Tutela Control Charts Guide

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DOCUMENT CONTROL

VERSION	DESCRIPTION	ISSUE DATE
0.0.1	Release for review	23/10/2019

Version number is a 4 decimal number e.g. 7.0.234.675. The first part of the 4-decimal number of the version represents the number of Major releases software has gone through. The second part of the version number represents the minor release of the software which generally occurs in cases of release of a service pack or any add-on. The third decimal place signifies the number of iterations used in the SDLC to reach the point where software is currently in. The fourth decimal place tells the number of revisions for the Build Numbers. Each build will have a set of bugs and those bugs will be resolved and the build will be released again and so forth. Consider a team releasing the revisions of a build every night; the revision number will be incremented each night.
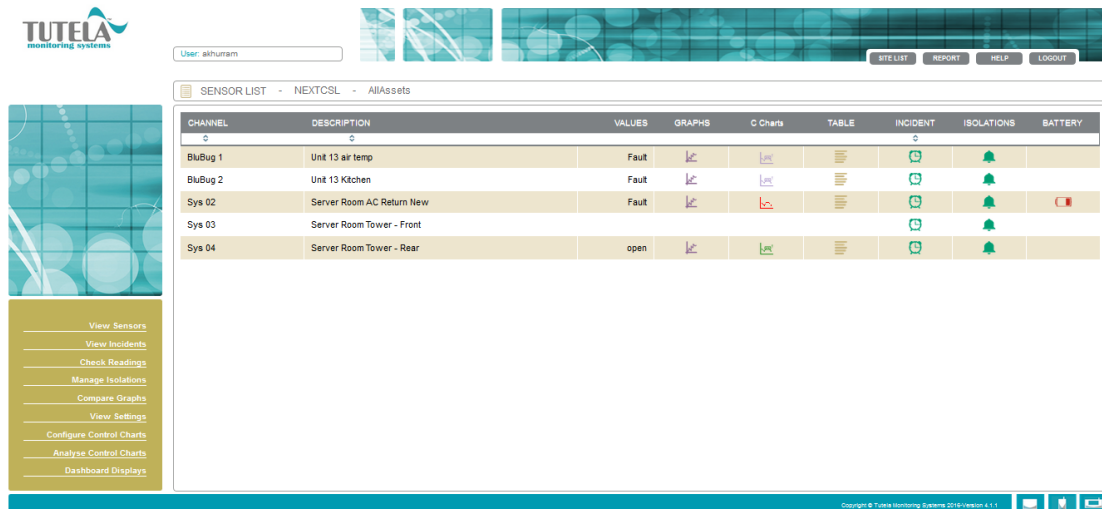
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1.0 OVERVIEW:

Tutela Web Application is equipped with feature that provides our customers facility to do simple task themselves.

This document focuses on the feature to configure and analyse control charts for any anomalies that can exist in the data.
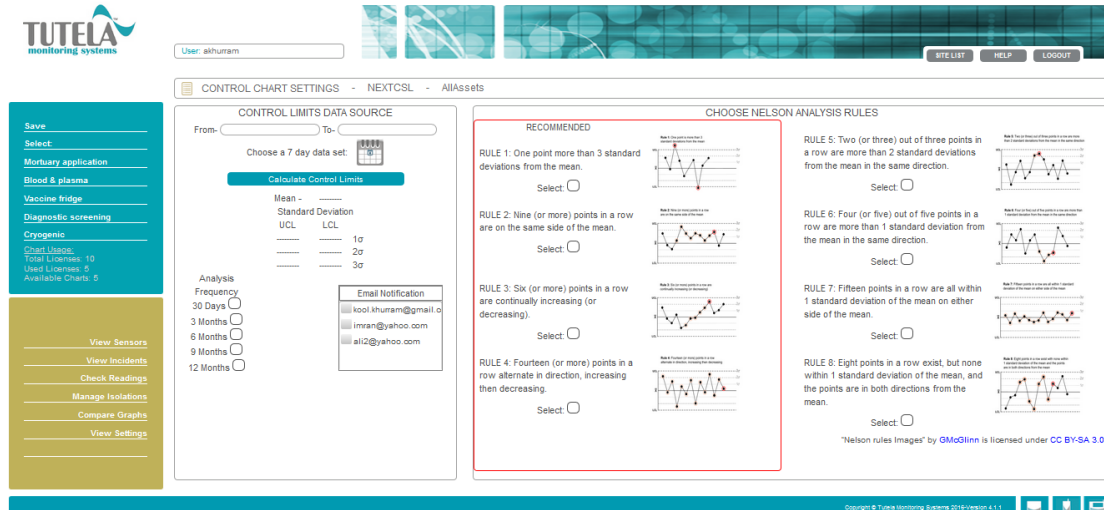
2.0 USER INSTRUCTIONS:

SENSORS PAGE

Sensor List page has a few new options for control charts. The control chart icon
against each sensor can be clicked to configure control chart of that particular
sensor. This button can be green if there is a control chart already configured.
This button can be blinking red if previously configured control chart on this sensor
has any anomaly in the data (data points fulfilling any Nelson rules of anomalies).

If the user wants to configure control chart on multiple sensors, the user should click
"Configure Control Charts" button on the left bottom panel. Control charts can also be
configured for background analysis only, which means if there will be any anomaly in
the data, the user will be notified via email and the control chart will not be shown
against the sensor. To configure this setting, "Analyse Control Charts" button should
be clicked from the bottom left panel.

CONFIGURE CONTROL CHART PAGE

Control chart configuration page shows all the configuration settings, which needs to be filled to calculate control chart. This page can be reached by clicking control chart button 🖳 against any sensor or from "Configure Control Charts" button as shown previously.

"From" and "To" dates represent benchmark date range on which target mean and target SD will be calculated as benchmark for comparing data points. Data points (Daily SD) will be calculated from this "From" date and will keep on calculating on daily basis. These data points (Daily SD) values will be further used to calculate target SD and target Mean. After filling these dates, user can click Calculate Control Limits button [Calculate Control Limits] to view the target mean and target SD (benchmark values to compare data with).

Note: Calculate Control Limits button will only work, if there was any control chart previously configured having "From" date after the From date you have selected. Otherwise, there will be no data points (daily SD values) calculated previously so no target values can be calculated and the message "no data exist" will be shown.

Analysis Frequency should be selected such that the control chart will be calculated on that period of past data. This frequency will also be used to see when the control chart will be next calculated. For instance, if user has selected 30 days, the control chart will be calculated from previous 30 days data from today and the next time control chart will be calculated after 30 days.

User should select email ids from "Email Notification" to whom the control chart should be emailed if there are any anomalies according to Nelson rules.

Nelson rules should be selected from "Choose Nelson Analysis Rules" area, which should be applied while analysing the data. A description of these rules are given at the end of this manual.

There are some pre-sets available on the Right panel, from where a pre-set can be selected which will fill the form with the particulars of that specific pre-set. Details about the pre-sets are:

Mortuary application: Steady rule consistent, over 3 months. It will select rule 2 and the three months' time in benchmark To and From fields.

Blood & Plasma: This is a tight rule over 6 months. It will select rule 7 and the six months' time in benchmark To and From fields.

Vaccine fridge: Loose rule and will accommodate the opening and closing of the door. It will just select rule 1.

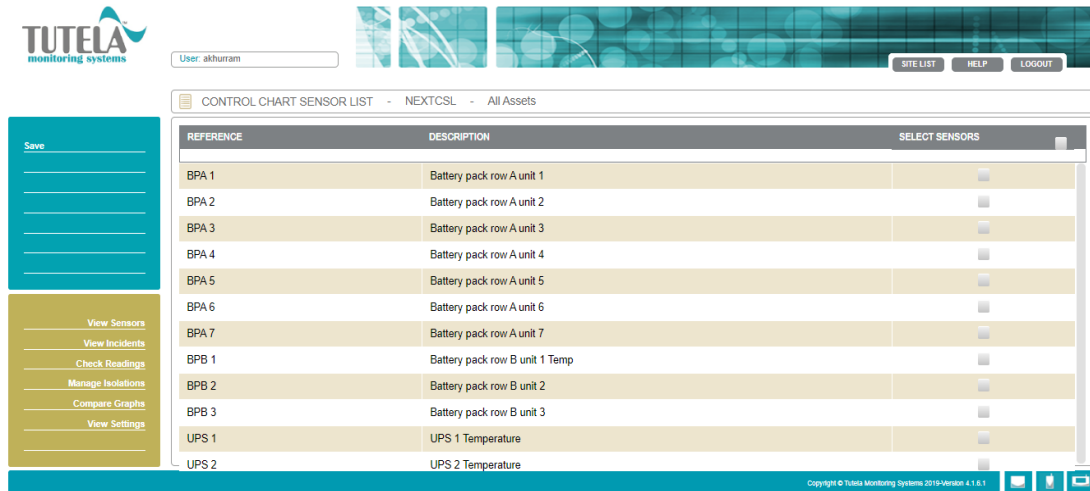Diagnostic screening: For reagents and consumables. It will just select rule 5.

Cryogenic: Need to explain the different choices such duration – 9-12 months. It will select rule 3 and 5.

After providing all these settings, "Save" button should be selected from top left menu to save these configurations. After saving, the chart should be available to view the next day.

In the Right panel, there is also some information about charts usage i.e. Total number of chart licenses, used charts and available charts.

CONTROL CHART SENSOR LIST PAGE

If the user has selected to configure control chart for multiple sensors from "Configure Control Charts", then after filling the configurations, a sensor selection page will appear. Users can select multiple sensors from this page to set the control chart on those sensors.

After sensor selection, press the "Save" button from top left panel to save these settings.

CONTROL CHART GRAPH PAGE
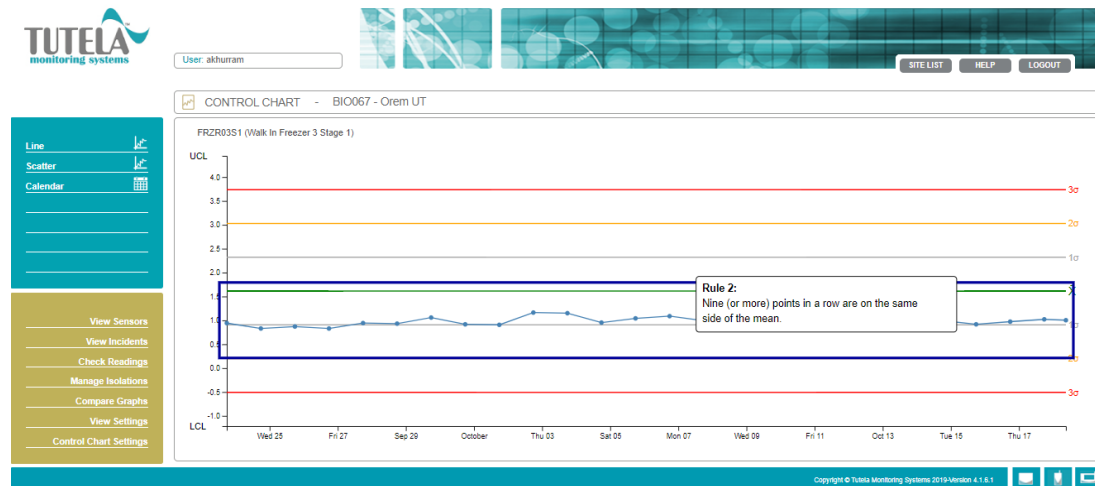
After at-least one day of configuring the control chart, the user will be able to view the graph. To view the control chart graph page, click the green control chart button ⬚ against the sensor, which was configured. The icon can be blinking red to indicate that there is an anomaly in generated graph. The "Users" menu button in the site list page will show customer list.

Anomaly points are highlighted with different coloured rectangular boxes. Every rule is assigned a different colour (Each rule with assigned colour is shown below). Moving the mouse over a rectangular box will show a tooltip describing the rule, which is fulfilled by these points among eight Nelson rules of anomalies.
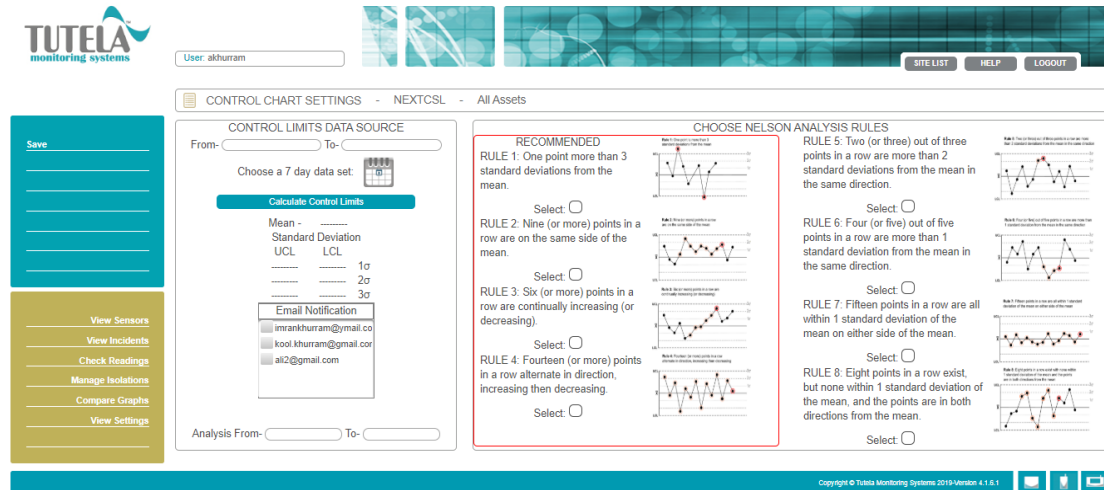
Note: Only those rules will be highlighted which are configured to analyse, so, it is not mandatory that all eight rules will be analysed and shown on the graph.

There are some other options on the left menus. User can select whether he/she wants to view line graph of this data or the scatter plot. User can click on "Calendar" button to change the data range for the data points plotted on the graph.

At any point, user can change the previously configured control chart configurations by clicking "Control Chart Settings" from bottom left menu. On clicking this button, the same configuration page will be shown with the previously configured data automatically filled. User can change the settings and save them.

| Nelson Rules	Colour of the box	
Rule 1	Red	
Rule 2	Royal Blue	
Rule 3	Black	
Rule 4	Brown	
Rule 5	Dark Green	
Rule 6	Purple	
Rule 7	Grey	
Rule 8	Magenta	

CONTROL CHART ANALYSIS

The user is provided the facility to configure control chart for emails only so that no anomaly or the graph is shown on the website. Using this analysis option, the control chart will be calculated only **Once** and after emailing, it will not be calculated in the future.

Clicking on the "Analyse Control Charts" will direct the user to the configuration page as shown above. It is the same configuration page, the only difference is that there is no analysis frequency; instead there is "Analysis Range" selection option at the bottom. Analysis Range selection will provide the ability to select custom data points range which was not provided in the analysis frequency options. As the chart is calculated only once in this case, so the custom date range selection will benefit the user.
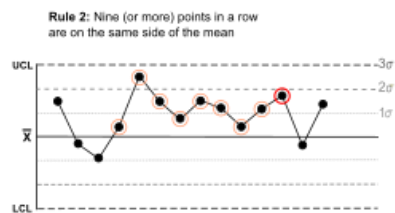
Rule 1
One point is more than 3 standard deviations from the mean.
One sample (two shown in this case) is grossly out of control.

Rule 1: One point is more than 3 standard deviations from the mean
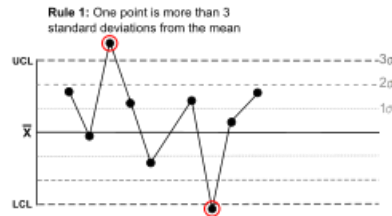
Rule 2
Nine (or more) points in a row are on the same side of the mean.
Some prolonged bias exists.

Rule 2: Nine (or more) points in a row are on the same side of the mean

Rule 3
Six (or more) points in a row are continually increasing (or decreasing).
A trend exists.

Rule 3: Six (or more) points in a row are continually increasing (or decreasing)
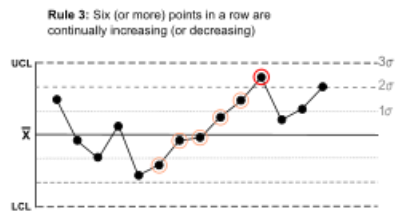
Rule 4
Fourteen (or more) points in a row alternate in direction, increasing then decreasing.
This much oscillation is beyond noise. Note that the rule is concerned with directionality only. The position of the mean and the size of the standard deviation have no bearing.
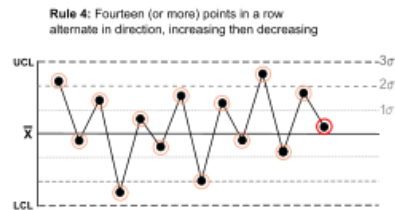
Rule 4: Fourteen (or more) points in a row alternate in direction, increasing then decreasing

Rule 5
Two (or three) out of three points in a row are more than 2 standard deviations from the mean in the same direction.
There is a medium tendency for samples to be mediumly out of control. The side of the mean for the third point is unspecified.
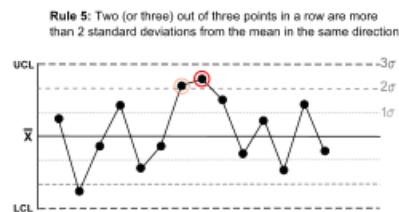
Rule 5: Two (or three) out of three points in a row are more than 2 standard deviations from the mean in the same direction

Rule 6

Four (or five) out of five points in a row are more than 1 standard deviation from the mean in the same direction. *There is a strong tendency for samples to be slightly out of control. The side of the mean for the fifth point is unspecified.*
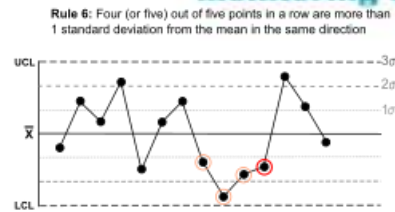
Rule 6: Four (or five) out of five points in a row are more than 1 standard deviation from the mean in the same direction

Rule 7

Fifteen points in a row are all within 1 standard deviation of the mean on either side of the mean. *With 1 standard deviation, greater variation would be expected.*

Rule 7: Fifteen points in a row are all within 1 standard deviation of the mean on either side of the mean
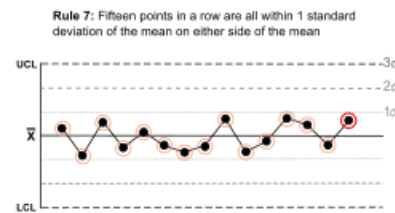
Rule 8

Eight points in a row exist, but none within 1 standard deviation of the mean, and the points are in both directions from the mean. *Jumping from above to below whilst missing the first standard deviation band is rarely random.*

Rule 8: Eight points in a row exist with none within 1 standard deviation of the mean and the points are in both directions from the mean