

QC in the Ethanol Laboratory

Dr. Jerome King
Midwest Laboratories, Inc.

“REASONS” TO TEST

- Process control/status
- Compliance
- Research/development

“FACTORS” TO CONSIDER

- COST
- IMMEDIACY OF RESULTS
- EASE OF OPERATION
- REQUIRED METHODS/CERTIFICATION
- WASTES PRODUCED
- RELIABILITY/APPLICABILITY OF METHOD

QC PROGRAM - REQUIREMENTS

- MANUALS
- STANDARD OPERATING PROCEDURES
- STANDARDS (laboratory control samples)
- POLICIES
 - TRACEABILITY
 - TRENDS/CONTROL CHARTING

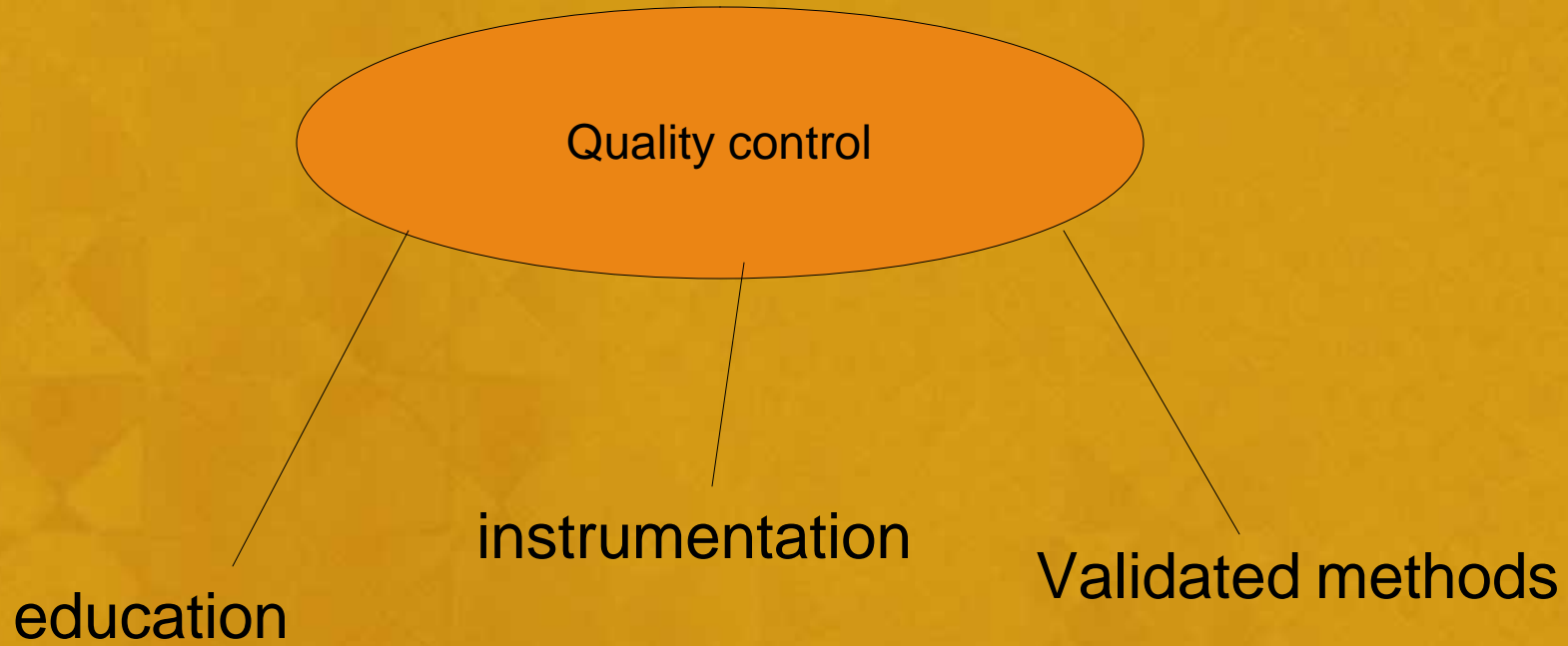
Quality control

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graph TD; A([Quality control]) --> B[accuracy]; A --> C[precision]; A --> D[contamination];
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accuracy

precision

contamination



ICP-MS



Ion Chromatograph

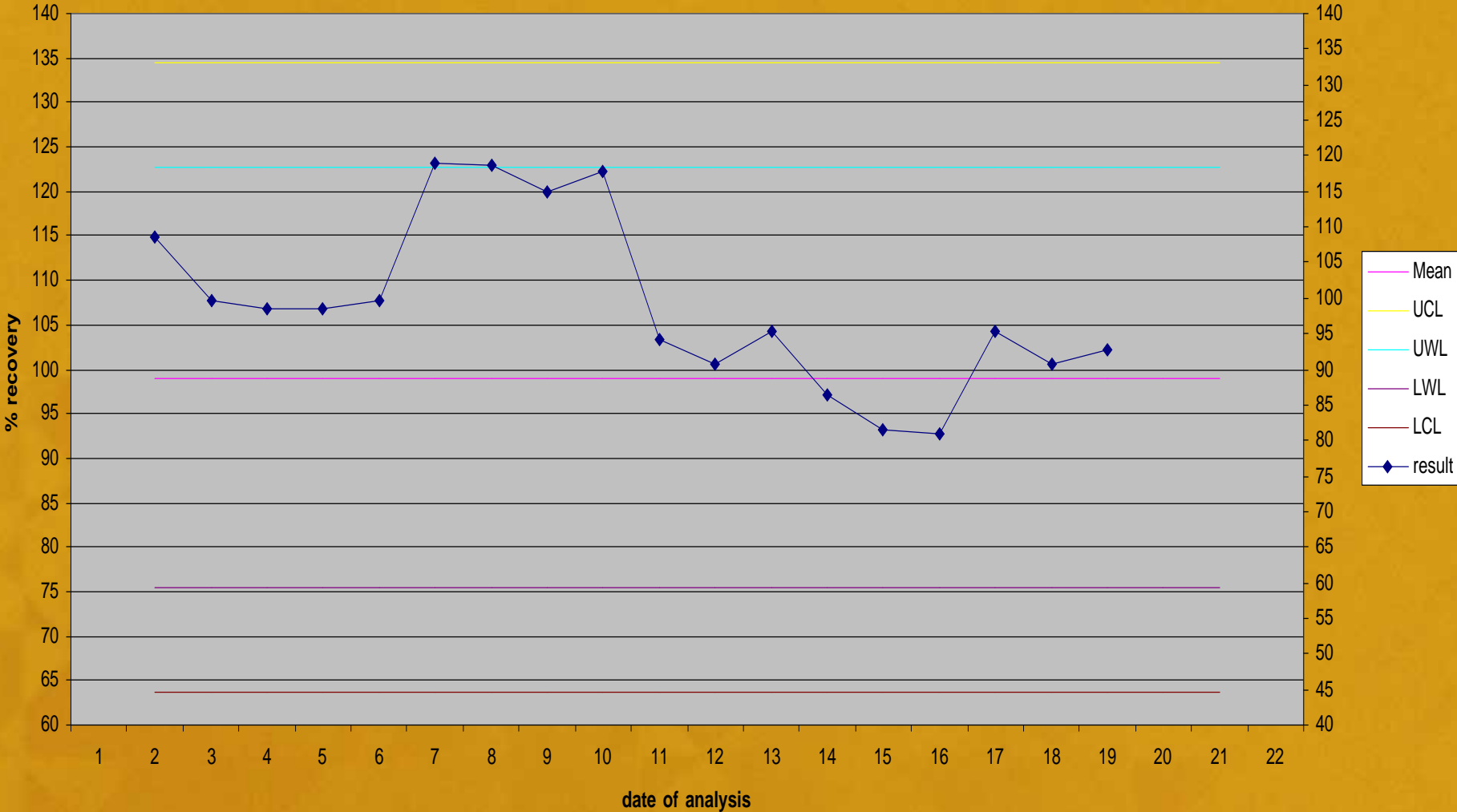




ACCURACY

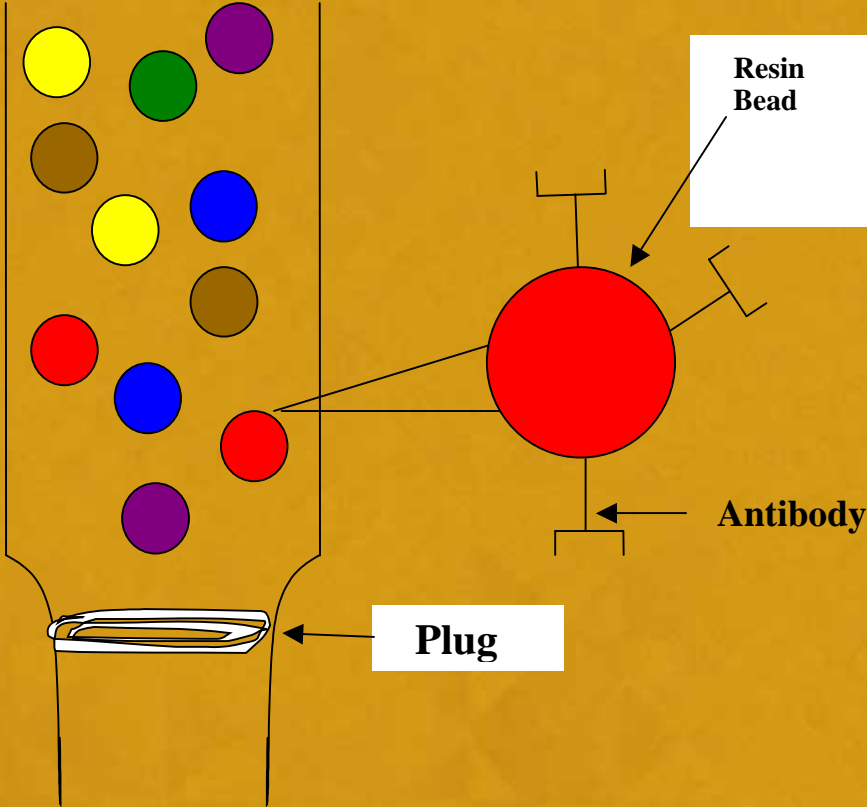
- How “close” to a “true” value
- Need a “known” or certified value
- Plot on a control chart
 - Upper warning level
 - Lower warning level
 - Upper control Level
 - Lower control level

Starch Control Chart





Affinity Column



DEMONSTRATION OF CAPABILITY

- CHECK/PROFICIENCY PROGRAMS
 - AOCS
 - Mycotoxins (Aflatoxin & Fumonisin)
 - AAFCO
 - AACCC
 - ASTM – CROSS CHECK PROGRAM
 - EPA/WP

METHOD CRITERIA

- ROBUSTNESS
 - E.G - % moisture
 - 1 gram, 2 grams, 5 grams, 10 grams
- UNCERTAINTY
 - TRUE VALUE +/- SOME AMOUNT
- INSTRUMENT LINEAR RANGE
 - WHEN DOES THE METHOD "PLATEAU"

ACCURACY

- SAMPLE SPIKE/FORTIFICATION
 - ADDING A KNOWN AMOUNT TO A SAMPLE

- CONTROL OR CHECK SAMPLE
 - SIMILAR TO WHAT IS BEING TESTED
 - MATRIX
 - AMOUNT/LEVEL

METHOD VALIDATION

- A NEED TO DO NEW THINGS/ANALYSES
 - BETTER DETECTION
 - MORE ANALYTES
 - BETTER CONFIDENCE
 - NEW MATRICES
 - NEW ANALYTES
 - NEW INSTRUMENTS
 - NEW REGULATIONS
 - FASTER RESULTS
 - MORE AUTOMATION/FEWER MANUAL TASKS

PRECISION

- How close repeat values are (%RPD)
 - Difference/mean *100
 - Method reproducibility
- **INTRA- AND INTER-LABORATORY**
Within and between

PRECISION - MEASUREMENT

- Glassware (class A)
- Certified thermometers
- Certified standards
- Certified weights

METHOD CONTAMINATION

- Method blank
 - Glassware, reagents, instruments
 - Only “thing” missing is the analyte
- **METHODS/INSTRUMENTS CANNOT DIFFERENTIATE BETWEEN ANALYTE AND CONTAMINATION**

EDUCATION/TRAINING

- READ/KNOW THE METHODS
- DEVELOP AND USE SOPs
- DEVELOP TRAINING REQUIREMENTS
- ATTEND CLASSES/SEMINARS

INSTRUMENTATION

- RESEARCH WHAT YOU NEED
- RESEARCH WHAT YOU CAN AFFORD
- GET RELIABLE INSTRUMENTS
- OBTAIN/USE A LIMS
- READ TRADE JOURNALS

RECORD KEEPING

- USE FOR COMPLIANCE
- USE FOR TROUBLE-SHOOTING
- USE AS A MANAGEMENT TOOL

- ADVENT OF ELECTRONIC RECORDS