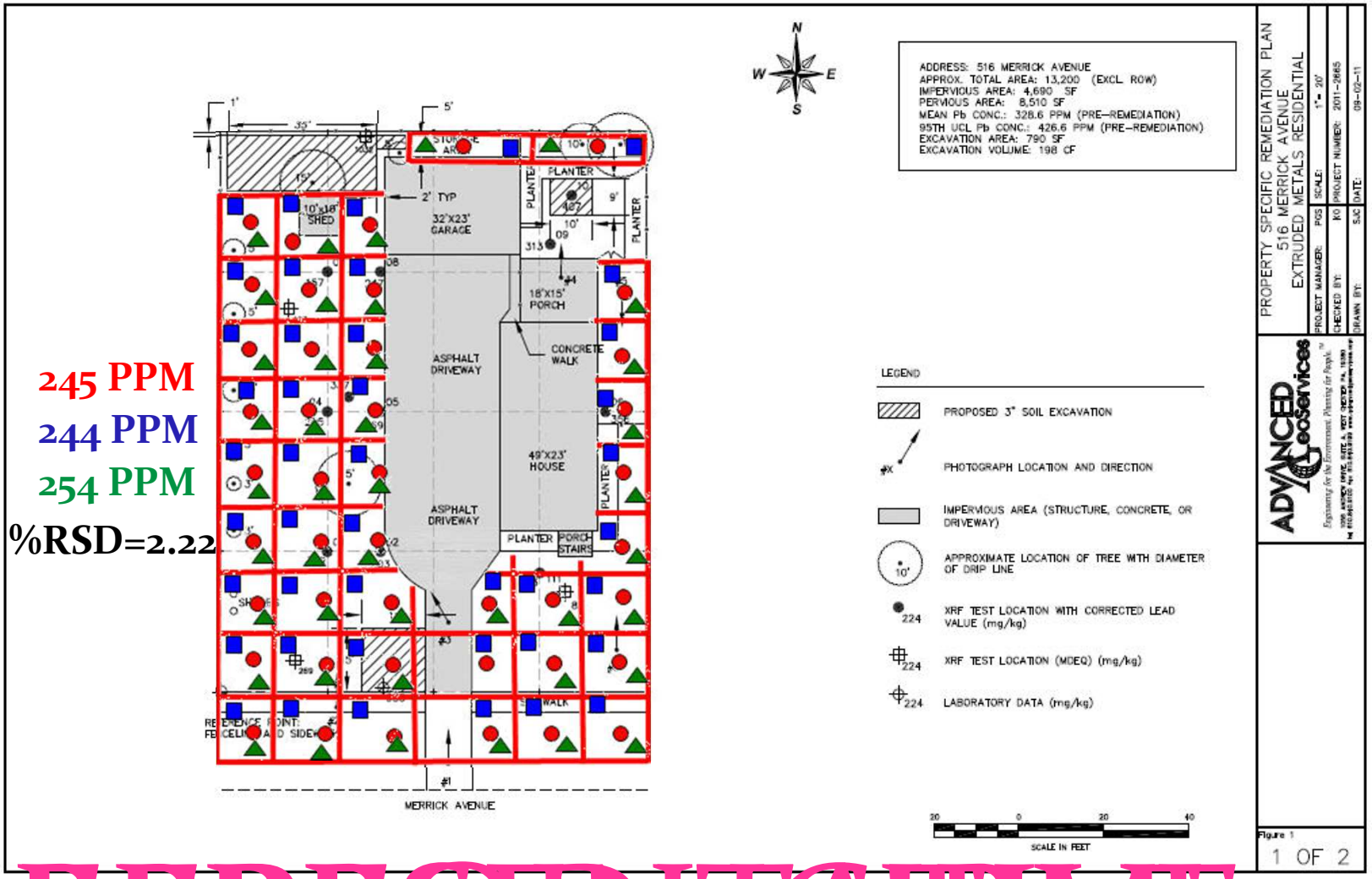
Why

What

Where

How

245 PPM
244 PPM
254 PPM
%RSD=2.22



RRERRSHNTAIBME

Statistics for Samples Collected at 516 Merrick

Biased Discrete MDEQ XRF Samples

Variance – 291,085
Standard Deviation – 416.97

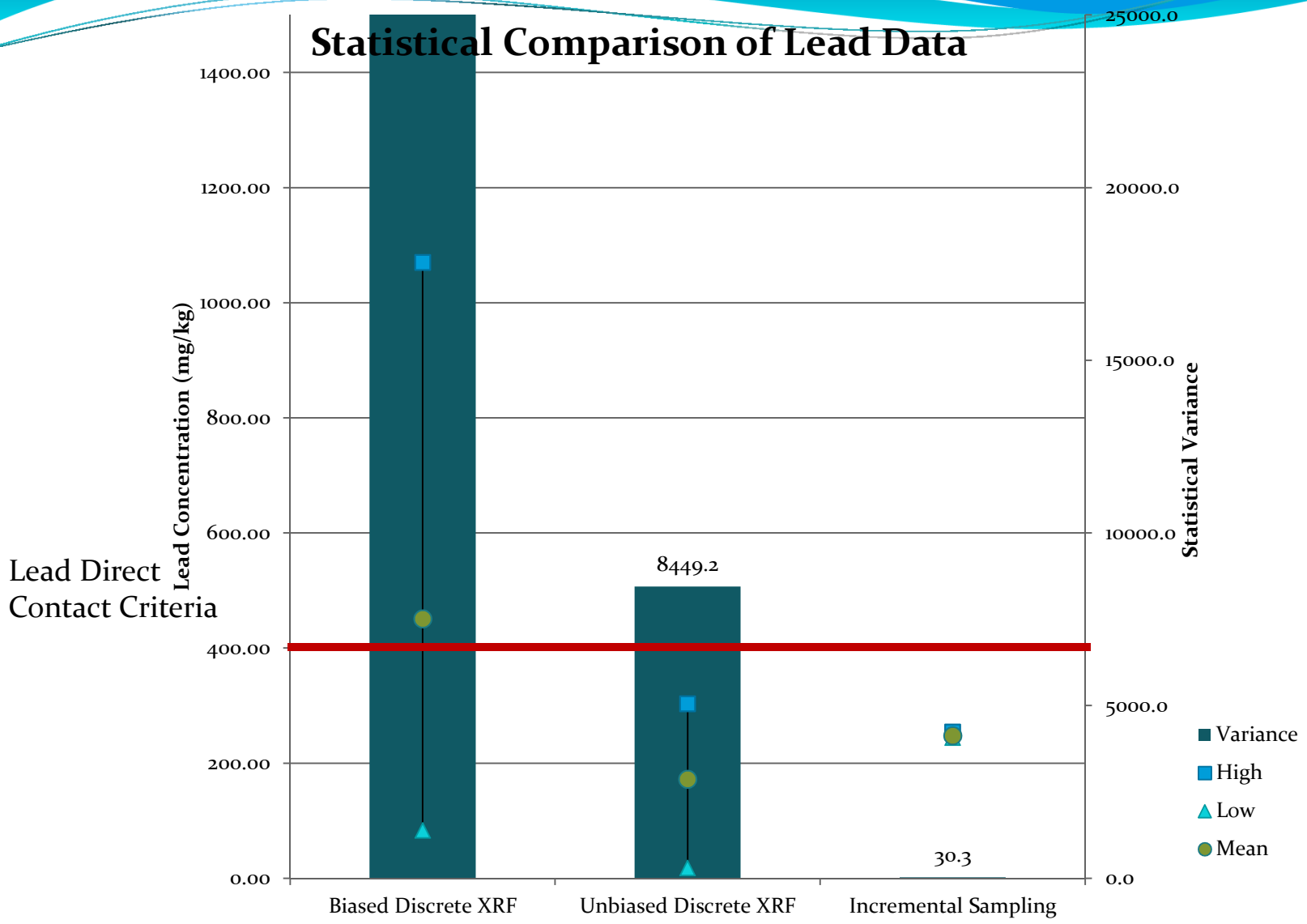
Unbiased Discrete Consultant collected XRF Samples

Variance – 8,449
Standard Deviation – 91.92

Multi Increment Lab Samples

Variance – 30
Standard Deviation – 5.51

DEFENDABLE



Lead Direct Contact Criteria

REPRESENTATIVE…REPRODUCIBLE…DEFENDABLE

Time and Money

DEQ Biased Discrete Screening
49 Properties (5 samples/property) and
ROW surrounding site
375 XRF Samples, 12 Lab Samples
3 Days
It's fast, relatively cheap (Great for determining if you have a problem)
Can't make remediation decisions

Consultant Unbiased Discrete Sampling
51 Properties (9 samples/property)
475 XRF Samples and 33 Lab Samples
2 weeks in the field + 10's of hours statistical evaluation
It takes lots of time, It's expensive, STATS, STATS, STATS
Defendable, but can both overestimate and underestimate exposure estimates due to sample

Multi Increment Sampling
49 Properties (40-100 incremental samples/property)
3050 increments in 49 Lab analyzed multi increment samples
4 days in the field, virtually no stats
As fast as XRF, Relatively cheap
Defendable, and represents the exposure over the entire decision area

Mueller Brass

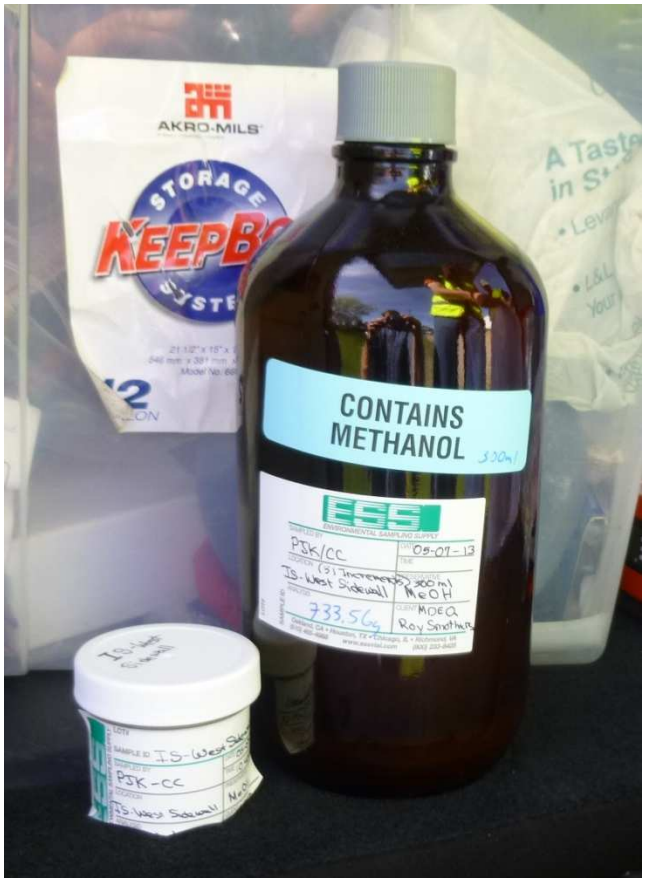
- Request for NFA approved (May 2012)
- Stakeholder Perspective

Paul G. Stratman, Consultant Project Manager,
“I must admit the process went much smoother than I anticipated and perhaps I will use on future projects."

Can I use this on excavations?

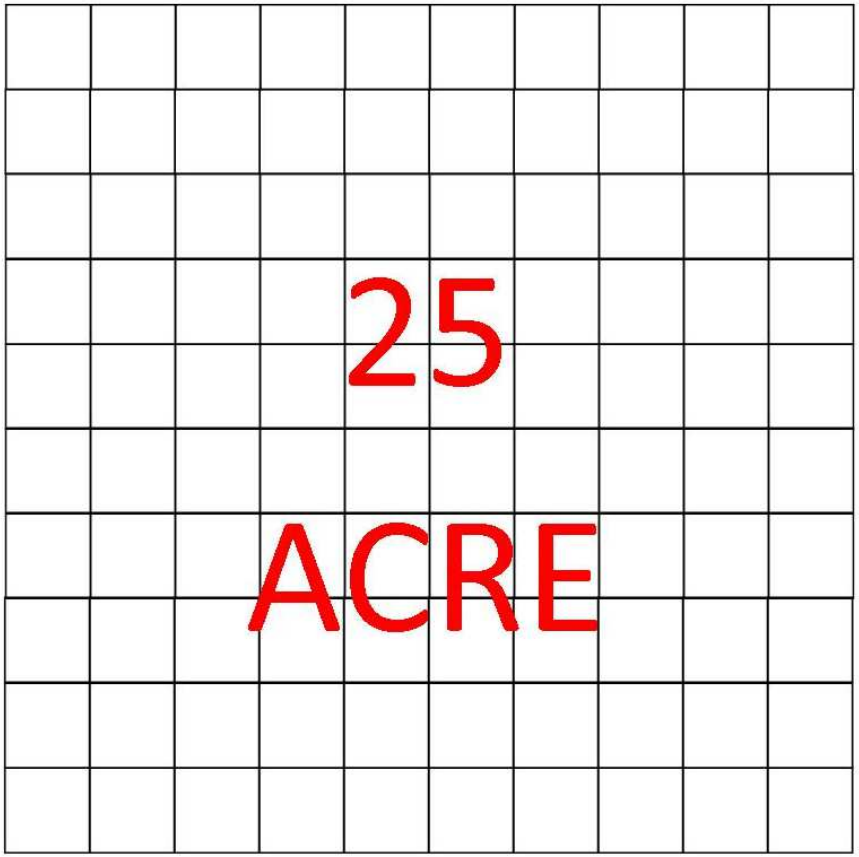
Can I use this for soil borings/subsurface?

Can I Incrementally Sample VOCs?



How do I decide on a decision unit and number of increments?

.25
ACRE



Comments

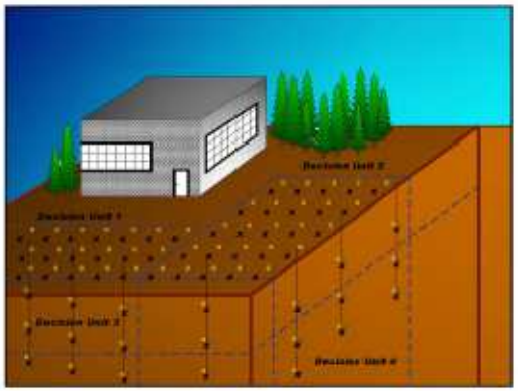
DEQ Michigan Department of Environmental Quality

Remediation and Redevelopment Division

DEQ

INCREMENTAL SAMPLING METHODOLOGY AND APPLICATIONS

REMEDIATION AND REDEVELOPMENT DIVISION
RESOURCE MATERIALS



Prepared by:
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Lansing, Michigan 48933

RRD-RESOURCE MATERIALS-XX-2014-01
June 2015

Protecting Michigan's Environment. Ensuring Michigan's Future.

http://www.michigan.gov/documents/deq/deq-rrd-IncrementalSamplingReference-3-26-2015_485537_7.pdf?20151013103853

DEQ

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