# Statistical Quality Control

## Before things go wrong in the Chocolate Milk Factory

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# At OSI we're *SERIOUS* about our chocolate milk

# When things go wrong we say "Oh My Goodness!!"

# Wouldn't you?

# Quality Drivers

- Customers

  They want a quality product, time after time

- Process Knowledge

  Process Flow, Equipment, Measurements, Causes

- Experience

  Operators, QC Staff, Process Experts

# Tools for the Quality Program

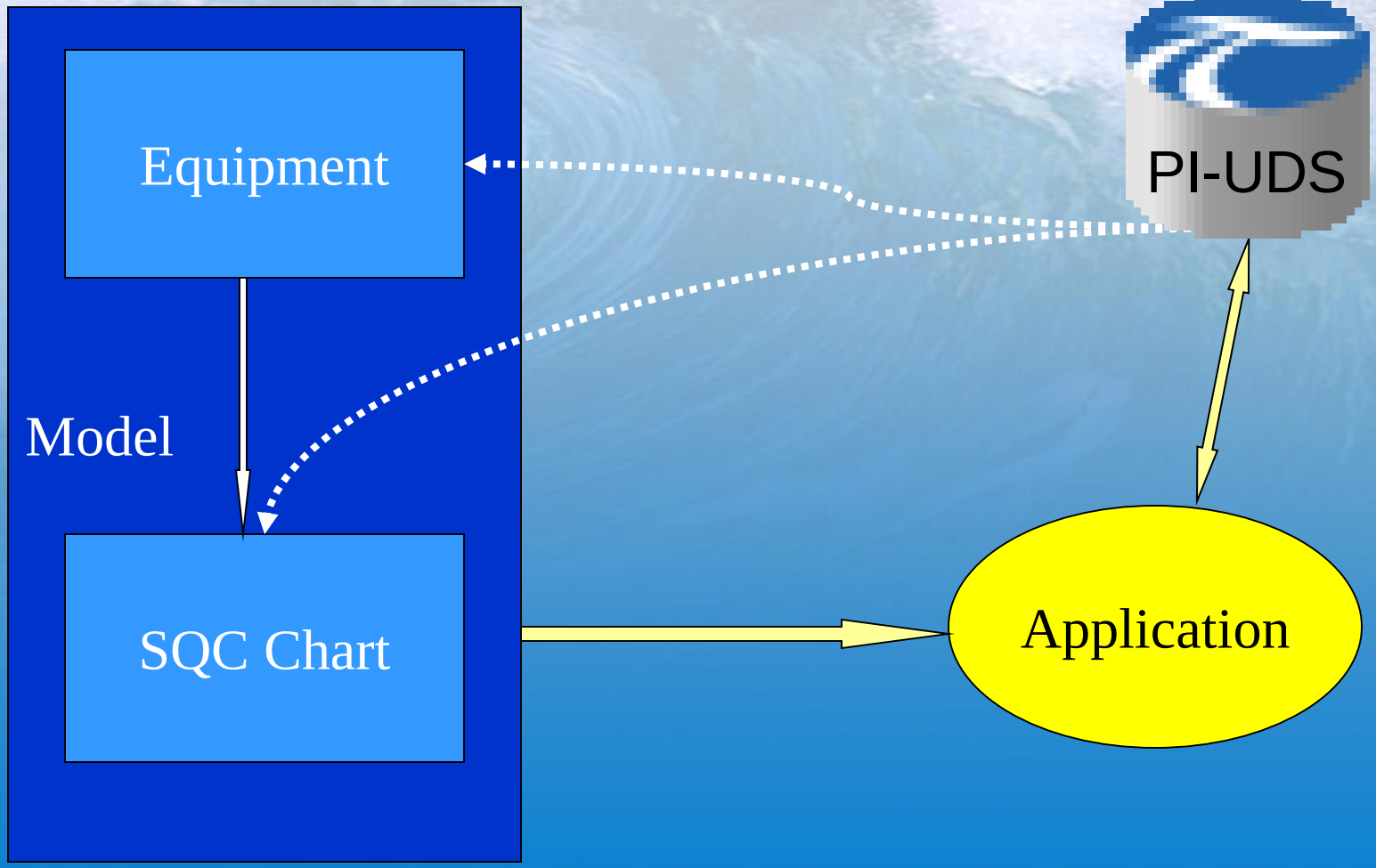
- ProcessBook and PI-SQC
- System Management Tools
- PI Server
- PI Application Framework
- PI ACE

# Using the PI System

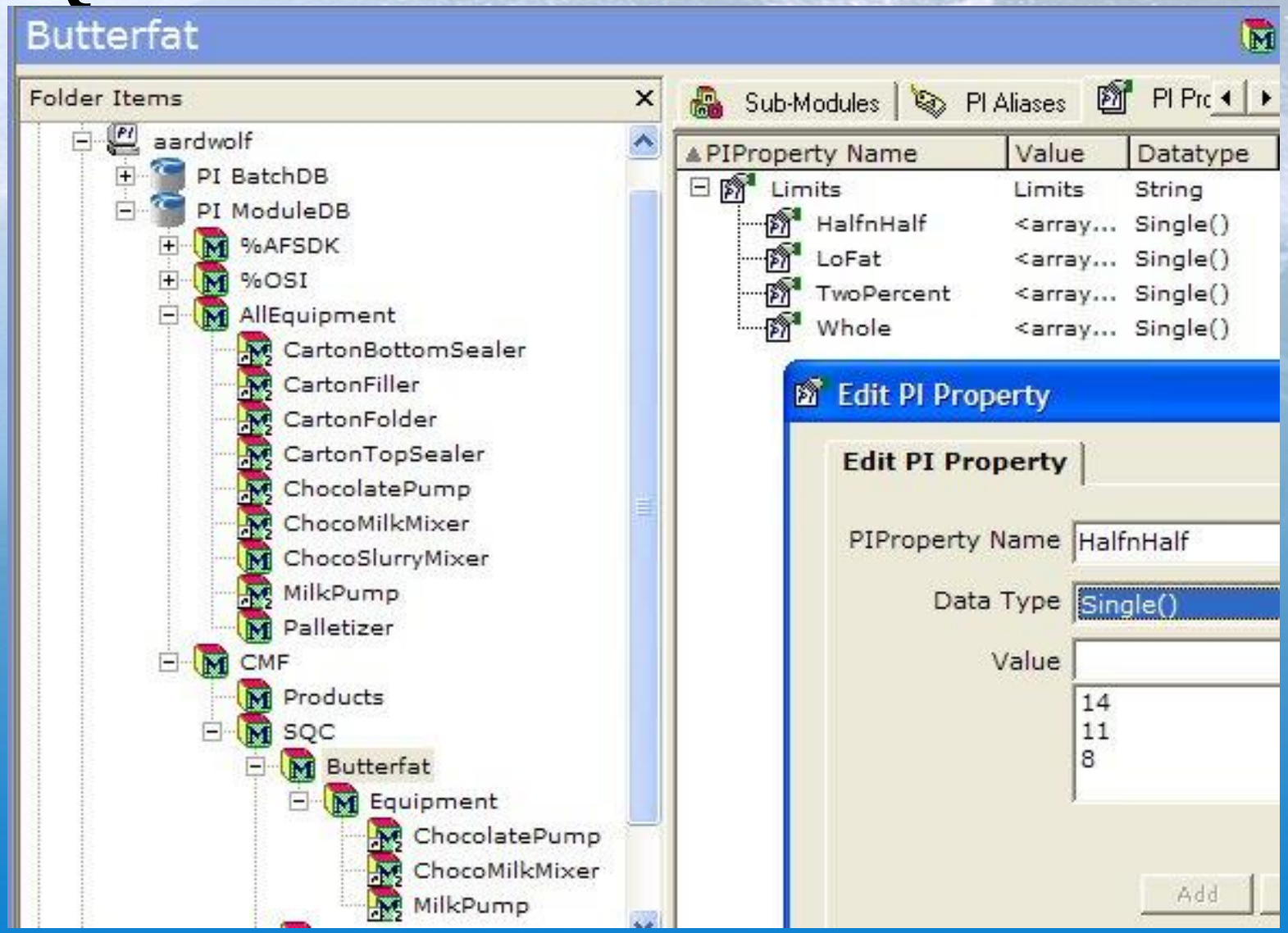
- Model the process using the Module Database or Application Framework
  - Module DataBase Editor
  - Application Framework Explorer

Why? You *need* the model. It's a framework for applications that expand the power of PI.

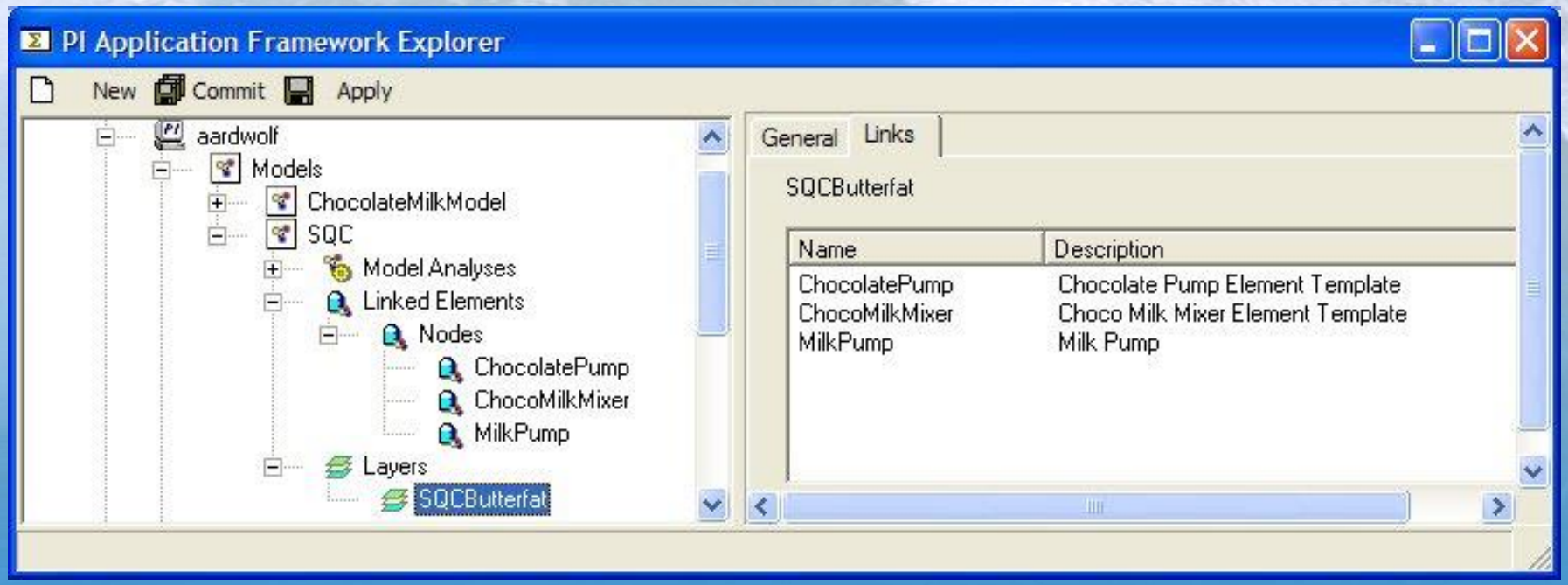
# Model Basics



# SQC Model in ModuleDatabase



# SQC Model in Application Framework

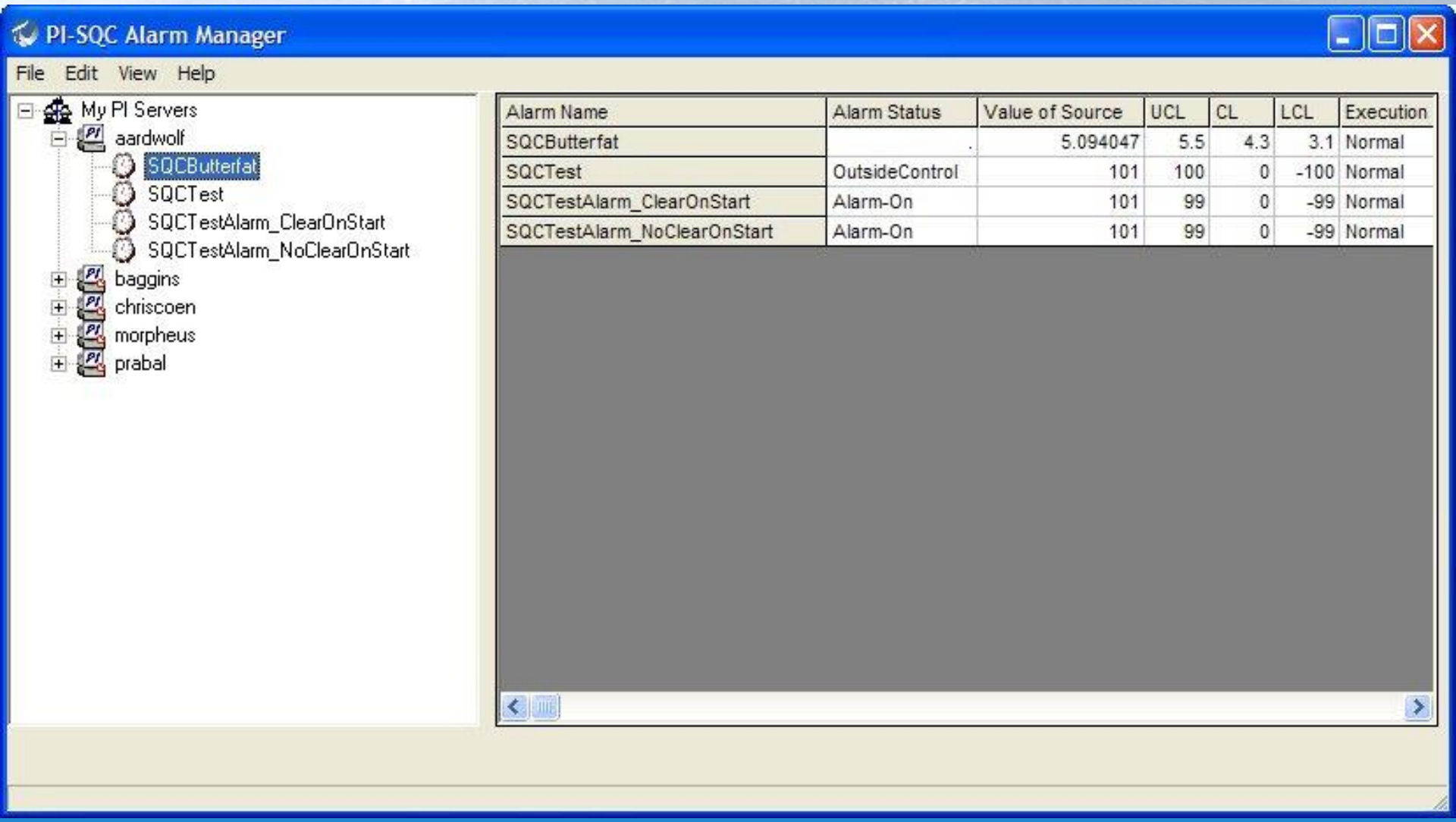


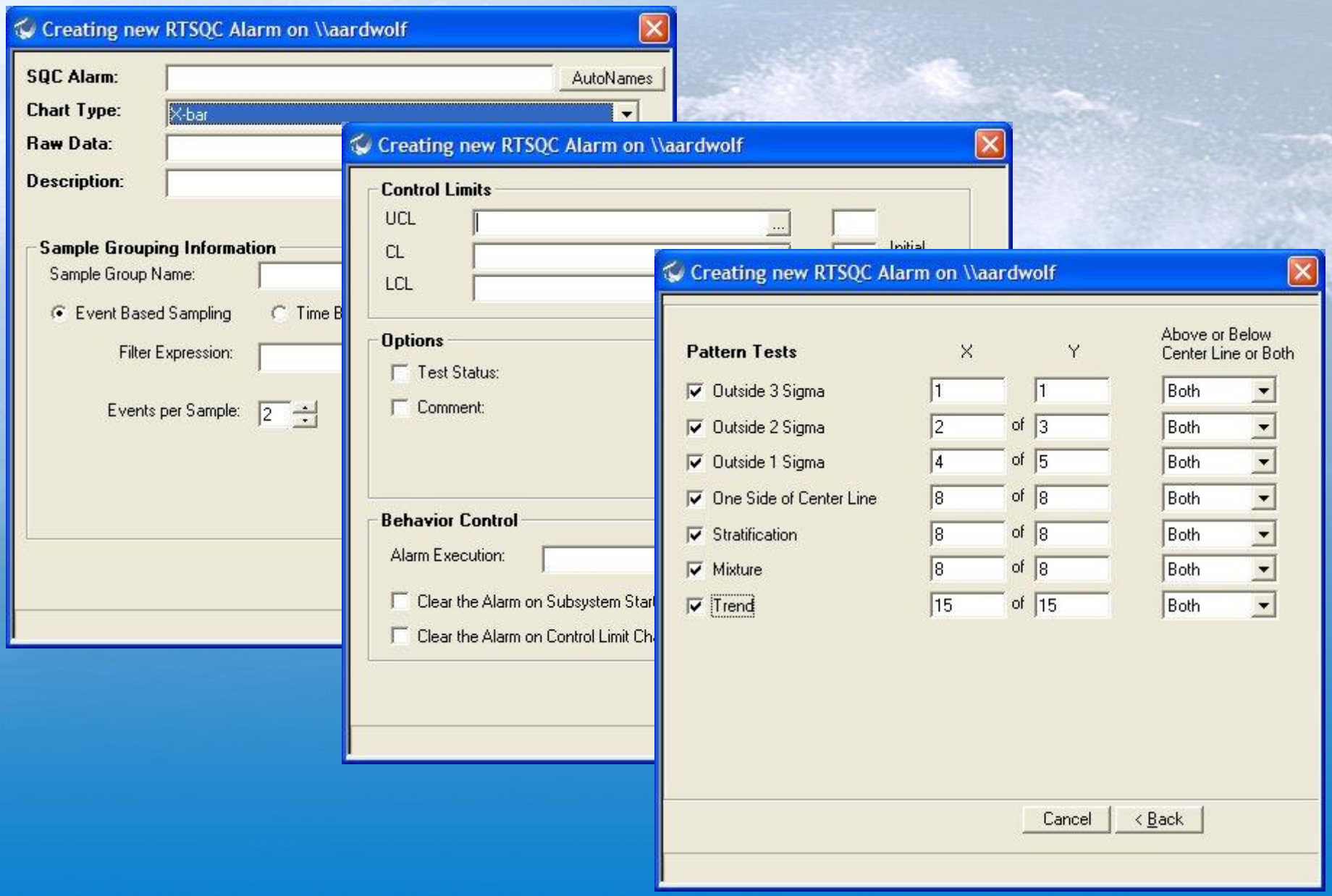
# Using the PI System

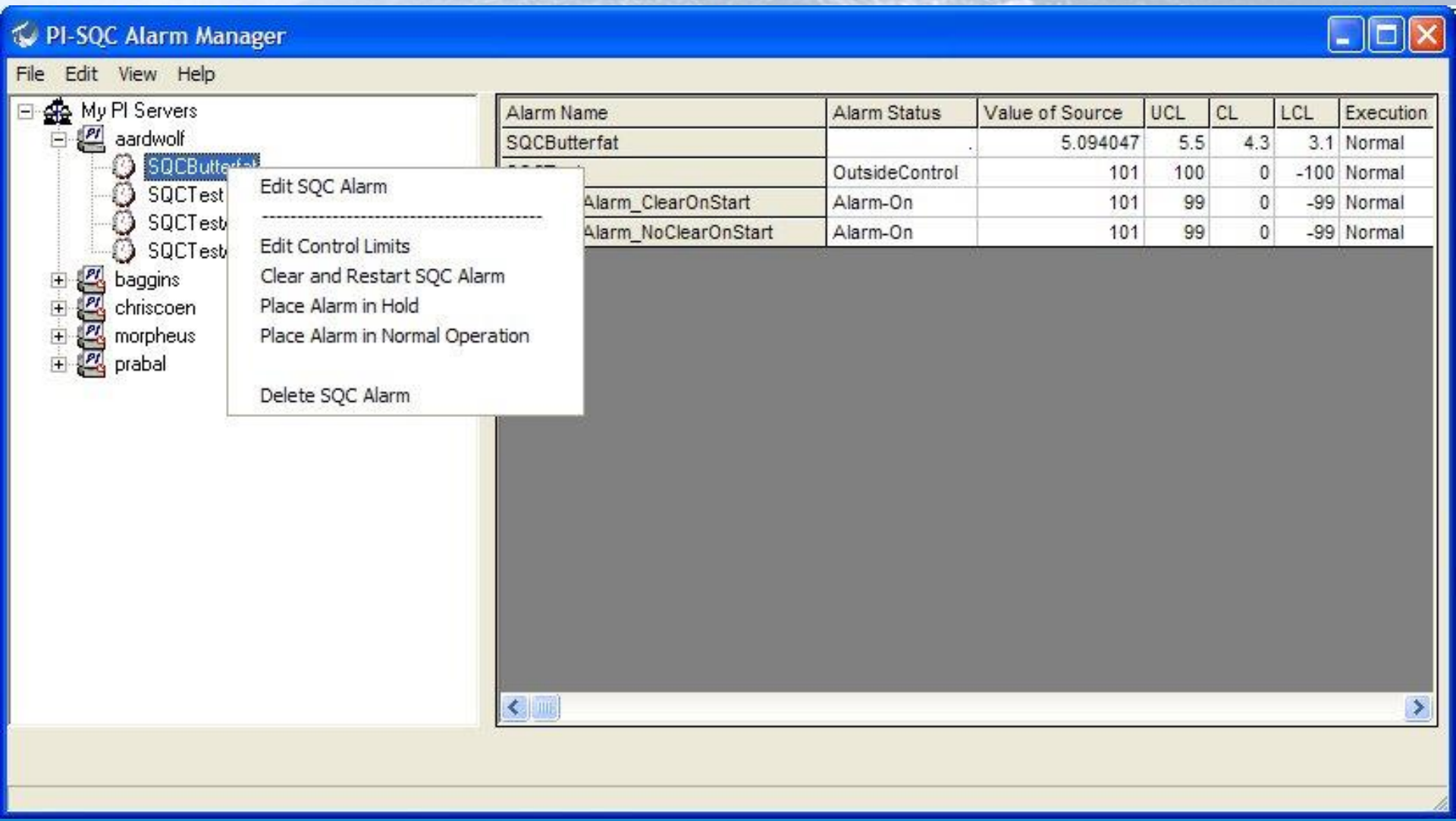
- Model the process using the Module Database or Application Framework
- Store Process and Quality measurements
  - PI Interfaces
  - DataLink
  - Tag Configurator
  - PointBuilder

# Using the PI System

- Model the process using the Module Database or Application Framework
- Store Process and Quality measurements
- Create and Manage Real Time SQC Alarms
  - SQC Alarm Manager
  - Tag Configurator


PI-SQC Alarm Manager
File Edit View Help
My PI Servers
aardwolf
SQCButterfat
SQCTest
SQCTestAlarm_ClearOnStart
SQCTestAlarm_NoClearOnStart
baggins
chriscoen
morpheus
prabal
Alarm Name | Alarm Status | Value of Source | UCL | CL | LCL | Execution
SQCButterfat | | 5.094047 | 5.5 | 4.3 | 3.1 | Normal
SQCTest | OutsideControl | 101 | 100 | 0 | -100 | Normal
SQCTestAlarm_ClearOnStart | Alarm-On | 101 | 99 | 0 | -99 | Normal
SQCTestAlarm_NoClearOnStart | Alarm-On | 101 | 99 | 0 | -99 | Normal

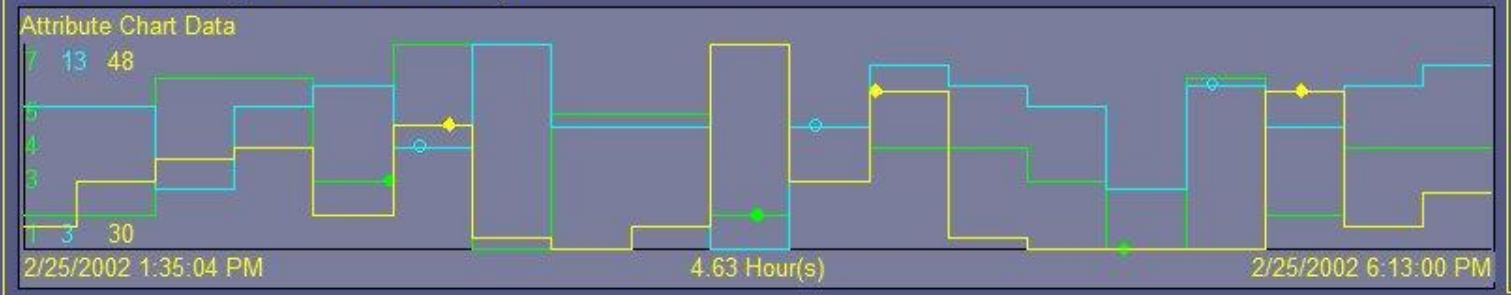

Creating new RTSQC Alarm on \\aardwolf
SQC Alarm:
AutoNames
Chart Type:
X-bar
Raw Data:
Description:
Sample Grouping Information
Sample Group Name:
Event Based Sampling
Time B
Filter Expression:
Events per Sample:
2
Creating new RTSQC Alarm on \\aardwolf
Control Limits
UCL
CL
LCL
Initial
Options
Test Status:
Comment:
Behavior Control
Alarm Execution:
Clear the Alarm on Subsystem Start
Clear the Alarm on Control Limit Ch
Creating new RTSQC Alarm on \\aardwolf
Pattern Tests
X
Y
Above or Below Center Line or Both
Outside 3 Sigma 1 1 Both
Outside 2 Sigma 2 of 3 Both
Outside 1 Sigma 4 of 5 Both
One Side of Center Line 8 of 8 Both
Stratification 8 of 8 Both
Mixture 8 of 8 Both
Trend 15 of 15 Both
Cancel
< Back


PI-SQC Alarm Manager
File Edit View Help
My PI Servers
aardwolf
SQCButterfat
SQCTest
SQCTest
SQCTest
baggins
chriscoen
morpheus
prabal
Edit SQC Alarm
Edit Control Limits
Clear and Restart SQC Alarm
Place Alarm in Hold
Place Alarm in Normal Operation
Delete SQC Alarm
Alarm Name
Alarm Status
Value of Source
UCL
CL
LCL
Execution
SQCButterfat
5.094047
5.5
4.3
3.1
Normal
OutsideControl
101
100
0
-100
Normal
Alarm_ClearOnStart
Alarm-On
101
99
0
-99
Normal
Alarm_NoClearOnStart
Alarm-On
101
99
0
-99
Normal

# Using the PI System

- Model the process using the Module Database or Application Framework
- Store Process and Quality measurements
- Create and Manage Real Time SQC Alarms
- Real Time and Ad Hoc SQC Charts
  - ProcessBook and PI-SQC

## Choose Chart Type and set time range



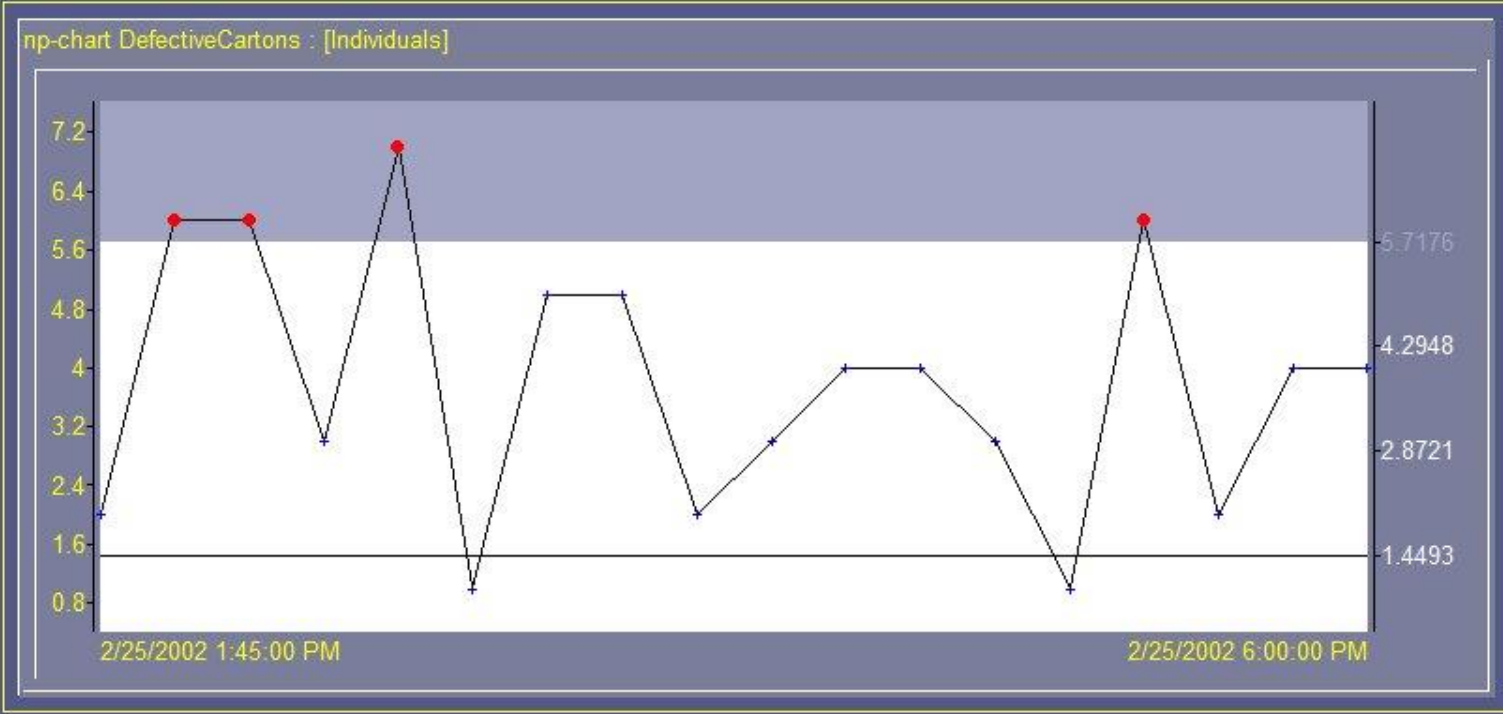

np-chart

**Start:** 2/25/2002 1:35:04

< Set at Cursor >

**End:** 2/25/2002 6:13:00

< Set at Cursor >




**Charting data from this PI Point**

Number of Defective Cartons

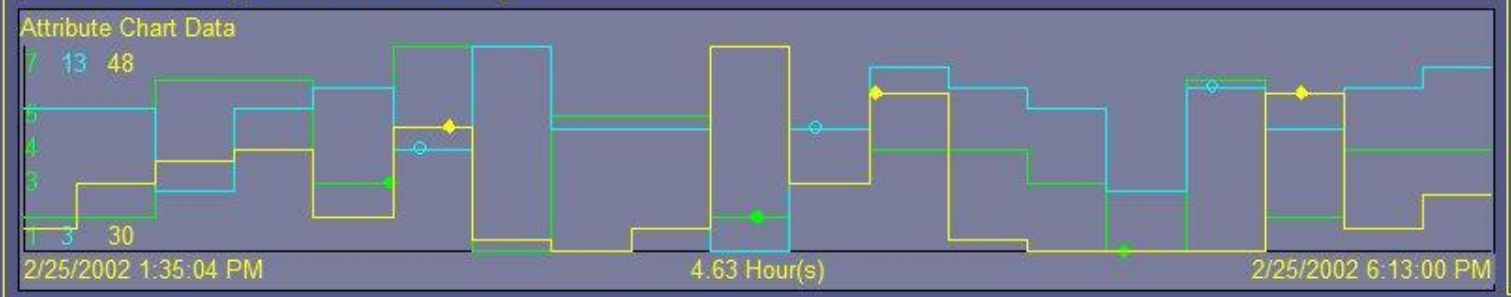
**Sample Size**

**UCL:** 5.71761
**CL:** 1.449275
**LCL:** -2.819059

# Carton Quality

- What did you see?
  - ProcessBook Display
  - PI-SQC
  - VBA
- *How did they do that? np Chart*
  - PI-SQC v1.1 Automation Interface
  - VBA calculation of control limits
- If you've done one, more are only a click away

## Choose Chart Type and set time range



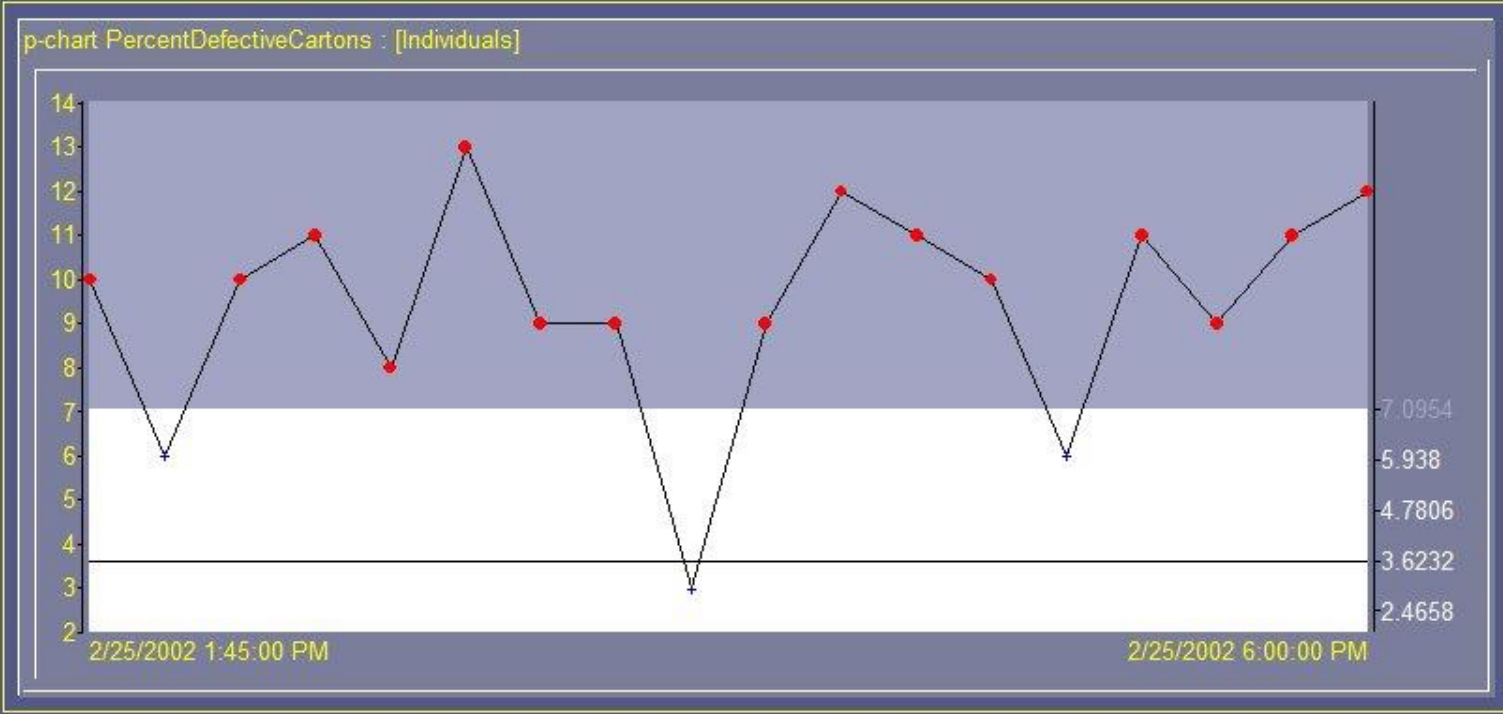

p-chart

**Start:** 2/25/2002 1:35:04

< Set at Cursor >

**End:** 2/25/2002 6:13:00

< Set at Cursor >




**Charting data from this PI Point**

% Defective Cartons

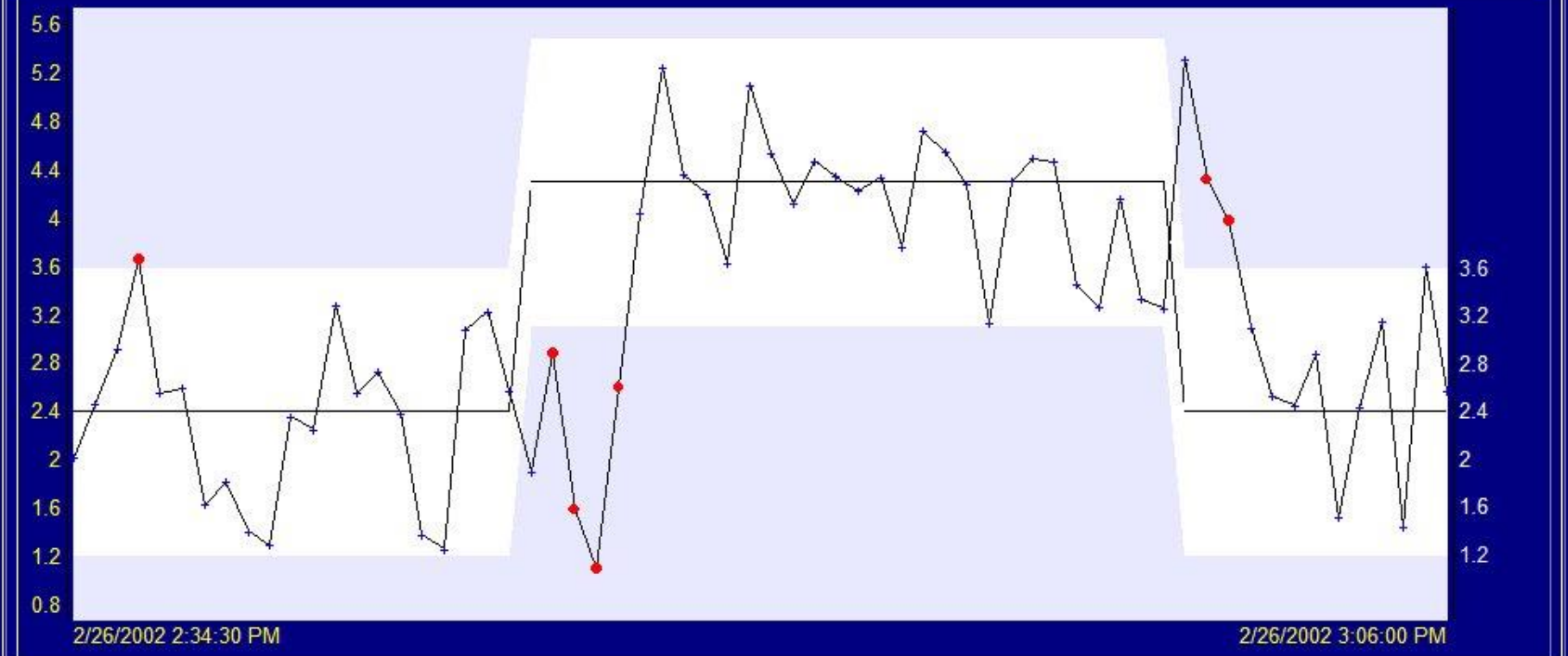
**Sample Size**

**UCL:** 7.095432
**CL:** 3.623188
**LCL:** 0.1509443

# SQC in real time…

- We know the Butterfat plays in chocolate milk quality.
- We use our Sophisticated Butterfat Sensor (SBS) to monitor in real time.

\\aardwolf\SQCButterfat

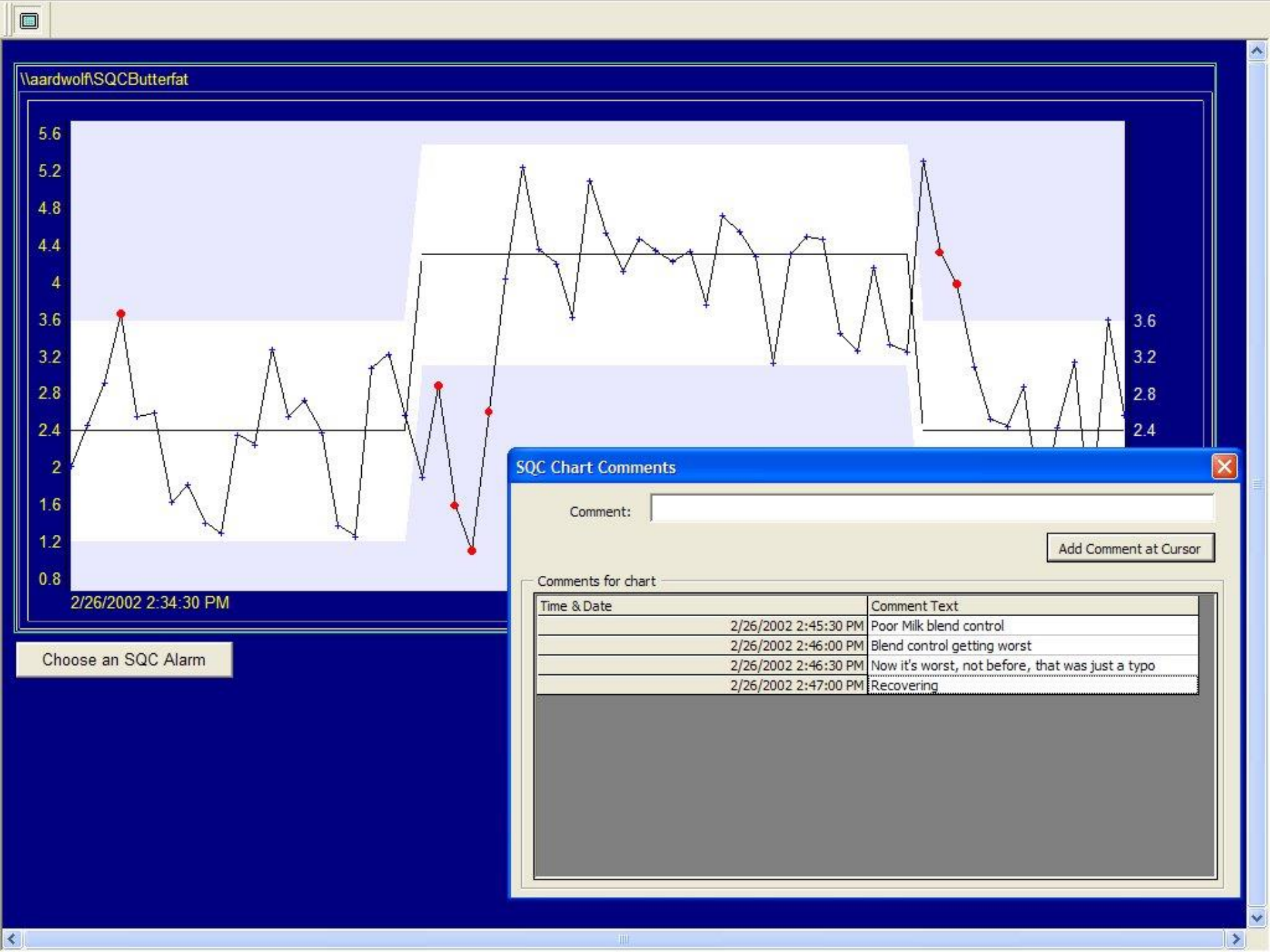


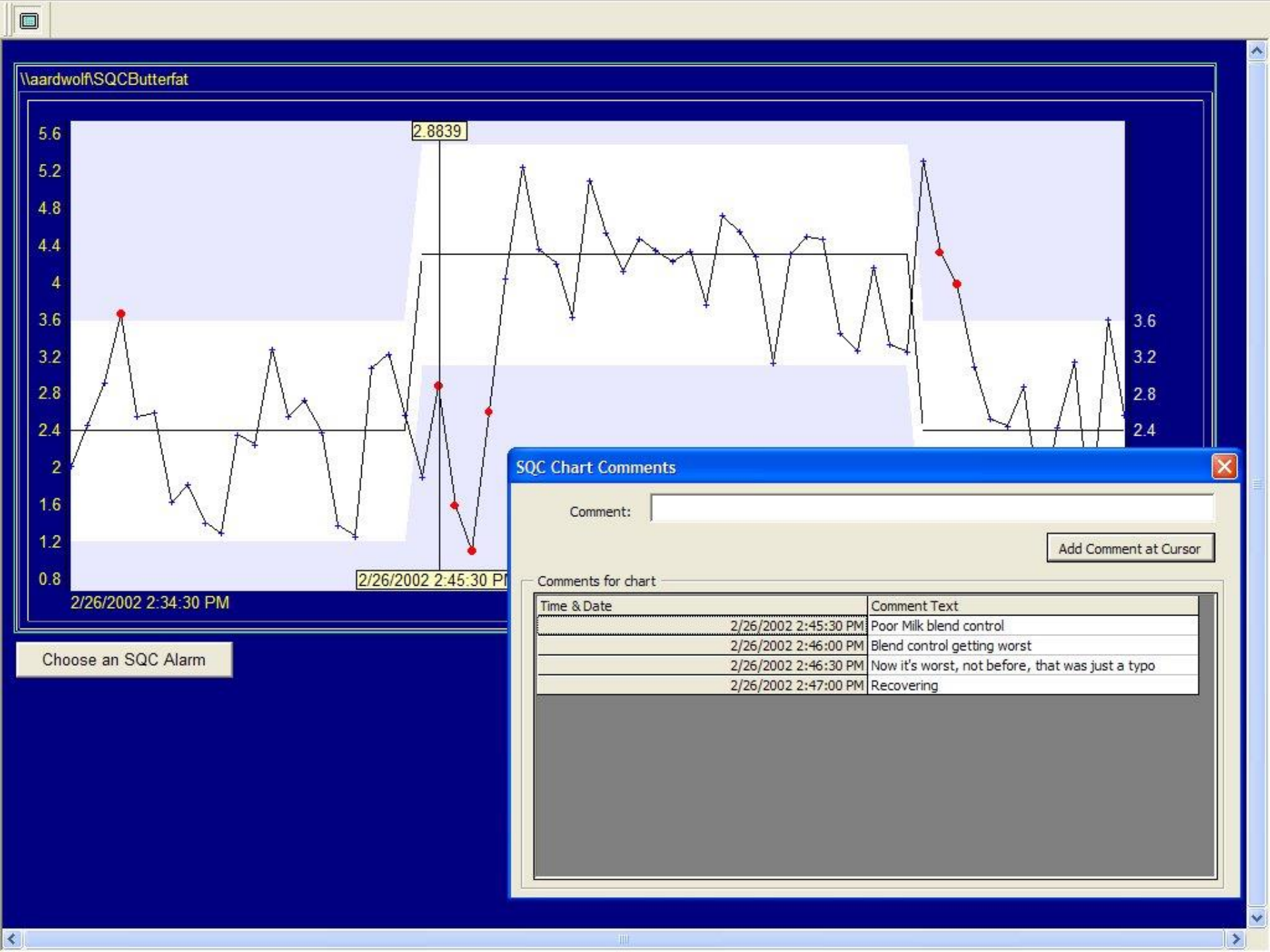

Choose an SQC Alarm

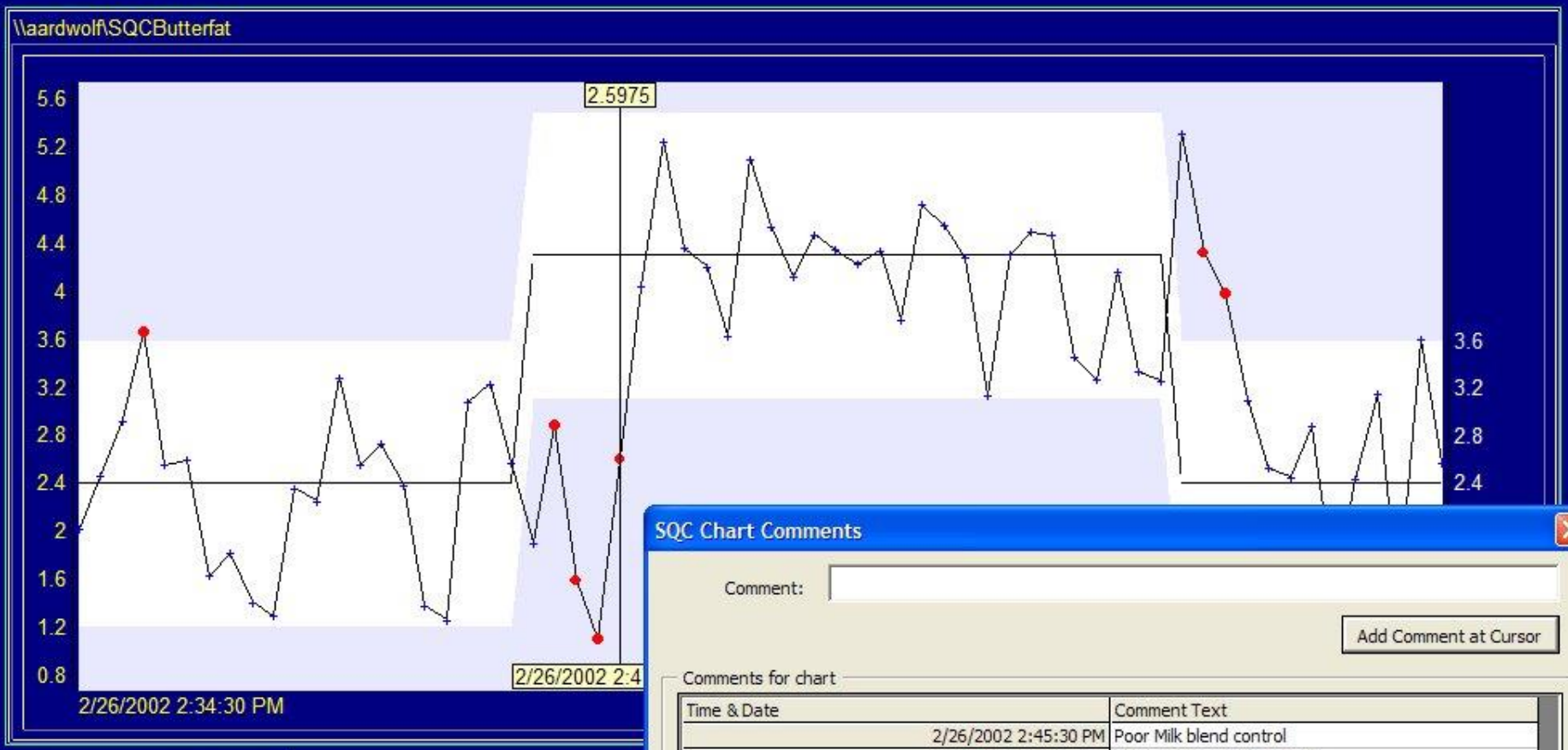
Free Form Comments

Assign Cause

Pareto Chart(s)


\\aardwolf\SQCButterfat
5.6
5.2
4.8
4.4
4
3.6
3.2
2.8
2.4
2
1.6
1.2
0.8
3.6
3.2
2.8
2.4
2/26/2002 2:34:30 PM
Choose an SQC Alarm
SQC Chart Comments
Comment:
Add Comment at Cursor
Comments for chart
Time & Date
Comment Text
2/26/2002 2:45:30 PM
Poor Milk blend control
2/26/2002 2:46:00 PM
Blend control getting worst
2/26/2002 2:46:30 PM
Now it's worst, not before, that was just a typo
2/26/2002 2:47:00 PM
Recovering


\\aardwolf\SQCButterfat
2.8839
5.6
5.2
4.8
4.4
4
3.6
3.2
2.8
2.4
2
1.6
1.2
0.8
3.6
3.2
2.8
2.4
2/26/2002 2:45:30 PM
2/26/2002 2:34:30 PM
Choose an SQC Alarm
SQC Chart Comments
Comment:
Add Comment at Cursor
Comments for chart
Time & Date
Comment Text
2/26/2002 2:45:30 PM
Poor Milk blend control
2/26/2002 2:46:00 PM
Blend control getting worst
2/26/2002 2:46:30 PM
Now it's worst, not before, that was just a typo
2/26/2002 2:47:00 PM
Recovering




Choose an SQC Alarm

SQC Chart Comments

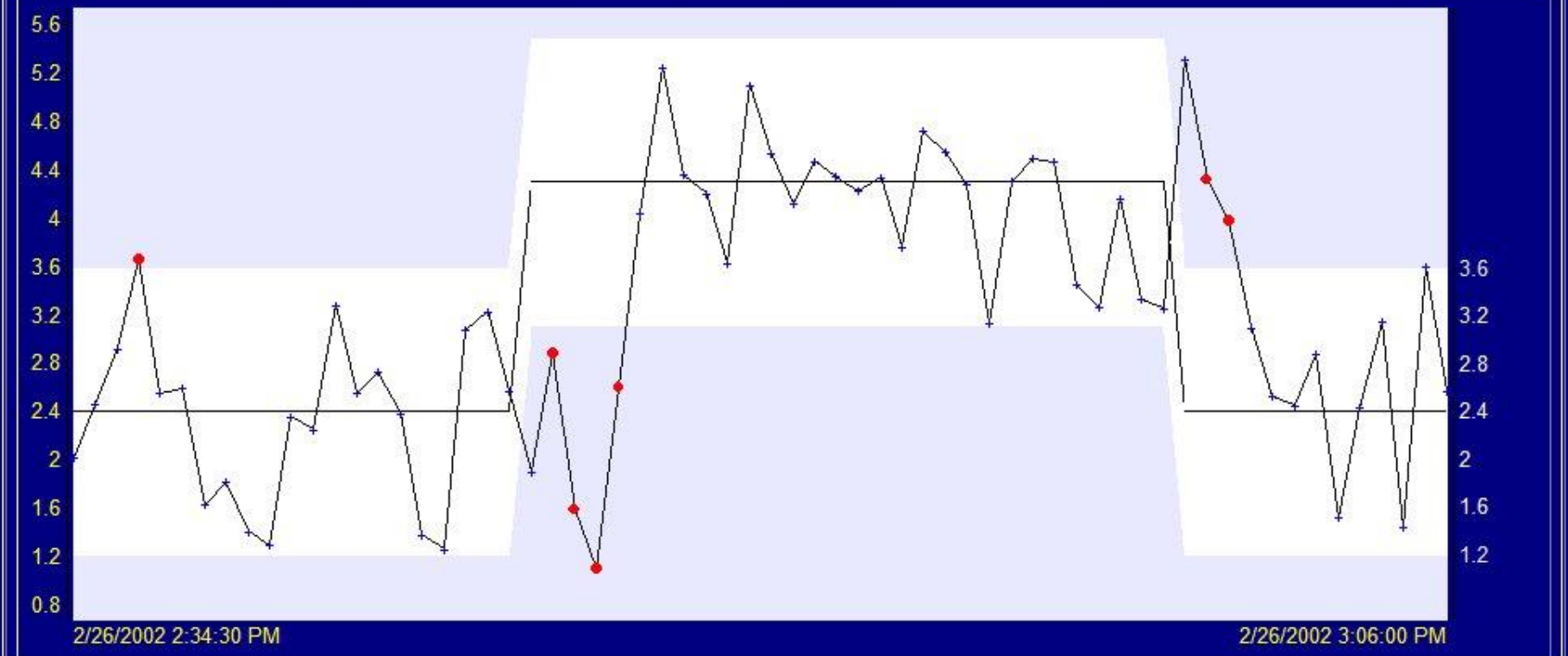
Comment:

Add Comment at Cursor

Comments for chart

| Time & Date | Comment Text |
|---|---|
| 2/26/2002 2:45:30 PM | Poor Milk blend control |
| 2/26/2002 2:46:00 PM | Blend control getting worst |
| 2/26/2002 2:46:30 PM | Now it's worst, not before, that was just a typo |
| 2/26/2002 2:47:00 PM | Recovering |

\\aardwolf\SQCButterfat



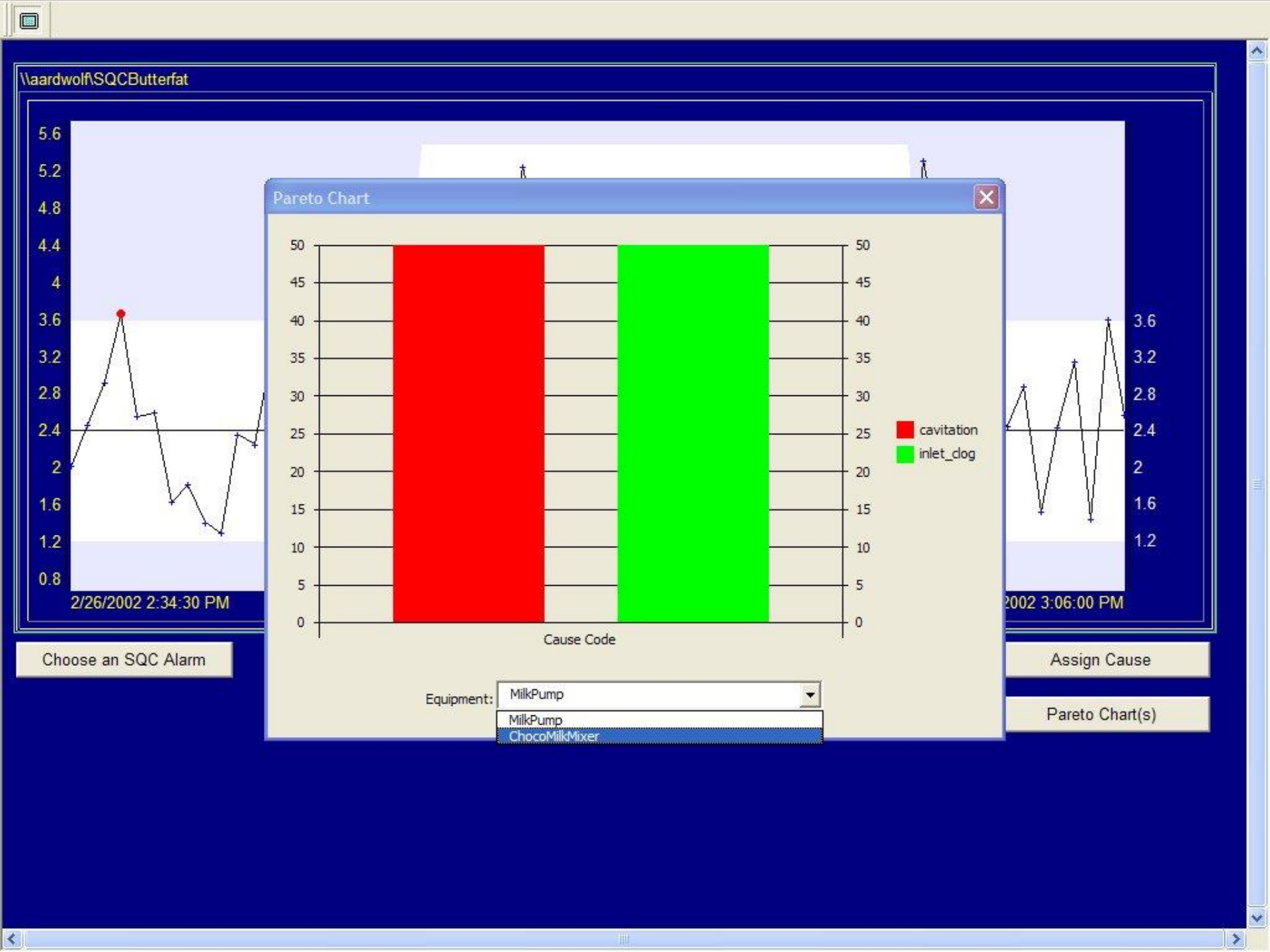

Choose an SQC Alarm

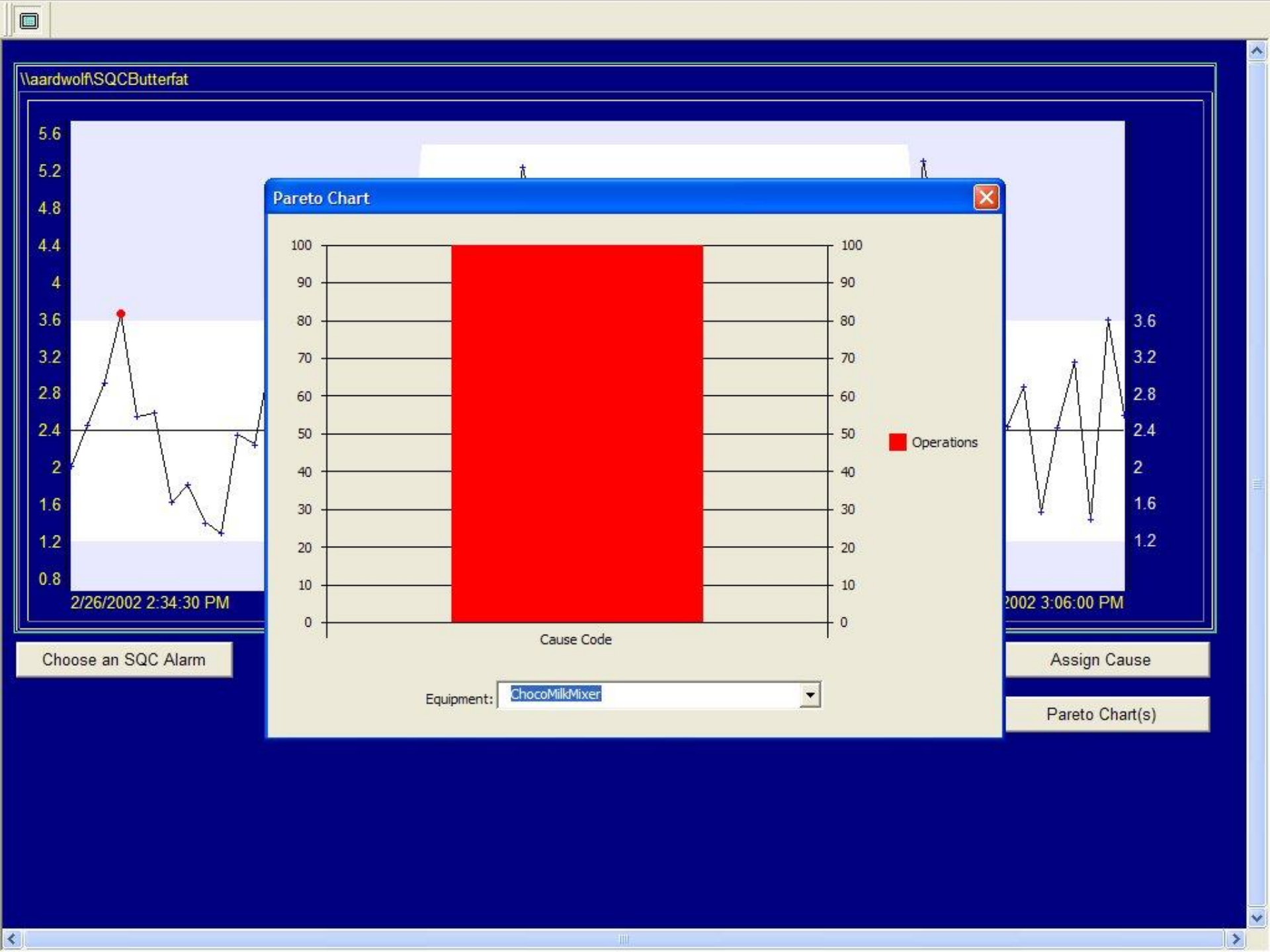
Free Form Comments

Assign Cause

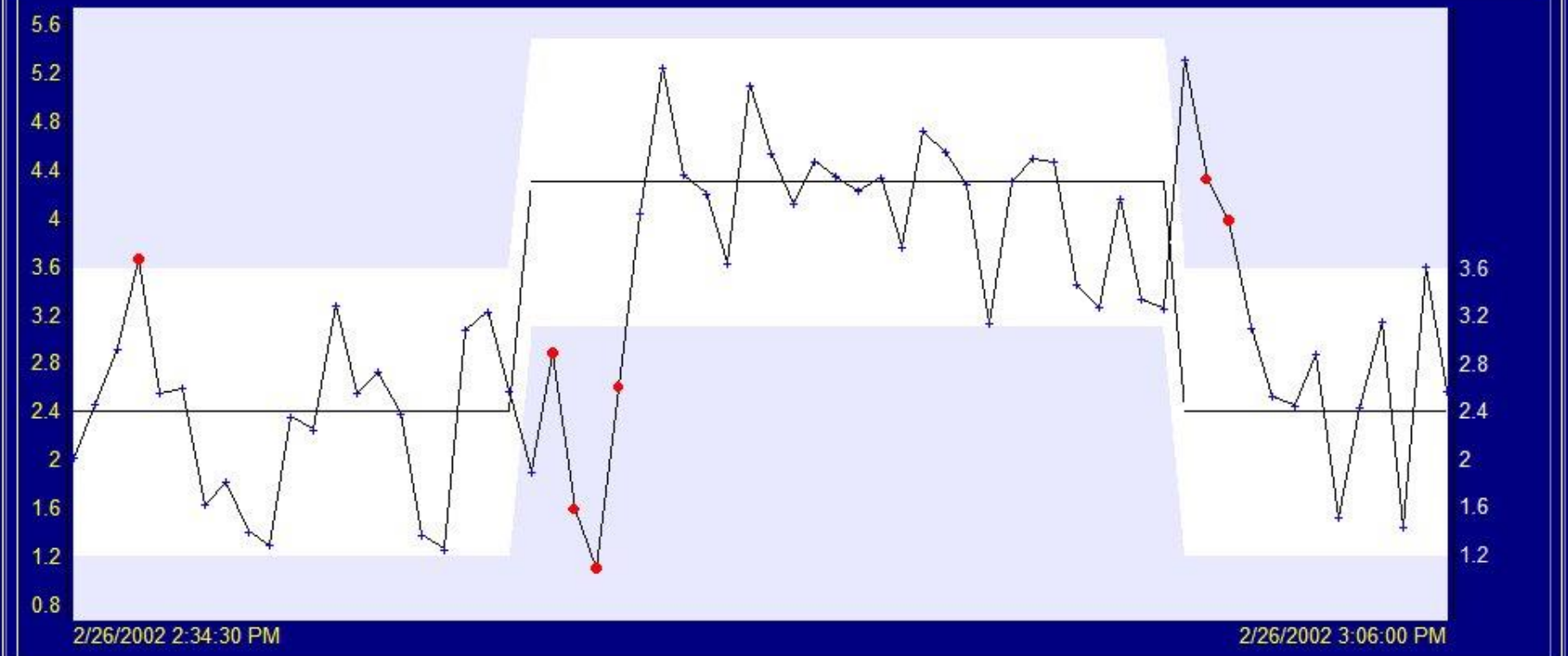
Pareto Chart(s)

\\aardwolf\SQCButterfat
5.6
5.2
4.8
4.4
4
3.6
3.2
2.8
2.4
2
1.6
1.2
0.8
2/26/2002 2:34:30 PM
2002 3:06:00 PM
Pareto Chart
50
45
40
35
30
25
20
15
10
5
0
Cause Code
cavitation
inlet_clog
Equipment:
MilkPump
Choose an SQC Alarm
Assign Cause
Pareto Chart(s)


\\aardwolf\SQCButterfat
5.6
5.2
4.8
4.4
4
3.6
3.2
2.8
2.4
2
1.6
1.2
0.8
2/26/2002 2:34:30 PM
2002 3:06:00 PM
Pareto Chart
50
45
40
35
30
25
20
15
10
5
0
Cause Code
cavitation
inlet_clog
Equipment:
MilkPump
MilkPump
ChocoMilkMixer
Choose an SQC Alarm
Assign Cause
Pareto Chart(s)


\\aardwolf\SQCButterfat
5.6
5.2
4.8
4.4
4
3.6
3.2
2.8
2.4
2
1.6
1.2
0.8
2/26/2002 2:34:30 PM
2002 3:06:00 PM
Pareto Chart
100
90
80
70
60
50
40
30
20
10
0
Cause Code
Operations
Equipment:
ChocoMilkMixer
Choose an SQC Alarm
Assign Cause
Pareto Chart(s)

\\aardwolf\SQCButterfat



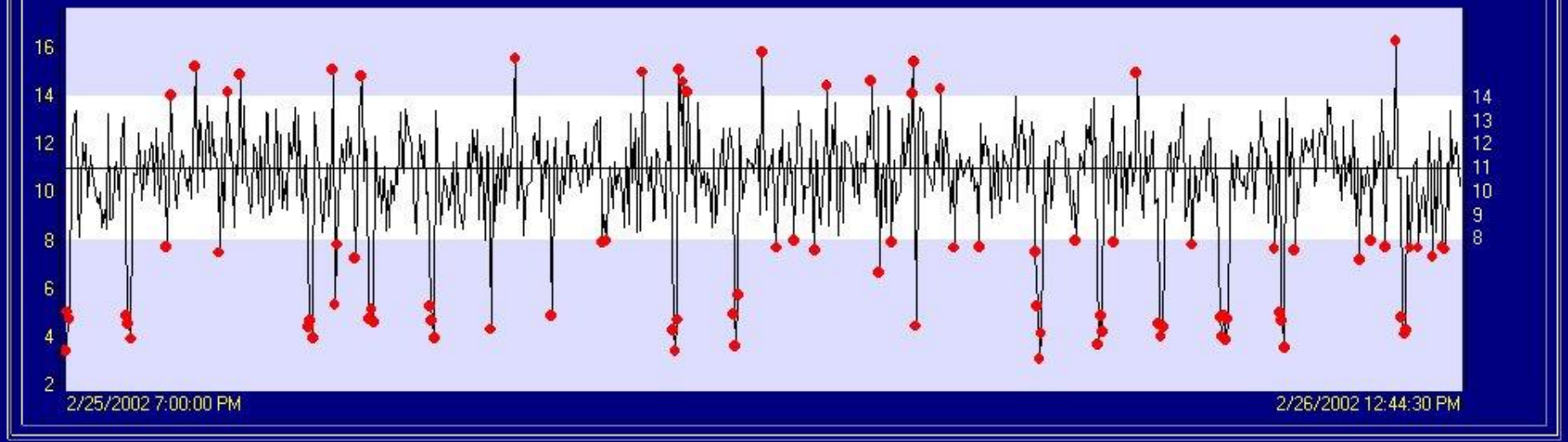

Choose an SQC Alarm

Free Form Comments

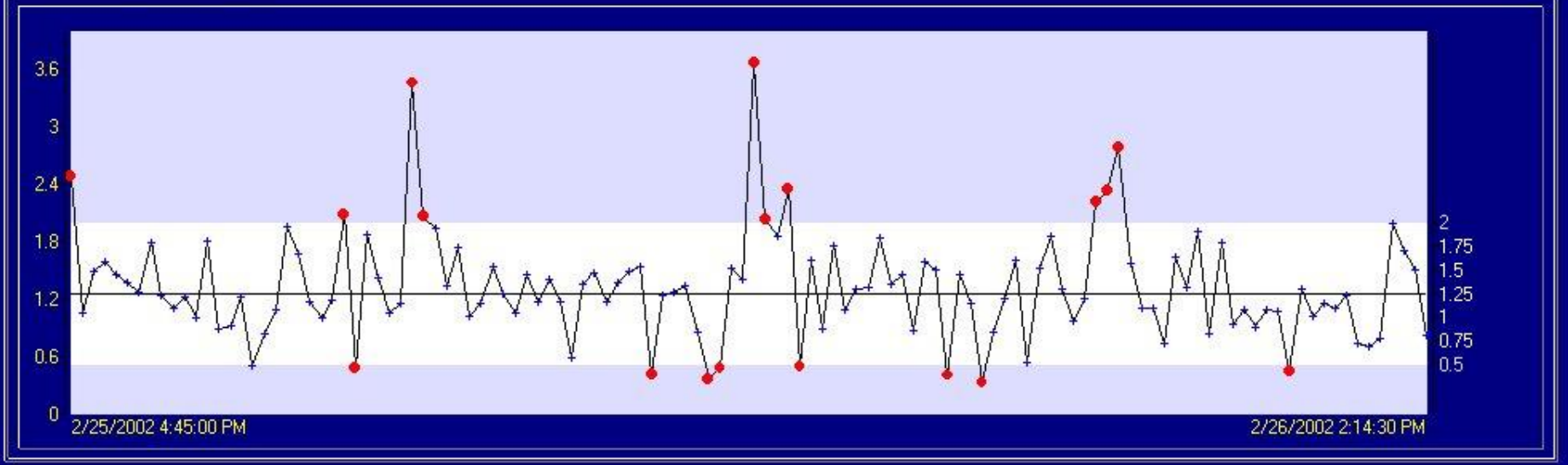
Assign Cause

Pareto Chart(s)

Past 24 Hours HalfnHalf : [Individuals]




Past 24 Hours LoFat : [Individuals]



# What next?

- Come to the demo room and see how it's done. Get hands on experience.
- Comprehensive demo with documentation and apps to build the infrastructure, data simulation, code examples, & displays *Soon*
- Application Framework integration and other enhancements are under study.