



**Asia-Pacific
Economic Cooperation**

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**Control Chart - Internal Quality Control of
Laboratory Data at National Institute for Food
Control**

Submitted by: Viet Nam



**7th Wine Regulatory Forum
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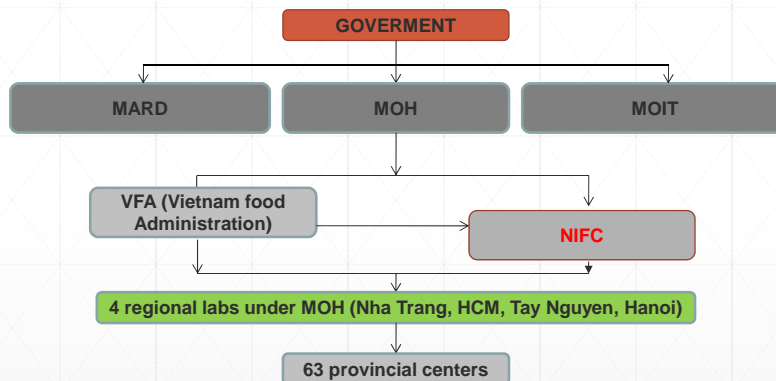


Control Chart

Internal Quality Control of Laboratory Data (at NIFC)

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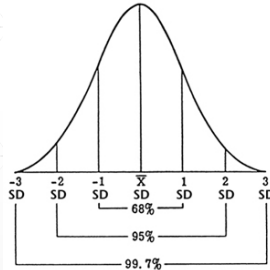
National Institute for Food Control



NIFC - national reference food safety laboratory!

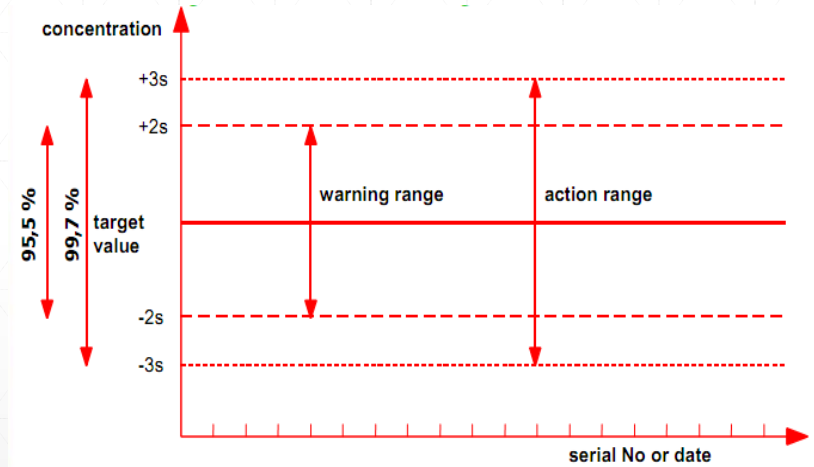
Control chart

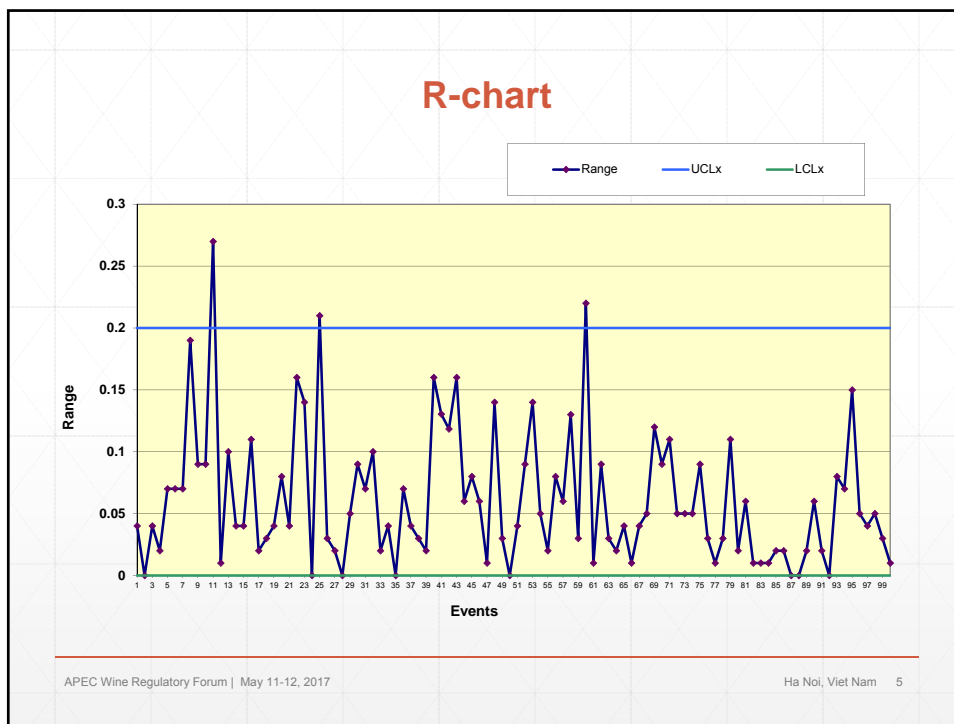
- Control chart was first developed by Walter Shewhart since 1930
- Control chart: a record of the results of periodic inspections over time.



- Control chart can be classified into two types: X-chart and R-chart

X-chart





- ### Data for control chart
- **CRM, RM**
 - The assigned value is available with uncertainty: $X \pm U$
 - **IQC, spiked**
 - The target value is average from 30 data
 - **Blank**
 - Control the signal of the blank = control the reagent quality
 - **Duplicate**
 - The bias of two duplicate, from 30 data
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X-chart

- IQC samples

$$CL = \bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{(n-1)}}$$

$$UWL = +2s$$

$$LWL = -2s$$

$$UAL = +3s$$

$$LAL = -3s$$

R-chart

- Duplicates

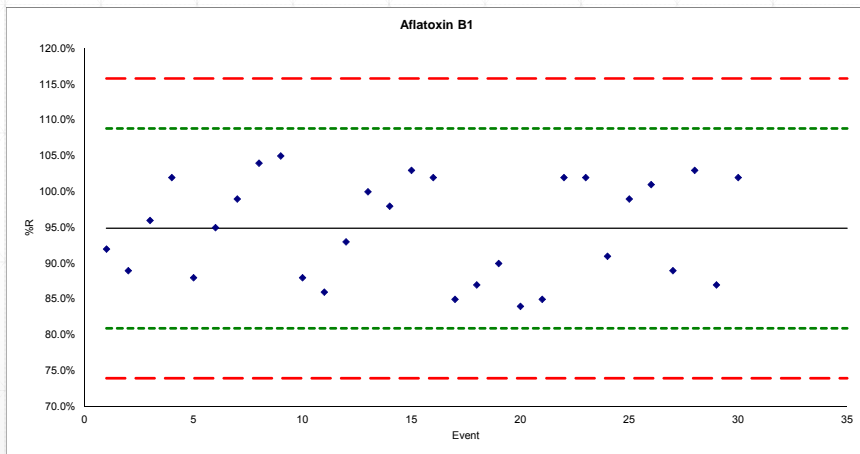
$$CL = \bar{x} = \frac{\sum_{i=1}^n (x_{i\max} - x_{i\min})}{N}$$

$$s = \bar{x} / 1,128$$

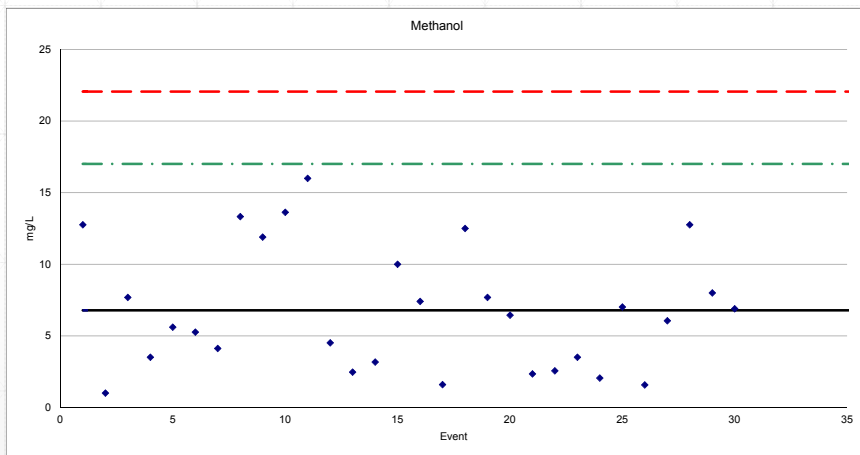
$$UWL = 2,83s$$

$$LWL = 3,67s$$

Example – X-chart



Example – R-chart



Out of control situations

- Out of control
 - 1 point beyond action limits
 - 2 out of 3 points in a row beyond warning limits
- Out of statistical control
 - 7 points in a row on the same side of the central line
 - 7 points in a row steadily increasing or decreasing
 - 10 out of 11 points in a row on the same side of the central line (X-chart)

Choices of control chart

- The more frequent a specific analysis is done the more sense a control chart makes
- If the analyses are always done with the same sample matrix, the sample preparation should be included. If the sample matrix varies, the control chart can be limited to the measurement only.
- Some methods include obligatory measurement of control samples or multiple measurements.
- In some cases the daily calibration gives values (slope and/or intercept), internal standard signals can be useful.

References

- Internal quality control – Handbook for chemical laboratories
- NORDTEST TR569

**THANK YOU FOR
YOUR ATTENTION!**
