

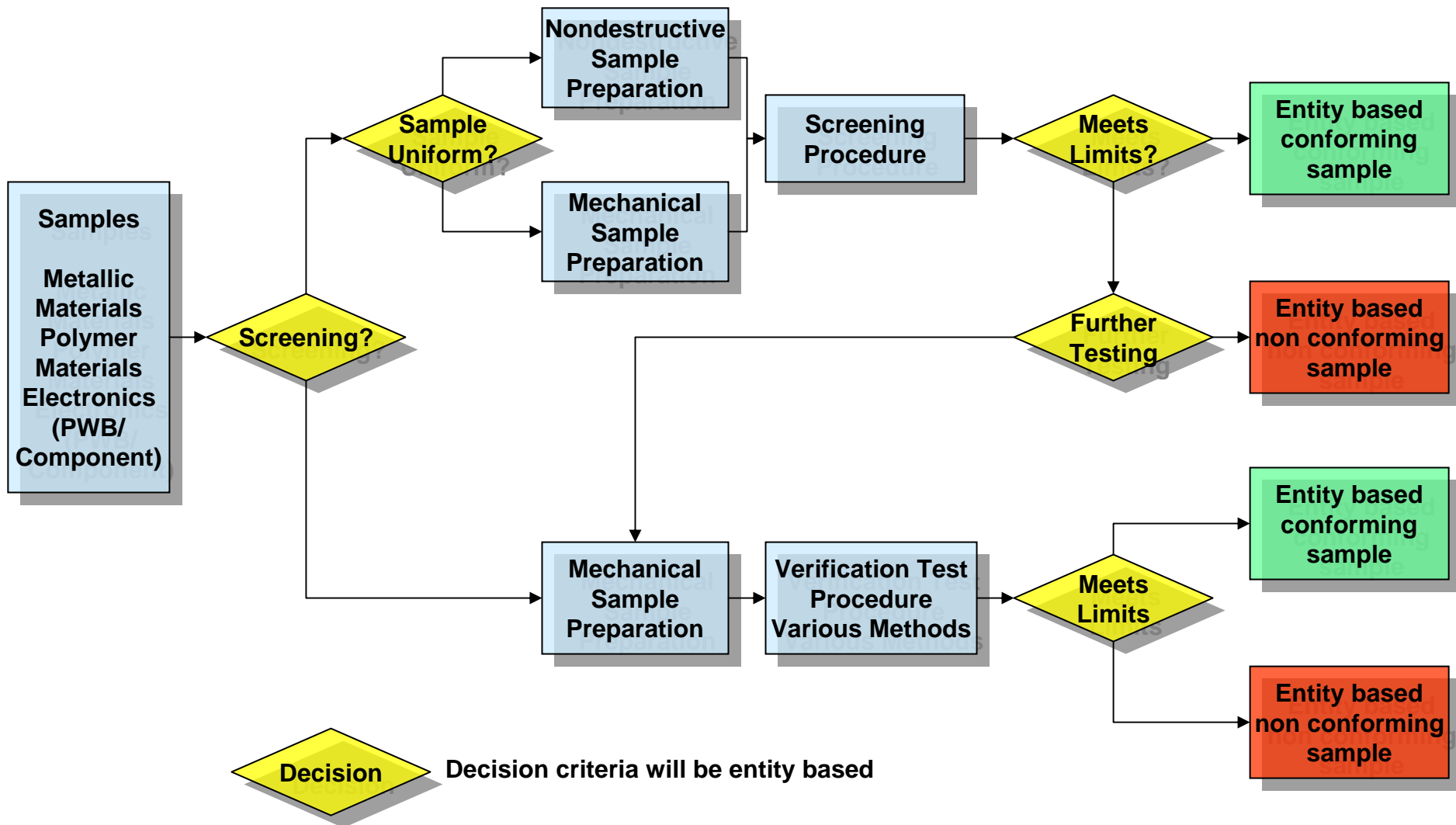
Contributing Work to the XRF Screening Method

...as it relates to...

IEC 62321, Ed.1:
Procedures for the Determination of Levels
of Regulated Substances in
Electrotechnical Products

XRF Screening Section

- Chapter 6
 - No single analytical technique can screen for all of the substances banned in the RoHS directive.
 - If one technique is required, then XRF is the most comprehensive, non-destructive, and user friendly option.
 - XRF is used as a “first-pass” screening for nearly all sample types. Most samples can be easily determined as compliant or non-compliant with a quick XRF measurement.
 - A small percentage of samples will require further testing.



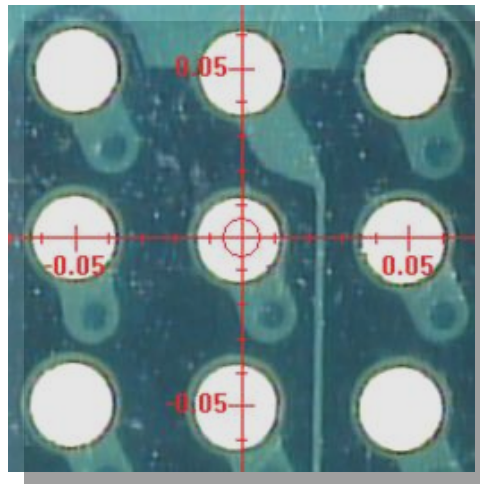
Screening Limits

- Samples will be sorted into three categories:
 - Pass (conforming)
 - Fail (non-conforming)
 - Further testing required
- Action limits are set with +/- 30% safety margin about the RoHS levels.
- Br is tested based on stoichiometric calculation for Br in PBB/PBDE
- Value below are in PPM. Instrument precision is denoted by the 3 sigma value.

Element	Polymer Materials	Metallic Materials	Electronics
Cd	$P \leq (70-3\sigma) < X < (130+3\sigma) \leq F$	$P \leq (70-3\sigma) < X < (130+3\sigma) \leq F$	$LOD < X < (250+3\sigma) \leq F$
Pb	$P \leq (700-3\sigma) < X < (1300+3\sigma) \leq F$	$P \leq (700-3\sigma) < X < (1300+3\sigma) \leq F$	$P \leq (500-3\sigma) < X < (1500+3\sigma) \leq F$
Hg	$P \leq (700-3\sigma) < X < (1300+3\sigma) \leq F$	$P \leq (700-3\sigma) < X < (1300+3\sigma) \leq F$	$P \leq (500-3\sigma) < X < (1500+3\sigma) \leq F$
Br	$P \leq (300-3\sigma) < X$		$P \leq (250-3\sigma) < X$
Cr	$P \leq (700-3\sigma) < X$	$P \leq (700-3\sigma) < X$	$P \leq (500-3\sigma) < X$

Sample Preparation

- **Samples fall into three basic categories**
 - Large surface area samples
 - Small area samples
 - Coatings and thin samples



Au	SnPb	Sn	Ag
Ni	Ni	Ni	Ni
Cu	Cu	Ag	Cu
Epoxy	Epoxy	Ceramic	Epoxy
Solderability			

Uniformity

Tested object may be considered as uniform and analyzed nondestructively if:

- it is not painted or plated and appears to the eye as of the same color and consistency throughout.
- it is not otherwise known to be non-uniform in its construction or design (beware of blended or “homogenized” samples).
- the top layer of a thin coating can be analyzed, separately from the base material in a known matrix only, and the instrument is calibrated for this known matrix. (beware of insufficient LOD for ultra thin coatings)

Uniform vs. Homogeneous

- Disclaimers:

This method speaks of uniformity for the sake of accurate XRF analysis and does not attempt to make a “legal” determination about sampling requirements.

When using any XRF instrument, it is recommended to test the object in more than one location if object design allows that. Any statistically significant differences between the measurements might indicate possible non-uniformity. In any instances of doubt as to the uniformity of the tested material, a destructive analysis is recommended.

In need of further testing?

- Samples that cannot be classified as conforming or non-conforming by XRF, will be passed on to other techniques for “verification testing”.
- Each regulated substance will be analyzed by a separate technique, which will deliver the final determination.
- My colleagues from WG-3 will cover the other chapters (other analytical techniques) in more detail.

Summary

- XRF is a popular choice for analysis for RoHS compliance in Industry.
- Industry needs a common and agreed test method for RoHS.
- The deadline for compliance is July 2006
- Industry does not have time for idealism, it needs a practical solution for testing now!
- Comments?