Region 4 XRF Field Operations Guide (FOG)

Urban Lead Symposium
September 2015

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Typical Lead/Arsenic Samples

- Collect grab or composite sample (Seived/ UnSeived)
- Send sample to lab for analysis
- Make decisions on lab results
- XRF mostly used for field verification

Purpose of XRF FOG

- Provide the OSC/RPM with a field analysis method that:
  - Improves lead and arsenic soil sample results for decision making
  - Is practical, time- and cost-effective
  - Allows the OSC/RPM the ability to make informed and defensible decisions in the field
  - Helps control soil variability

SIEVING

When starting a soil sampling project, compare sieved and non-sieved XRF results for the first 10 samples. If the results are generally comparable, then sieving may not be needed. If sieved and non-sieved XRF results are not comparable, it is recommended that the remaining soil samples be sieved.

Steps in XRF FOG

1. Collect soil samples and place in plastic bag
2. Measure moisture content; if >20% dry sample until <20%
3. Determine duration time needed for specific XRF e.g., Niton® XRF requires min 30 seconds to analyze lead and arsenic

Steps in XRF FOG (cont'd)

4. Control outside variables by confirming XRF calibration and by performing a Bag Test
5. Take 4 XRF readings of soil in the bag
   - Readings taken from left side then right side, flip the bag, then take reading from left side and right side
6. Record results in spreadsheet and determine if additional readings are necessary

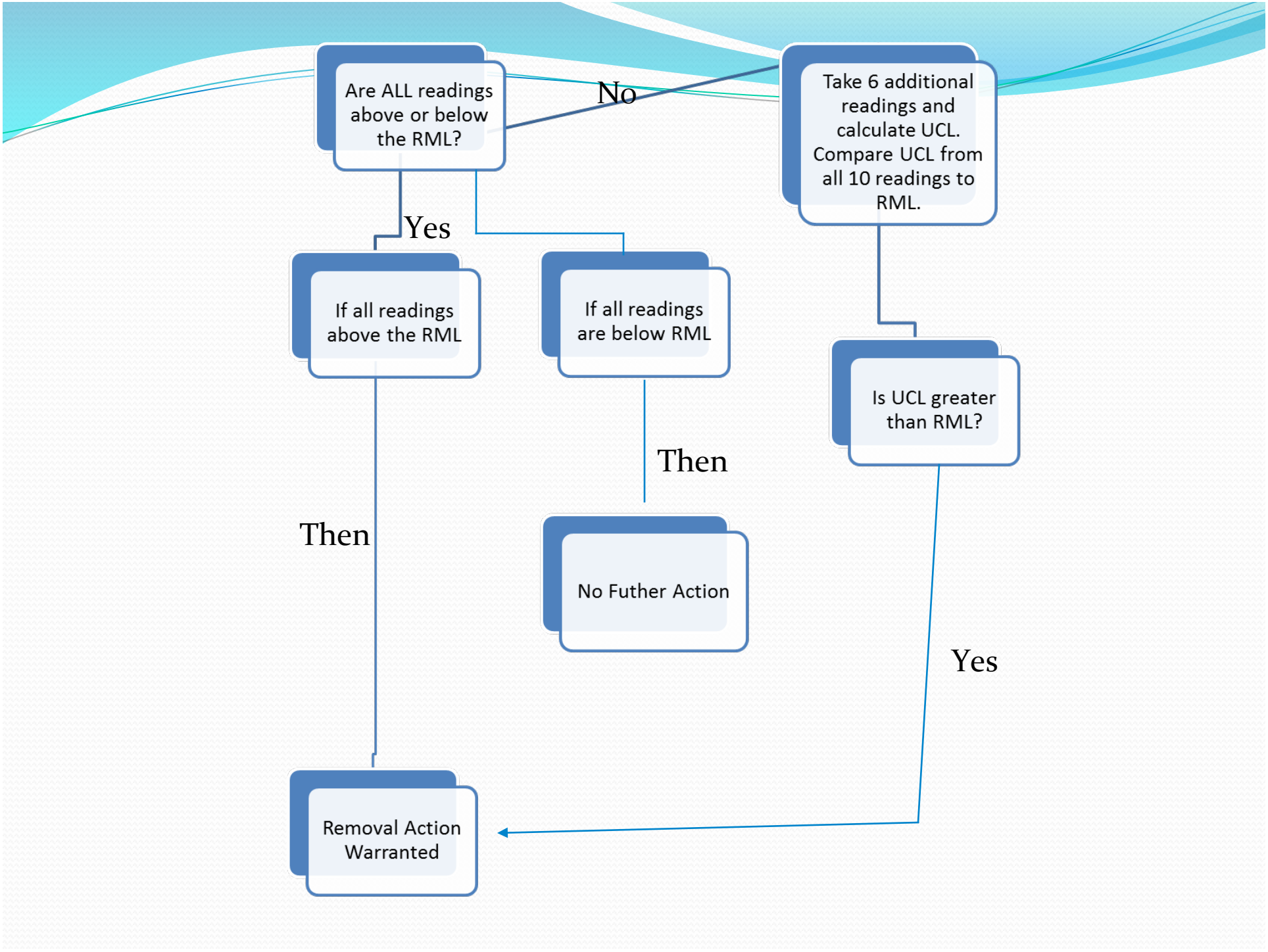
Are additional readings necessary?

- If all the readings (minimum 4) are either below or above the RML, no additional readings are needed
- If all are not, take 6 more readings and compare the calculated UCL to the RML
  - Typically the 1-sided t UCL should be used for decision making. If readings are highly variable, review 1 sided Chebyshev UCL for decision making.

After 10 readings, if UCL and some readings are > RML, the property should be considered for potential removal activities.

Confirmation and Duplicates

- Confirmatory samples consisting of 3 to 4 subsamples collected from the same bowl and sent to an off-site laboratory can be considered to provide additional data.
- A duplicate XRF measurement is recommended for every 10th field reading.
- It is suggested that calibration be confirmed three times per day during a sampling event: once prior to sampling, again midway through sampling, and another when sampling activities are complete.


Are ALL readings above or below the RML?
No
Take 6 additional readings and calculate UCL. Compare UCL from all 10 readings to RML.
Yes
If all readings above the RML
If all readings are below RML
Is UCL greater than RML?
Then
Then
No Futher Action
Yes
Removal Action Warranted

XRF Spreadsheet

4	Sample ID	Readings	Lead XRF	Lead Error as 2SD	Arsenic XRF	Arsenic Error as 2SD		
5	HP0085B-18							
6		1	82	9	43	8		
7	Date	2	45	6	26	6		
8	22-Aug-14	3	53	7	31	7		
9		4	58	7	19	6		
10		5						
11		6						
12		7						
13		8						
14		9						
15		10						
16								
17		Minimum	45		19		Lead	Arsenic
18		Maximum	82		43		59.5	29.8
19								
20		Total Readings	Lead Average	Instrument Error	Arsenic Average	Instrument Error	95% t-LCL	95% t-LCL
21		4	59.5	6.2	29.8	11.4	41	18
22							95% t-UCL	95% t-UCL
23			Lead SD	Subsampling Error	Arsenic SD	Subsampling Error	78	42
24			15.9	26.0	10.1	32.0	95% CS-LCL	95% CS-LCL
25							25	8
26			Lead RSD		Arsenic RSD		95% CS-UCL	95% CS-UCL
27			26.8%		34.0%		94	52
28								

Questions or Comments?

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