

2009 Tri-State Mining District Transition Zone Assessment Study



November 3, 2009

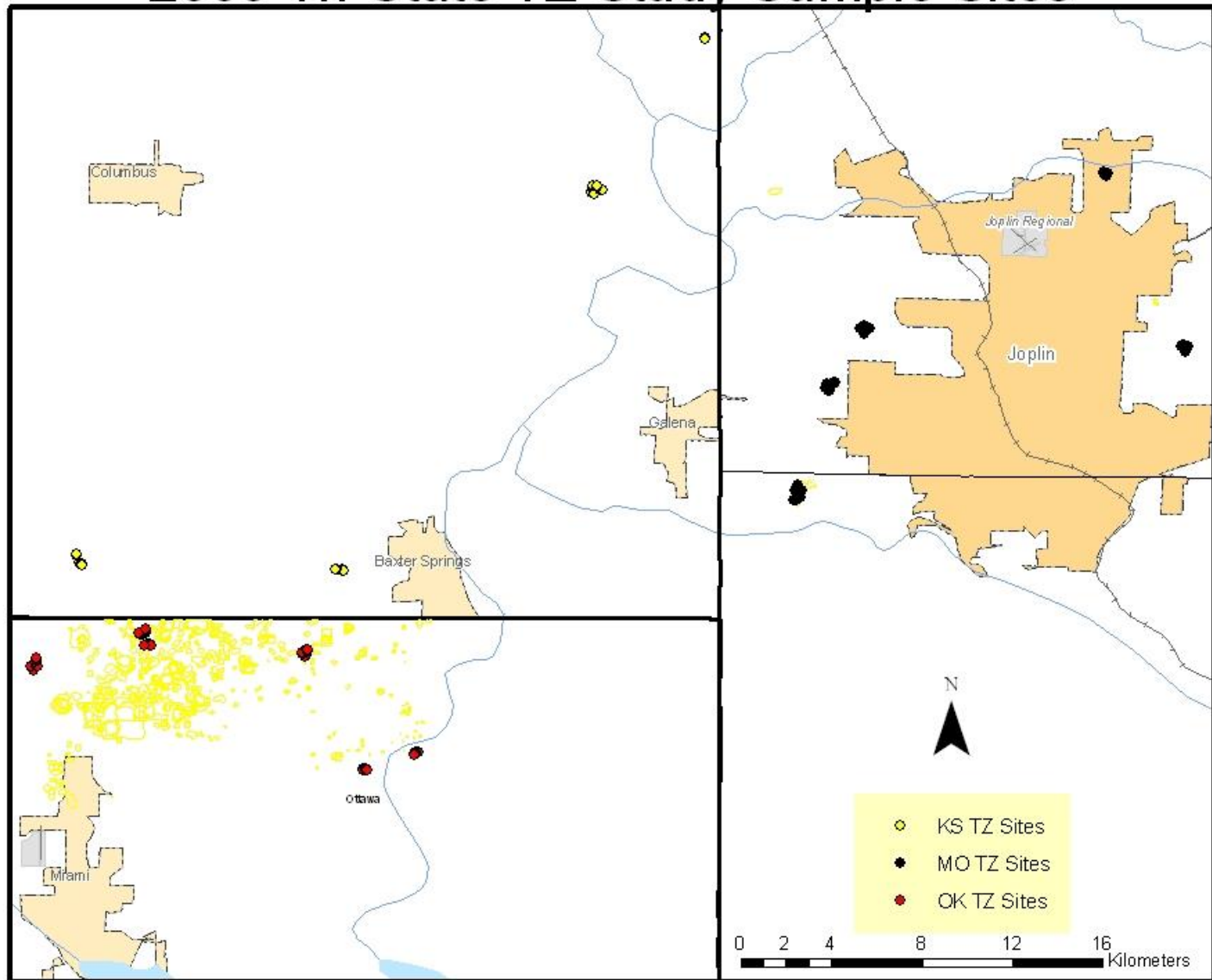
Objectives

- Determine extent of soil degradation from mining operations.
 - Obtain data on metal concentrations for soil samples in depositional areas of the TSMD.
 - Verify results by submitting duplicates for ICP/AES analysis.

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- 240 samples collected from 17 sites
 - 6-KS
 - 5-MO
 - 6-OK

 - Sites selected using different variables
 - Surrounding land use
 - Proximity to other piles/bases

2009 Tri-State TZ Study Sample Sites



Methods

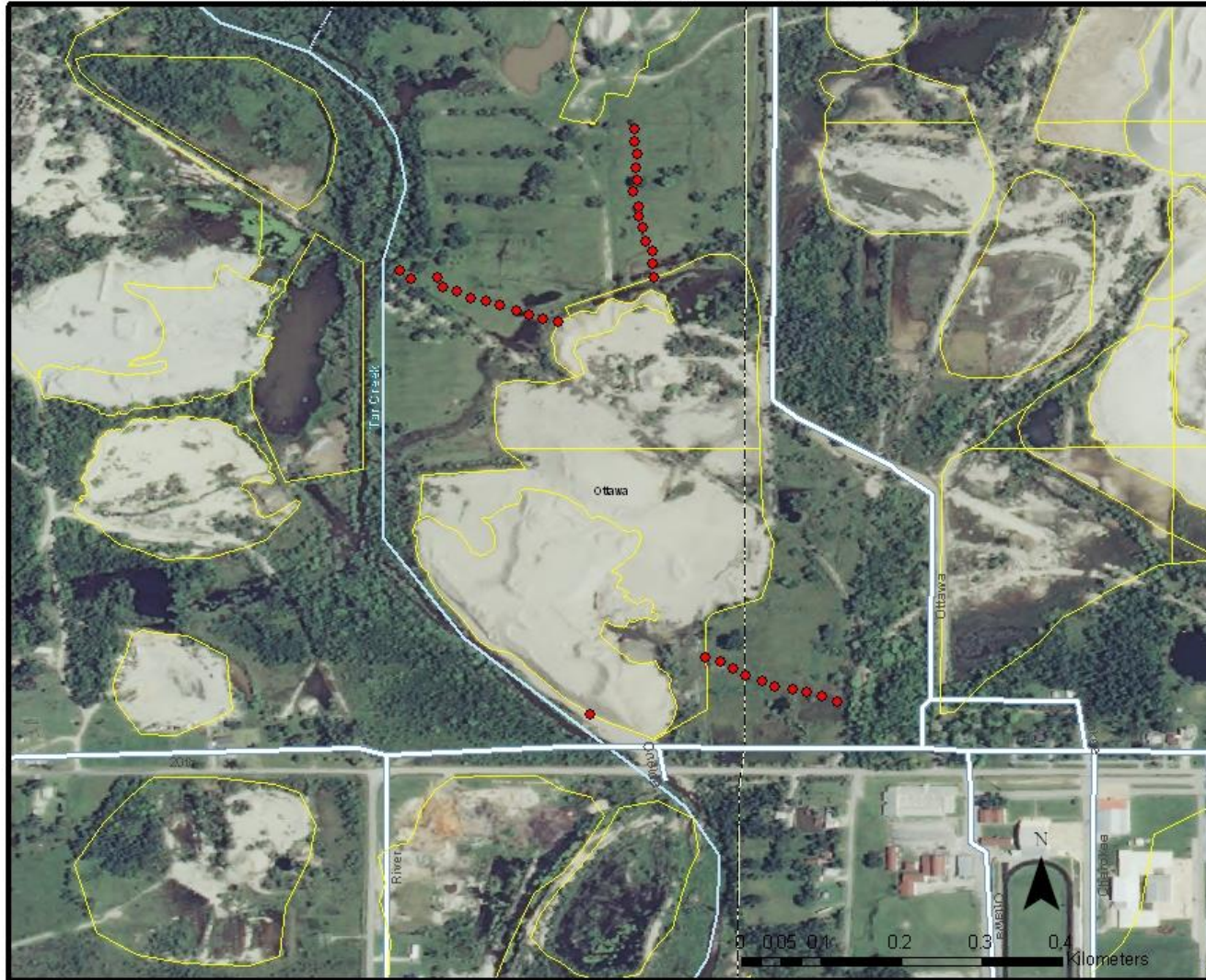
- Maps of chat piles/bases were used to determine the start of each transect
 - EPA delineated boundary
- Transects extended from piles in four opposing directions
 - Was not possible at all sites-2 directions used
- XRF reading taken at mapped boundary
- First soil sample taken 50' from boundary and at 50' intervals
- Transect sampling continued until 2 consecutive samples below background
 - Above DL Cd
 - 90ppm Pb
 - 440ppm Zn

Methods

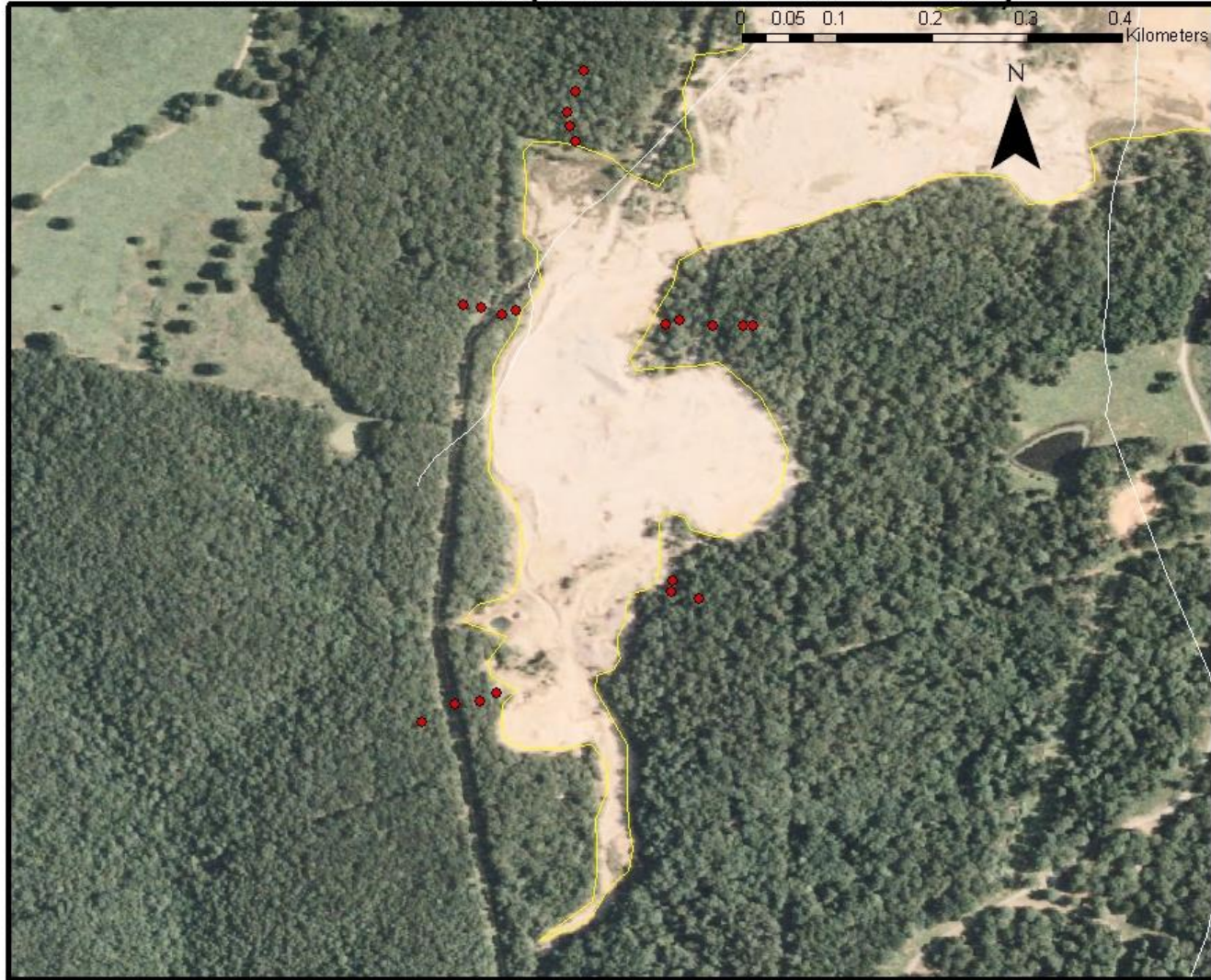


- ❑ Sampling depth 1-6"
- ❑ Detritus removed and samples placed in 1-L zip-loc baggies
- ❑ Samples returned to lab and individually dried @105°C
- ❑ Analyzed with handheld XRF

Oklahoma CP 025 Transects



Missouri Pile (Wooded Land Use)



Kansas Pile (Agricultural Land Use)



Preliminary Results



- 46 Total transects
 - Longest- 600'

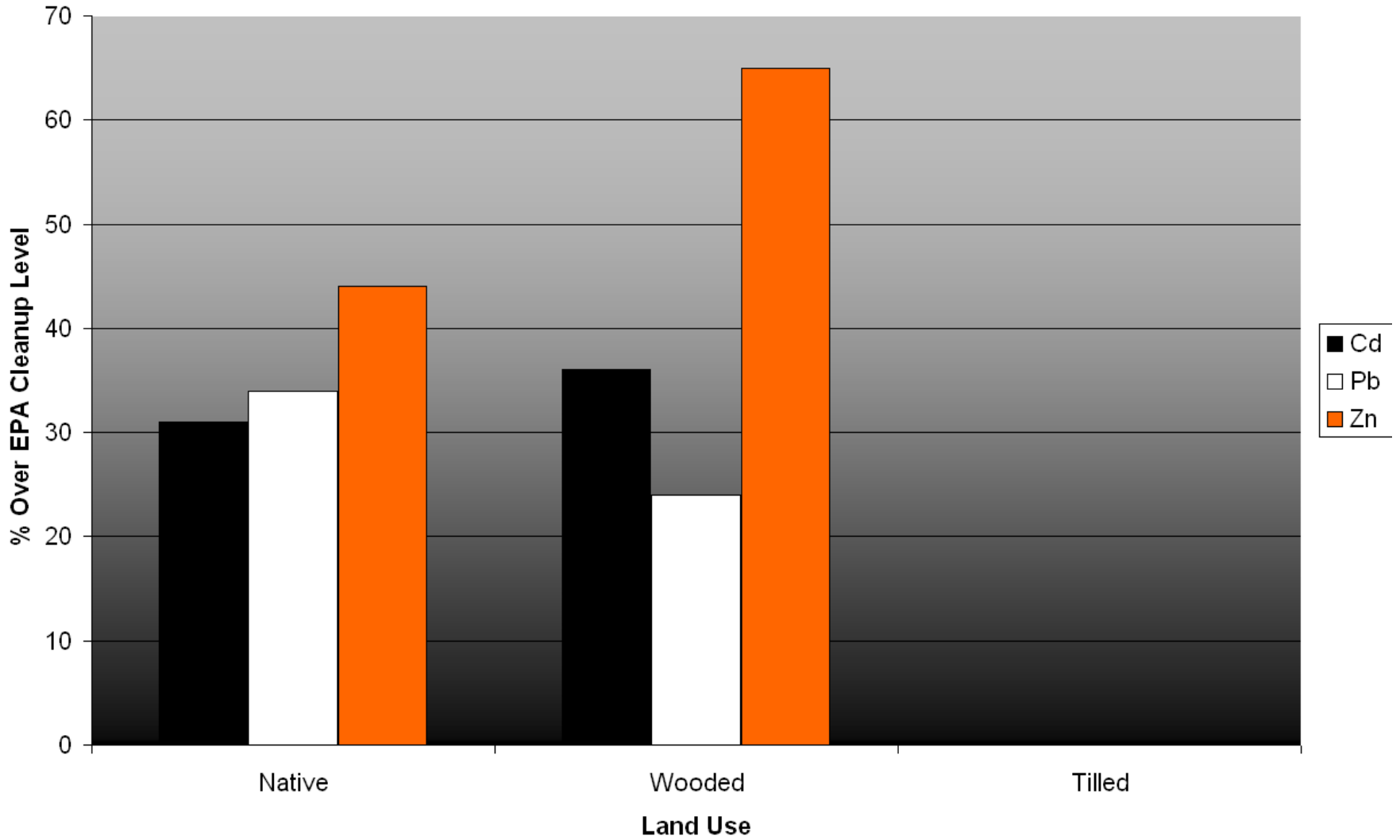
- 50'
 - 39 (85%) over BKG
 - 30 (65%) over EPA cleanup levels

- 200'
 - 21 (45.6%) over BKG
 - 14 (30.4%) over EPA cleanup levels

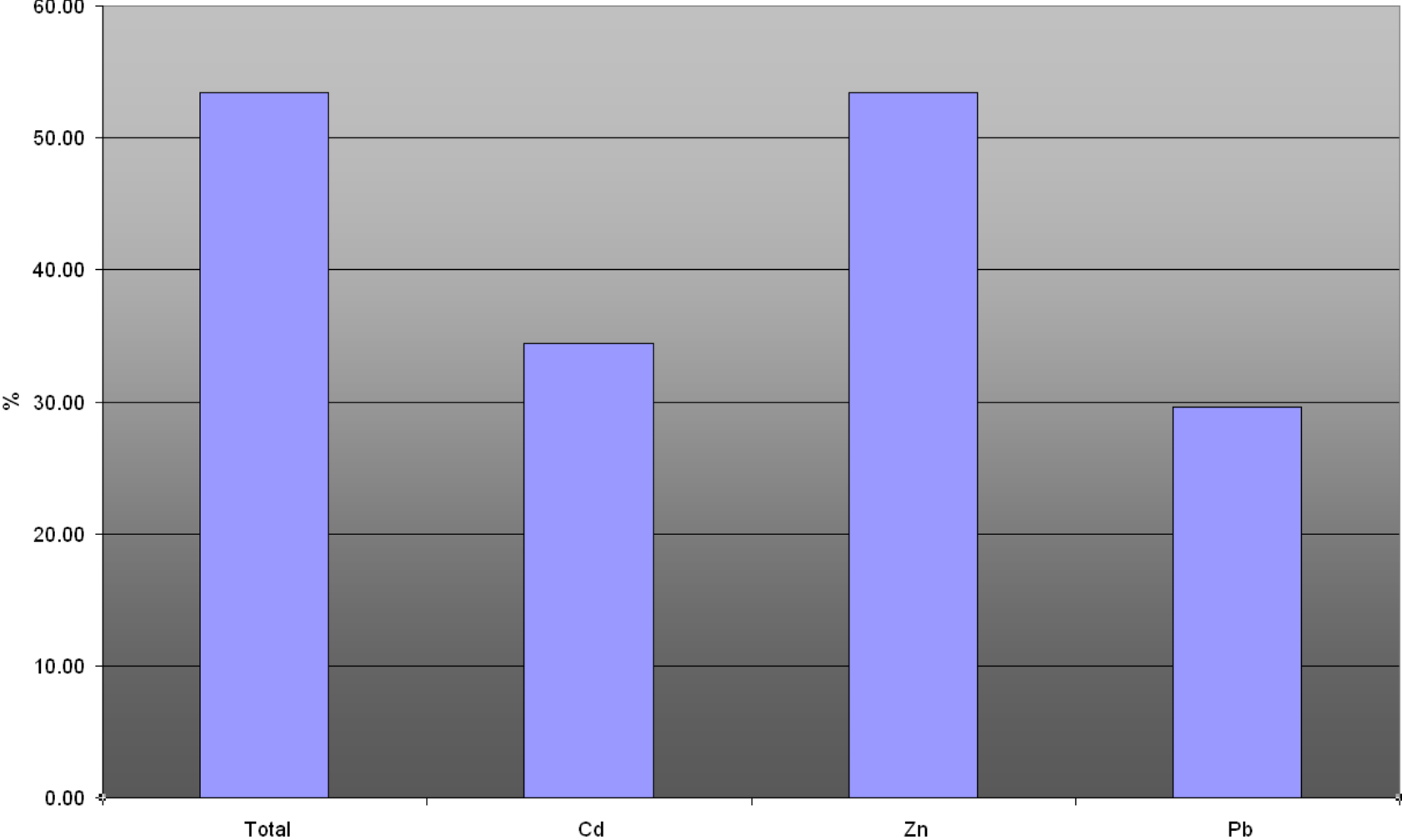
Preliminary Results

- 160 Samples over BKG levels
- 112 Samples over EPA cleanup levels
- 70% of samples over BKG were also over EPA cleanup levels

2009 TSMD Transition Zone Study



% Over EPA Cleanup Levels



Confirmatory Samples

- 19 Samples sent to Texas A&M

- EPA Method 6200- Field Method for Soil and Sediment
 - Least squares linear regression
 - Requires $r^2=0.7$ or greater
 - TZ data was log transformed Pb and Zn $r^2>0.9$
 - Still working on Cd

Next Steps

- Further analysis
 - Classify contamination by distance
 - Classify by land use
 - Compare to injury levels
 - Determine Cd/Zn

- Accurate account of contaminated acres