

Quality Control Strategies for Field Analytics *Superfund Implications*

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Screening Data vs. Screening Analytics

DQOs for Superfund guidance

"For the data to be definitive, either analytical or total measurement error must be determined." (p. 43)

◆ Screening Data-

Cheaper/rapid (lab? field? std? non-std?) analytical methods

Too much uncertainty for decision making

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Costlier/rigorous (lab? field? std? non-std?) analytical methods

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Targeted high density sampling

– Data comes from samples, so you have to know what the analysis represents

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◆ Screening Analytics

Manages CSM & sampling uncertainty

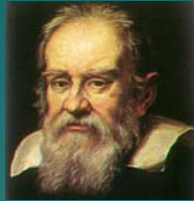
Manages analytical uncertainty

Collaborative Data Sets

Demonstration of Method Applicability (DMA)

"I think that in the discussion of natural problems we ought to begin not with the Scriptures, but with experiments, and demonstrations."

Galileo Galilei



- ◆ Concept founded in SW-846, performance based measurement (PBMS) initiative
<http://www.epa.gov/sw-846/pbms.htm>
- ◆ Initial site-specific performance evaluation
 - Analytical and direct sensing methods
 - Sample design, sample collection techniques, sample preparation strategies
 - Used to select information sources for field and off-site
- ◆ Goal is to establish that proposed technologies and strategies can provide information appropriate to meet project decision criteria

What to Look For....



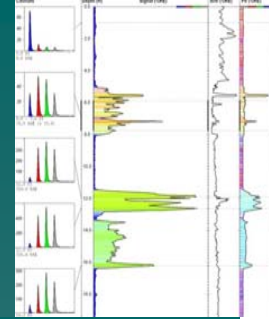
- ◆ Effectiveness- Does it work as advertised?
- ◆ QA/QC issues
 - Are DLs and RLs for site matrices sufficient?
 - What is the expected variability? Precision?
 - Bias, false positives/false negatives?
 - How does sample support effect results?
 - Develop initial relationships of collaborative data sets that provide framework of preliminary QC program
- ◆ Matrix issues?
- ◆ Do collaborative data sets lead to the same decision?
- ◆ Assessing alternative strategies as contingencies

More DMA Benefits

- ◆ Augment planned data collection and CSM development
- ◆ Test drive communication and data management schemes, decision Support Tools (DSTs)
- ◆ Develop relationships between visual observations and direct sensing tools
- ◆ Flexibility to change tactics based on DMA rather than full implementation
- ◆ Establish initial decision logic for DWS
- ◆ Evaluate existing contract mechanisms
- ◆ Optimize sequencing, staffing, load balance, unitizing costs
- ◆ http://www.brownfieldstsc.org/pdfs/Demonstrations_of_Methods_Applicability.pdf

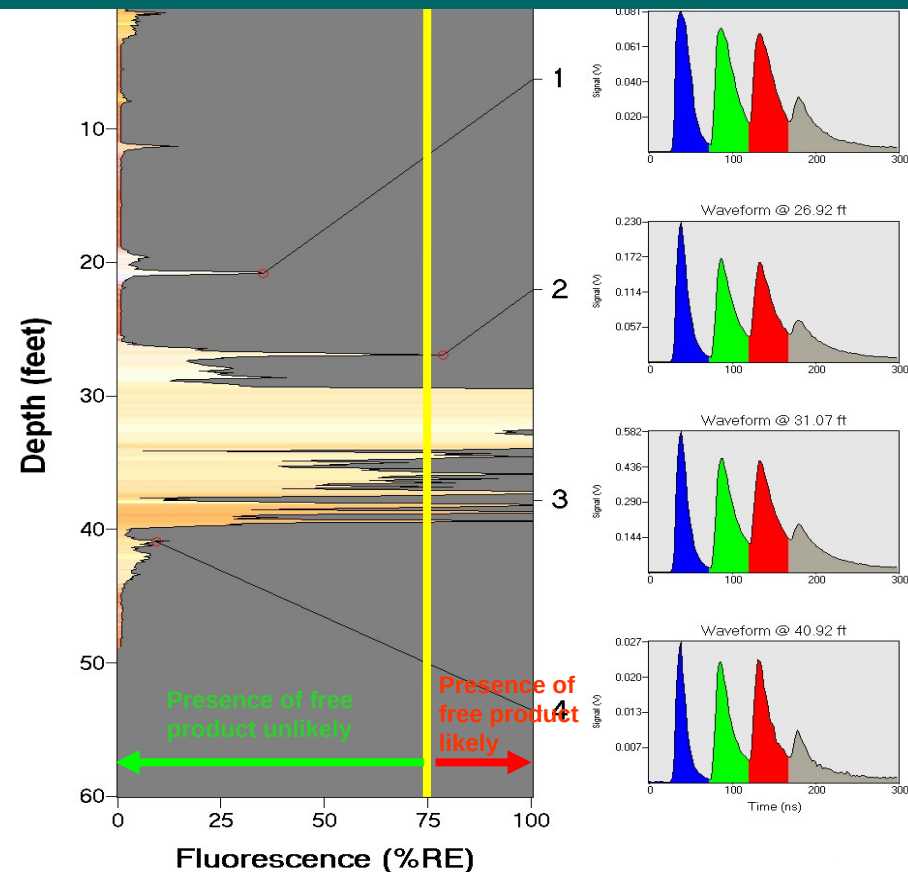
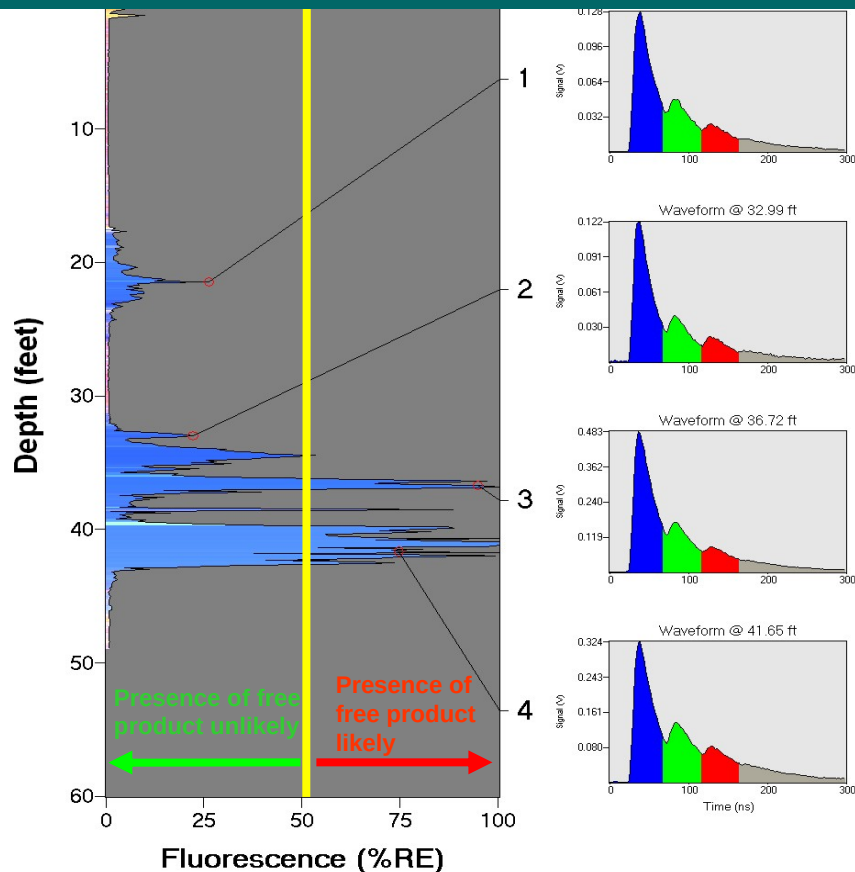


Laser Induced Fluorescence (LIF)



Free Product At >50% Relative Fluorescence for Gasoline

Free Product At >75% Relative Fluorescence for Oil



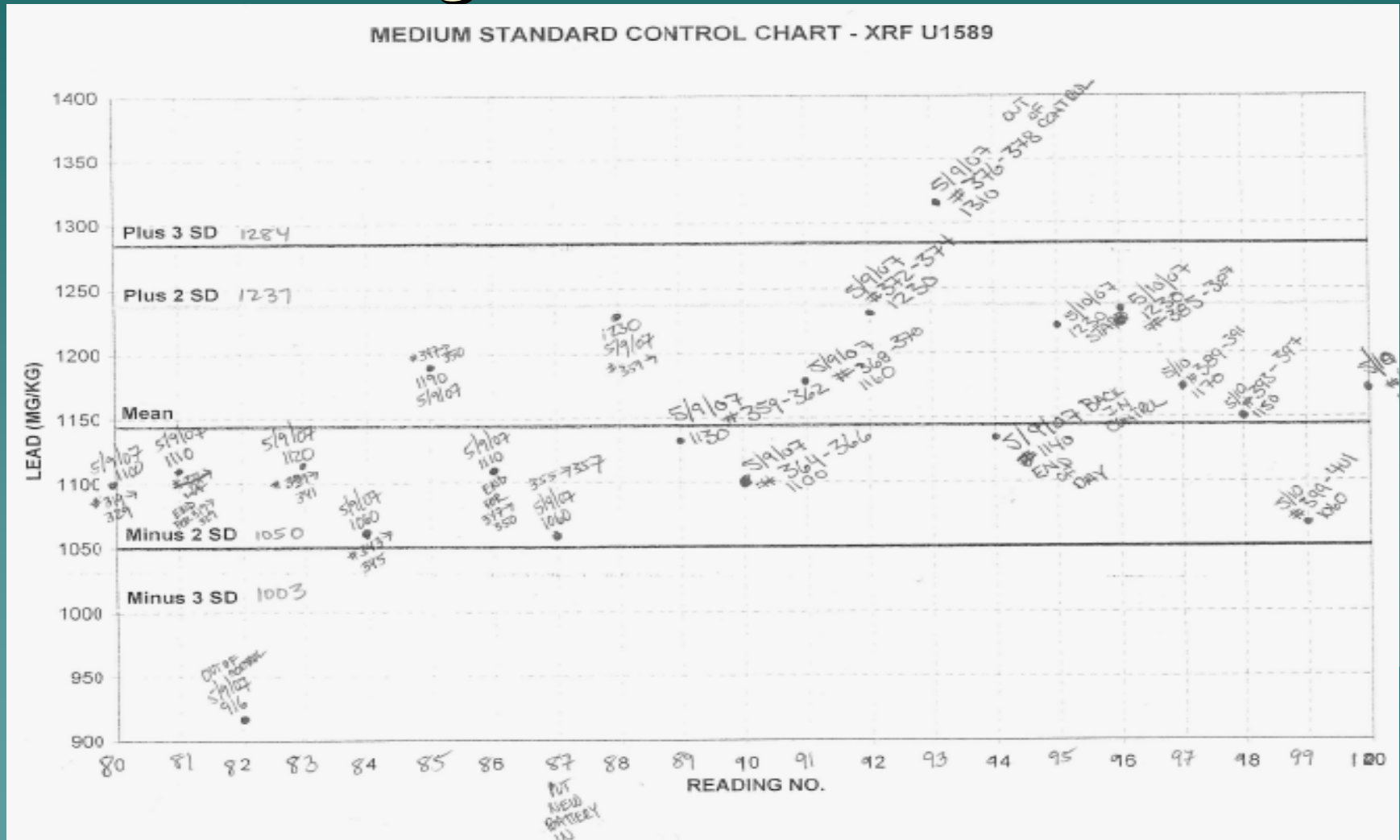
Example

XRF Quality Control Procedures

- ◆ Initial warm-up (30 minutes)
 - Energy calibration/standardization checks
- ◆ Blanks - silica or sand
- ◆ Calibration checks - initial and continuing
 - NIST SRMs, site specific check samples
- ◆ Detection limit evaluation and monitoring
- ◆ Duplicates - instrument, sample replicates
- ◆ Monitor for inference effects, trends
- ◆ Matrix effects - variability, moisture
 - In-situ reference location
- ◆ Watch sample or decision unit variability
- ◆ Watch dynamic range
- ◆ Decision error rates

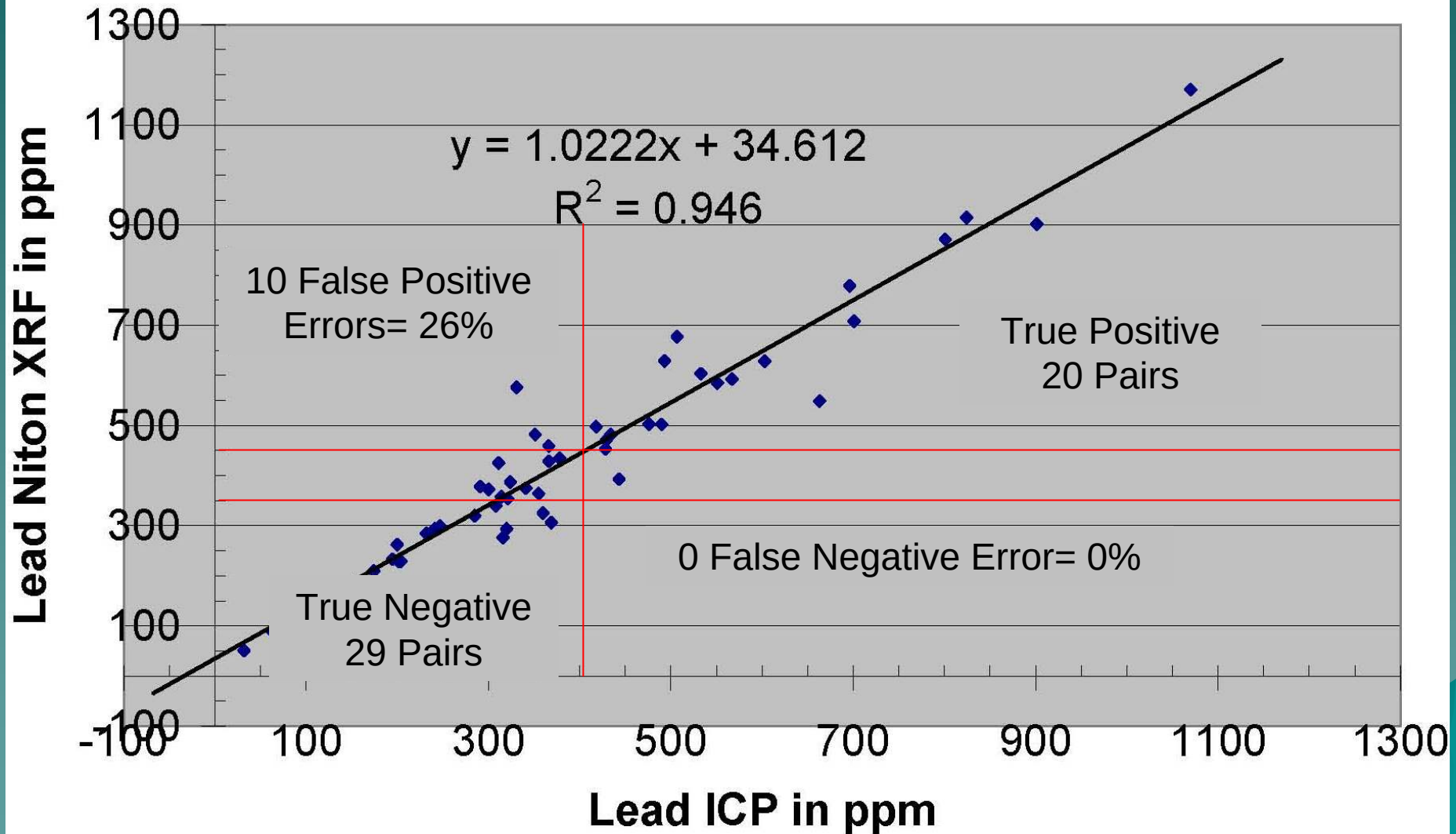


Control Charting Your Continuing Calibration Checks



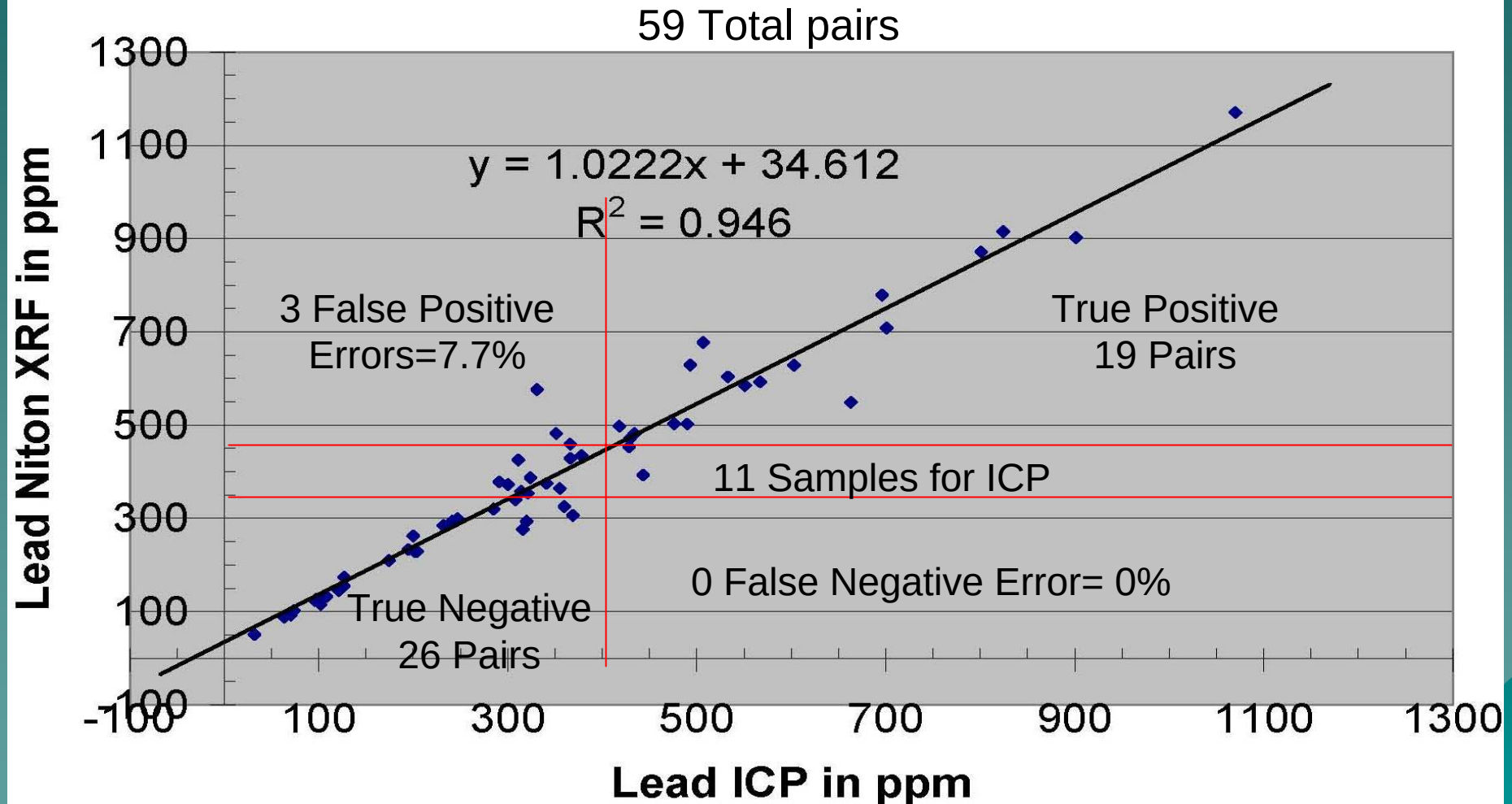
Lead Niton vs. ICP

59 Total pairs



3 Way Decision Structure With Region of Uncertainty

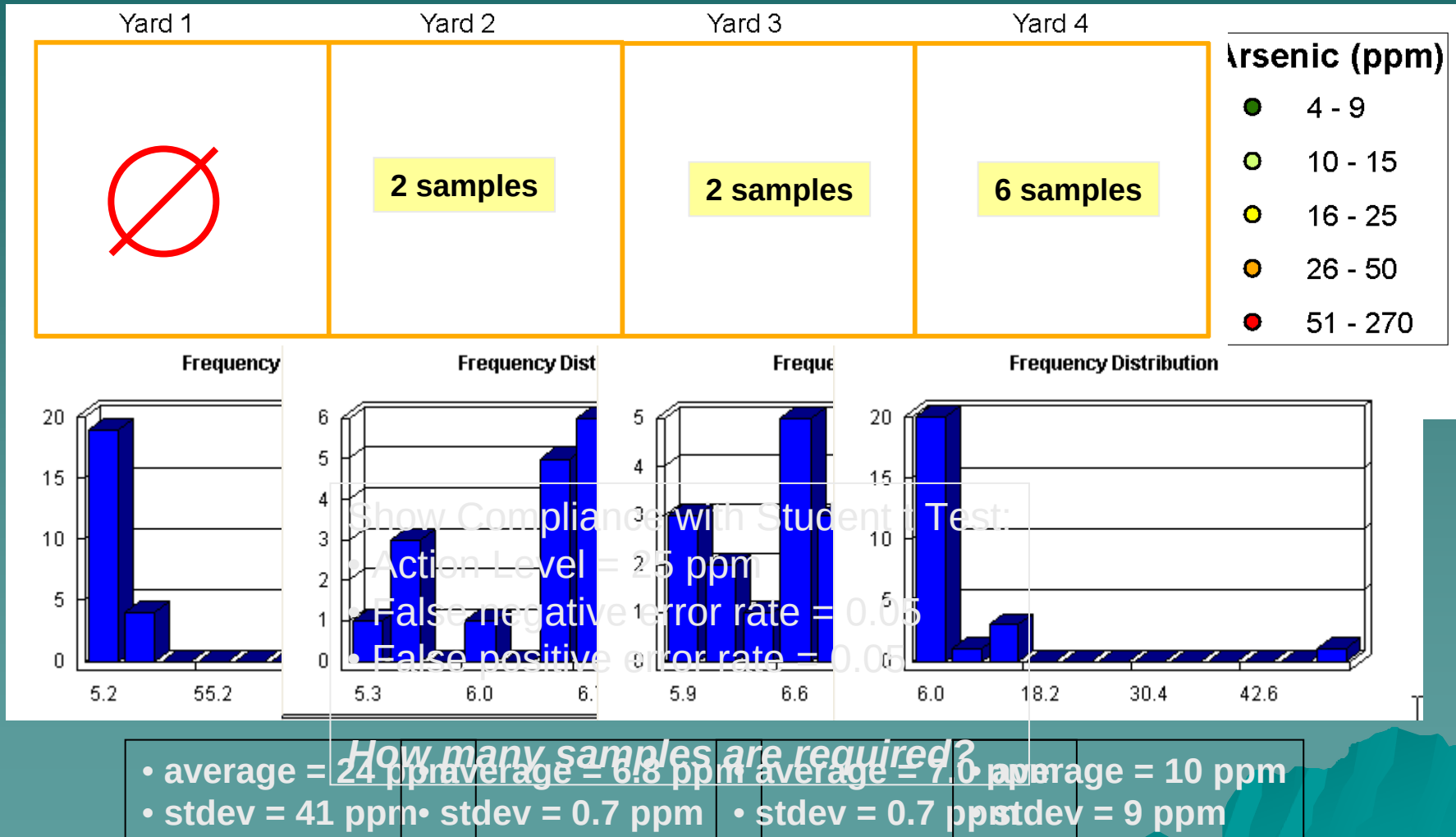
Lead Niton vs. ICP



Another Example....

- ◆ 4 residential backyards screened by XRF for arsenic with action level of 25 ppm averaged over yard
- ◆ Use XRF to determine:
 - whether each yard is likely above or below action level, and
 - if below, how many laboratory samples are required to statistically show it?
- ◆ In this case XRF acts as QC for sampling design and average derived from laboratory results

Here's what the yards look like:



Lab and Field Analytics Advancing Superfund

- ◆ Ultimate goal is to provide data that supports development of more efficient and effective remedies
- ◆ Higher density collaborative data sets manage variability: analytical, matrix, spatial, temporal, even cost
- ◆ New challenges
 - Optimization of remedies
 - IG audits
 - Transfer of remedial systems to states

Facilitated Discussion

Advantages and Limitations

Accessing, Utilizing, Deriving Benefit

- ◆ Contract mechanisms
- ◆ Region success strategies
- ◆ RPM/contractor perceptions
- ◆ Services- Regional tech support, TIFSD, ORD, commercial services
- ◆ Quality assurance/quality control
- ◆ Documentation, storage, reporting
- ◆ End data users, decisions supported, collaborative data sets